Office of Industrial Relations
Workplace Health and Safety Queensland

Project report

Improving the design of cattle crates: making it safer for operators

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Queensland Government

Contents

Introduction and background

In August 2014, a worker in Central Queensland sustained fatal injuries while cross loading cattle at Gracemere. Following this incident, Workplace Health and Safety Queensland (WHSQ) facilitated a beef supply chain forum with key stakeholders to discuss the high risk issues, barriers and possible solutions for reducing the risk of fatalities and serious injuries associated with livestock transport in the beef supply chain.

With industry support WHSQ commenced *Improving the design of cattle crates: making it safer for operators* project. This project was undertaken between 2014 and 2016 and included a review into the use and design of cattle crates. A key outcome of this project is the *Guide for the safe use and design of cattle crates*.

This project reviewed the impact of design on work health and safety (WHS) hazards associated with the use and maintenance of cattle crates or trailers. For the purposes of this project, the use and maintenance of cattle crates is the collective term for:

- loading, unloading, through loading and cross loading of cattle
- mid-transit welfare inspections of cattle
- cleaning and maintenance of cattle crates.

Workers' compensation data

Workers' compensation claims for major cattle transporters, from 2007 to 2016, highlighted a greater number of days lost and nearly double the average cost of statutory payments compared with the state average (Table 1). A review of these claims shows that the majority of the incidents were acute or traumatic in nature, such as falls from heights and being crushed by cattle. There were few claims related to cumulative injuries such as body stressing caused by hazardous manual tasks (HMT). Industry feedback suggests that there is likely a significant under-reporting for these types of injuries.

Workers' Comp claims (2007-16)	Average days lost	Average statutory payment
Cattle transporters	28.2	$14,373
All industries	20.0	$7,490

Table 1: Comparison of Workers' Comp Claims (2007-16) [1]

Strategic alignment

As outlined in the *Australian Work Health and Safety Strategy 2012-22*,[2] road transport and agriculture are both priority industries for both WHSQ and Safe Work Australia. Cattle transportation is classified under road freight transport and is also part of the beef supply chain. Therefore this project aligns with action areas in both WHSQ's Queensland *Livestock Industry Action Plan 2014-17*, and the *Road Freight Industry Action Plan 2014-17*.

[1] Queensland workers' compensation data

[2] Safe Work Australia 2015, *Australian Work Health and Safety Strategy 2012-22*, Commonwealth of Australia, Canberra.

Work health and safety and electrical safety legislation

The *Work Health and Safety Act 2011*[3] and *Electrical Safety Act 2002*[4] outline duties for a person in control of a business or undertaking (PCBU) and designers/manufacturers of plant. These duties include the requirement to ensure the health and safety of workers at the workplace as far as is reasonably practicable. The WHS Act also outlines concurrent duties for other parties in the supply chain, such as the beef supply chain which includes cattle transporters.

Focusing on the design of the cattle crate is fundamental in effectively reducing the WHS and electrical safety (ES) risks associated with the use and maintenance of cattle crates. The hierarchy of control[5] ranks methods of controlling risk from the highest level of protection and reliability to the lowest. Ideally elimination of the hazard is the most effective control. If elimination is not reasonably practicable, the PCBU must minimise the risk so far as reasonably practicable through design by doing one or more of the following:

- substituting (wholly or partly) the hazard creating the risk with something that creates a lesser risk
- isolating the hazard from any person exposed to it
- implementing engineering controls.

Administrative controls such as training and personal protective equipment are the least preferred method of control as they do not reduce the risk, are less effective and reliable as they rely on human behaviour.

Australian work health and safety guidance material

Australian WHS jurisdictions and industry associations have published information that touches on the use and design of cattle crates, please see further information on the last page of this report. There is no other notable guidance related to this topic.

Consultation with stakeholders highlighted that they sought practical guidance based on the principles of safe design as well as examples of solutions to address known WHS and ES risks associated with the use and maintenance of cattle crates. The requested guidance needed to be relevant for new designs and retrofitting existing crates given the large number and longevity of existing cattle crates in use.

