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Review of effluent spillage and animal welfare during livestock transport: a discussion paper

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Abstract

Transport of livestock via public road networks and by rail is an indispensable and crucial component of the live-export and red-meat supply chains so that animals can be moved between farms, feedlots, saleyards, live-export ports and abattoirs. Public concerns have been raised over several issues related to livestock transport, particularly effluent spillage and limb protrusion. These issues are particularly apparent where livestock travel through urban centres. To understand these issues, a consultation and survey process was conducted with all key stakeholders. A literature review was also undertaken, to identify knowledge gaps and provide recommendations on a way forward with these issues. Industry stakeholders identified a number of potential techniques that could be used to minimise effluent spillage and limb protrusion. These issues will continue to impact on the red-meat industry unless they are addressed in an integrated approach involving all the industry relevant stakeholders.

Executive summary

Transport of livestock via public road networks and by rail (Queensland only) is an indispensable and crucial component of the live-export and red-meat supply chains to move animals between farms, feedlots, saleyards, live-export ports and abattoirs.

Public concerns have been raised over several issues related to livestock transport, particularly effluent spillage and limb protrusion. These issues can lead to:

- Aesthetic issues through effluent deposition on public roads and odour from transport vehicles;
- Potential community exposure to health risks from effluent deposition;
- Potential environmental contamination from livestock effluent and manure;
- Animal welfare concerns from limb protrusion and possible entrapment through the sides of livestock trailers.