Industry feedback highlighted a number of issues and challenges that impact on the use and design of cattle crates. These factors include:

- operating under multiple regulatory frameworks set by various agencies
- animal welfare requirements
- wide range of existing crate designs
- different types of cattle transportation operations
- varying road and environmental conditions
- interfacing with a wide range of structures at facilities controlled by others within the supply chain
- working within timeframes set by others.

[3] *Work Health and Safety Act 2011*, Queensland Government, Brisbane.
[4] *Electrical Safety Act 2002,* Queensland Government, Brisbane.
[5] Office of Industrial Relations 2011, State of Queensland, Brisbane, viewed November 2016, <*www.worksafe.qld.gov.au/injury-prevention-safety/managing-risks/managing-risk*>

Adding further complexity, the industry has its own unique culture with a predominantly older, male workforce, a high acceptance of risk[6] and under-reporting of incidents and near misses.

Objectives

This project aimed to increase the capacity of cattle transporters, crate designers and manufacturers to identify and manage the risks associated with the use and maintenance of cattle crates.

This included identifying:

- key WHS and ES issues associated with crate design during the use and maintenance of cattle crates
- how to manage these risks through design of new or retrofitted crates.

The guide for the *Safe use and design of cattle crates* was developed as an outcome of this project.

This project did not include the safe design, construction and operation of livestock loading/unloading ramps and yards. For more information on this, please refer to Australian Livestock and Rural Transporters Association of Australia (ALTRA)'s *Guide to safe design of livestock loading ramps and forcing yards.*

Method

Data collection

Relevant data was collected through:

- Site visits to sale yards, break down areas, abattoirs, graziers/producers, wash bays and manufacturing sites.
- Review of current crate designs covering new, old and retrofitted crates. This included review of how crates are being used, interviews with transport operators and visits to crate designers, manufacturers and retrofitters.
- Forums with cattle transporters, crate designers, manufacturers and retrofitters.
- Review of Queensland workers compensation claims (2007-2016) for major cattle transporters.

Industry consultation and communication

Key industry and WHSQ stakeholders were consulted throughout this project.

Stakeholders included: crate designers, manufacturers and retrofitters, cattle transport operators, representatives from the beef supply chain, Agforce, Department of Transport and Main Roads (DTMR), Ergon Energy, peak industry associations such as Livestock and Rural Transporters Association of Queensland (LRTAQ), ALTRA, Beef Industry Safety Advisory Group, Meat Industry Advisory Group and WHSQ staff.

[6] Safe Work Australia 2015, *Transport industry: Synthesis of research findings report*, Commonwealth of Australia, Canberra.

Five industry forums were held around the state during April and May 2016. Locations included Brisbane, Toowoomba, Rockhampton, Townsville and Longreach (during the LRTAQ Annual Conference). The purpose of the forums was to consult with industry on how to improve the design of cattle crates as well as seeking contribution to the draft guidance material.

The LRTAQ has been supportive of this project. It links to a LRTAQ initiative to improve WHS along the supply chain for cattle transport operators, introduction of safe design principles and promoting innovative crate design improvements.

Findings

A summary of the current WHS and ES hazards, innovations for controlling the risks and operational factors that impact on the use and maintenance of cattle crates, is provided below.

Work health and safety and electrical safety hazards

Significant and current WHS and ES hazards identified:

- **Working at heights**. Workers access and work frequently at various heights above the ground, including on the catwalk on top of the crate (approximately 4.6 metres off the ground), operating upper deck doors and flaps/ramps (approximately 2.6 metres off the ground).
- **Slips, trips and falls**. This hazard is present around the whole crate – internally, externally, on the top and sides of the crates, on ladders and at other access points.
- **Being hit or crushed.** Working in close proximity to unpredictable cattle exposes operators to risk of being hit directly by cattle or being crushed when cattle kick a door/gate thus crushing the body.
- **Hazardous manual tasks (HMT).** HMT's may lead to body stressing injuries and commonly include handling heavy ramps/flaps (up to 40 kg) in awkward postures, overstretching to reach the first step onto the crate, pulling body weight up and down the crate and opening or closing jammed pins, latches and doors.
- **Working near electricity.** Potential contact with live electricity when the crate is positioned underneath live overhead powerlines and undertaking work on top of crates. An electrical shock can jolt the operator off the crate or result in fatality.

The risk of injury is greater when there is a combination of hazards. This was seen in reviewing a number of serious workers compensation claims. For example, 'while closing the last rear door flap after through loading of cattle on the upper deck, operators stand on a narrow and slippery ledge which is approximately 2.6 metres above the ground'. 'They use significant effort while in awkward postures to lift and close the heavy ramp'. There is also a potential for loss of balance in this circumstance.

The level of risks increase when:

- working in poor light e.g. loading cattle at night
- in adverse weather conditions
- fatigued
- under pressure to meet schedule and
- working alone.

Design guidelines or standards

Transport operators, designers, manufacturers and retrofitters clearly acknowledged that the design of the crate and its features is guided by vehicle dimensions regulations[7] and the need to maximise internal volume to maximise load capacity. Some designers were aware of and applied known safety standards such as *Australian Standard 1657 – 2013 Fixed platforms, walkways, stairways and ladders— design, construction and installation* (AS 1657).

Generally, there is poor access/egress around the crate. Some features such as side ladders and hand/foot holds are not adequate for secure placement of feet or hands and did not meet the guidance mentioned in AS 1657.

Variation in design

There was significant variation in certain crate features within the different types of crates and even within a fleet of crates. This included: rear door position/width/closing mechanisms, ladder position, location and number of closing mechanism (such as pins and latches). Stakeholders report that this leads to incompatibility between two crates when through or cross loading or between crate and interfacing structures such as loading ramps.

Between crates

Poor compatibility between crates, due to door position/width and ladder position, compromises available space for safe movement of cattle and operator. This can create significant gaps through which operators and cattle can fall. Operators have mentioned the difficulty associated with variable types and placement of closing mechanisms such as pin and latches to secure flaps/ramps. Use of crates with different pin/latch configuration increases the potential for operating error and WHS risks when closing and opening flaps.

With other facilities

Operators regularly interact with a wide range of external structures such as loading ramps that are owned and operated by others. Currently, there is a wide variation in designs of loading ramps and other structures. This can create poor compatibility between the loading ramps and crate doors that can lead to more gaps through which operators and cattle can fall through.

Maintenance

Few operators and manufacturers mentioned regularly undertaking a maintenance program for non-vehicle components of the crate such as gates, hinges, springs, ladders, pins, latches and slam shut mechanisms. During site visits, no manuals were produced regarding the required maintenance of non-vehicle components and use of the crate.

[7] Queensland Government 2016, *Heavy Vehicle National Law* and *Heavy Vehicle (Vehicle Standards) National Regulations*, Queensland Government, Brisbane, viewed December 2016, <www.nhvr.gov.au/law-policies/heavy-vehicle-national-law-and-regulations>

Solutions

A range of innovative solutions for reducing WHS and ES risks were identified on crates around Queensland. These have been described in the *Guide to safe use and design of cattle crates* (Appendix 1). It is acknowledged that advancement in technology (in function, materials, and robustness) and reduced costs of technology has made incorporating these features more feasible. Examples include remotely operated pneumatic and hydraulic gates and flaps, fibreglass reinforced plastic catwalk sections and wireless internal cameras.

There are many examples where operators have attempted to incorporate or retrofit design changes to their crates to improve safety. Retrofitting includes additional walkways on the side of crates and additional lower first steps at the side of crates. Operators report they have received fines from government departments for retrofitted safety features that marginally exceeded on-the road vehicle dimension allowances.

Regulatory frameworks

Operators need to comply with multiple, complex regulatory frameworks to successfully run their businesses. This includes road regulations, fatigue management, animal welfare and local council requirements. Operators report that meeting the requirements from various agencies can be difficult with some requirements appearing to be in conflict with each other.

Discussion of findings

Overall, there was a wide range of improvements emerging to manage WHS and ES risks in the use and maintenance of cattle crates. The identified WHS hazards are well known in the sector. There was a lack of consistency in the knowledge of, and inclusion of specific or referenced safety or engineering standards in the design of new or retrofitted crates. It is widely acknowledged that the design of cattle crate is influenced by many external factors. A number of innovative solutions that reduce WHS risks and make work easier for operators were identified.

Current design criteria

Currently there are many types of cattle crate configurations including road trains, B-doubles, and single trailers in use around Queensland. Within each type there is a wide variety of features specific to the manufacturer’s design. In addition, there are a range of customised features requested by the individual customer at time of commissioning a new crate or at retrofit.

Specifications for crates depend on factors including type of cattle cartage, varying road and environmental conditions, distances travelled and cost. There is a significant lack of uniformity in cattle crate designs on the road and available from manufacturers in Queensland. In particular, rear door position, width, closing mechanism, access/egress around the crate and onto top of crate. This creates incompatibility between crates when cross or through loading. It is noted that there is a tendency for operators to continue commissioning similar or repeat designs of existing crates.

There is currently no guidance or engineering standard to assist with design of crates, except for the requirement to meet vehicle dimension criteria set by national regulations[8]. Volumetric loading for transporting cattle and animal welfare guidelines encourages design to maximise the number of head of cattle into a crate.[9] This influences the available width for designers to include features, such as side access/egress structures on the side of the crate.

Crates remain in operation for a long time within the industry. It is common for crates to be on-sold to smaller and more remote operators who may keep the crate in use for many years. This results in a number of older crates in circulation with fewer safety features.

Innovation and technology

Incorporation of safety innovations is more feasible at the design stage for new crates compared with the retrofitting of older models. Subtle structural changes are sometimes necessary to incorporate improved safety features without contravening vehicle dimensions and maintaining structural integrity.

Advancement in materials such as fibreglass reinforced plastic and in technologies (such as wireless internal cameras and pneumatic mechanisms) make it more feasible and practical for their use in crates.

Compatibility of crate features

Lack of a consistent or common design for certain features of a crate was a significant issue raised by stakeholders. This leads to incompatibility between crates during cross and through loading and between crate and interfacing structures at facilities such as livestock loading ramps. Cross loading is impacted by the operator's own and another operator's crate designs. Through loading is affected by the crates the operator is using for a particular trip. Incompatibility between crates leads to a thoroughfare that has gaps in the walkway and between the walkway and doors. This increases WHS risks for workers when working at height. Workers are potentially faced with increased risk when dealing with cattle that have fallen or escaped through gaps. There is also an increased risk and error rate when operating doors and flaps when operators are unfamiliar with the pin/latch configuration.

Cattle crates necessarily interface with external structures at other facilities to load and unload the cattle. Transporters encounter different widths and positioning of loading ramps at each facility such as, saleyards, cattle producers and graziers, feedlots and abattoirs on a daily basis.

Stakeholders agree that it would be beneficial to have a consistent design for certain features of the crate that would improve compatibility between crates and structures at facilities. However, there is no clear agreement on what consistent design would be and without this, operators naturally prefer the design they are using. Crates can be designed safely when used individually, but WHS risks are increased when used with other crates that have a different design.

[8] Queensland Government 2016, *Heavy Vehicle National Law* and *Heavy Vehicle (Vehicle Standards) National Regulations*, Queensland Government, Brisbane, viewed December 2016, <www.nhvr.gov.au/law-policies/heavy-vehicle-national-law-and-regulations>

[9] Department of Agriculture, and Animal Health Australia 2016, *Australian Animal Welfare Standards and Guidelines for Cattle*, Commonwealth of Australia, Canberra.

There are external influences that encourage more consistency in design. External walkways at high volume cattle loading and unloading sites such as saleyards, provide fall protection structures. The Australian Livestock and Rural Transporters Association (ALRTA)[10] recommended walkways be positioned on one side of the loading ramp. This forces the same side of each crate to be parked next to the external walkway. It would encourage particular positioning of rear doors and the pin/latch configuration to suit these structures.

Influencing factors

Throughout this project, a number of issues and challenges that impact on the use and design of cattle crates were clearly identified and acknowledged by stakeholders. Major influencing factors are discussed below.

Regulatory impact

The complex regulatory framework that operators work within is challenging to design and use cattle crates. Road regulations[11] specify that crate dimensions must fit within the 2.5 metre width and 4.6 metre height restrictions. Animal welfare standards and guidelines[12] specify loading densities for the land transportation of cattle based on a 12.25 metre long by 2.4 metre wide deck. This is a challenge for retro fitting features such as the addition of side ladders or handholds as existing crates are already at their maximum width dimension.

In addition to the regulatory impact on crate design, there are other regulations that influence the use of crates, including working during the night, prescribed road routes and requirements for effluent management.

Other examples include road and local regulations requiring breakdown of the load into smaller configurations just outside the final destination. Operators report they travel towards their destination with a full set of crates, then due to the class of their truck, they need to through-load and shuttle crates of cattle to the destination. While this may entail a short travel distance, it can add several hours to the trip and require additional cattle transfers to do so (with increased exposure to risks). There are good examples that provide direct access to required destinations such as (until recently) the Rockhampton bypass to abattoirs and the Roma saleyards route.

Balancing and meeting the requirements from various regulatory agencies is one of the biggest challenges faced by operators.

Supply chain

The transportation of cattle is conducted within a unique supply chain. This involves a network of businesses and facilities that control structures and work systems that operators interact with and rely on.

[10] Australian Livestock and Rural Transporters Association 2015, *Guide to safe design of livestock loading ramps and forcing yards*, Australian Livestock and Rural Transporters Association, Canberra.
[11] Queensland Government 2016, *Heavy Vehicle National Law* and *Heavy Vehicle (Vehicle Standards) National Regulations*, Queensland Government, Brisbane, viewed December 2016, <www.nhvr.gov.au/law-policies/heavy-vehicle-national-law-and-regulations>
[12] Department of Agriculture, and Animal Health Australia 2016, *Australian Animal Welfare Standards and Guidelines for Cattle*, Commonwealth of Australia, Canberra.

This includes cattle producers/graziers, saleyards, feedlots, local councils (for break down areas, saleyards and wash bays) and abattoirs. The parties involved in each supply chain is widely variable between operators.

Supply chain parties should work together to improve WHS and ES for operators. Businesses that interact with transport operators have a duty to consult and cooperate to jointly reduce risks. Operators rely on the cooperation and support of other parties along the supply chain to assist with the design of the physical work environment and work organisation of activities they undertake when at external sites. Improved communication, consultation and cooperation between parties in the supply chain are necessary and can result in health and safety improvements.

External walkways/gantries and cross loading structures

There are a number of WHS and ES risks that cannot be eliminated through improved design of the crate alone. Though outside the scope of this project, the use of external walkways/gantries and cross loading structures needs to be mentioned. These structures used within the supply chain eliminates or reduces high risks activities such as work at heights. Their strategic installation and use at high volume loading and unloading sites, such as sale yards, abattoirs, feedlots and wash bays, will universally benefit operators as they frequently interact at these facilities. An example of one of these structures is found in the *Guide to safe design of livestock loading ramps and forcing yards.*

Sharing and progressing innovative solutions

There are many innovative solutions currently in practice. Operators develop good solutions with their manufacturer, however these solutions may not be shared or taken up across the industry. Factors that influence this include, low crate turnover (crates are retained for many years), minimal opportunities to share ideas and learnings (successes or failures), significant customisation of crate features for individual operators and differences in the type of haulage operation. Improved sharing and communication of solutions, successes and failures will benefit the industry.

Maintenance and inspection

Currently there is largely ad hoc maintenance and inspection of non-vehicle components. Regular maintenance and inspection programs are required to ensure minimisation of WHS risks. For example, when slam shut mechanism, latches, pins and ladders are not maintained it leads to an increased risk of being hit or crushed and increased body stressing. Operators requested more information on best practice maintenance and inspection programs for non-vehicle components.

Other factors

Repeatedly, operators raised the role of cattle handling practices to reduce exposure to WHS and ES risks. With settled cattle, there is reduced need to interact with cattle and therefore reduced frequency to access crate and be in close proximity with cattle. Currently this knowledge is gained informally through mentors/supervisors and exposure from working with cattle. Recent introduction of low stress livestock handling techniques training and *Guide to managing risks in cattle handling*[13] contribute to improving overall cattle handling practices.

[13] Safe Work Australia 2015, *Guide to managing risks in cattle handling*, Commonwealth of Australia, Canberra.

Though not specifically a WHS hazard, the management of effluent impacts on the risk of workers slipping and the effort required to clean it up. Effluent is highly likely to be tracked onto the work and walking areas around the crate, increasing the risk of slips or falls. As part of effluent management, effluent is stored in tanks until there is an appropriate dumping facility. If tanks are not emptied and cleaned regularly, it can solidify in the tanks which make cleaning very difficult. Recommendations to address this include use of flooring designed to easily drain mud and effluent and provision of more effluent dumping points along major haulage routes.

There are a number of other factors that were raised during this project. These included an ageing workforce, fitness for work, existing safety culture and level of acceptance of risk within the industry. While they are acknowledged, these issues are outside the scope of this project which focused on use and design of cattle crates.

Opportunities

Key opportunities for consideration by the sector and the supply chain they operate in are outlined below.

Supply chain

The supply chain should consider:

- Improving communication, consultation and cooperation between parties in the supply chain.
- Using contract specifications to manage transport operators risk, particularly at other sites along the supply chain.
- Using external walkways and cross loading structures at facilities along the supply chain.
- Improving work organisation (e.g. scheduling of work) of operators activities when onsite at facilities along the supply chain.
- Promoting the adoption of loading ramp recommendations as per ALRTA guide.
- Identifying where areas of consistency are needed, sharing and communicating these with other parties in the supply chain.
- Reviewing of availability of effluent dumping points.

Sharing solutions within the sector

Considerations for the sector include:

- Contributing to industry sector newsletters.
- Sharing solutions/good ideas that work.
- Promoting a safe design key message.
- Innovating and encouraging advancement and technology (make operators feel comfortable with technology).
- Designing crate features that are consistent with ALRTA and other industry guidance.
- Working towards consistency of design of key crate features e.g. door positioning and width.
- Developing and sharing best practice for non-vehicle crate maintenance programs.

Working with other agencies

Improved co-ordination of regulatory framework will assist transporters to meet their regulatory requirements. For example government departments and agencies such as National Heavy Vehicle Regulator, Department of Transport and Mains Roads with LTRAQ, ALTRA, Agforce, Meat Industry Advisory Group, Meat and Livestock Australia and Animal Health Australia.

Cattle handling practices

Consider common principles for low stress handling techniques for cattle transportation and how to improve worker training within the sector.

Further information

Legislation and codes of practice

Work Health and Safety Act 2011
Work Health and Safety Regulation 2011
Electrical Safety Act 2002
Electrical Safety Regulation 2013
How to manage work health and safety risks Code of Practice –2011
Work Health and Safety Consultation, Co-operation and Co-ordination Code of Practice 2011
Electrical Safety Code of Practice – Working near overhead & underground electric lines 2010

Other publications

Australian Livestock and Rural Transporters Association of Australia *Guide to safe design of livestock loading ramps and forcing yards*
Australian Standard *AS1657 - 2013 Fixed platforms, walkways, stairways and ladders— design, construction and installation*
Safe Work Australia *Guide to managing risks in cattle handling*

Appendix 1 – Guide to safe use and design of cattle crates

Guide for safe design and use of cattle crates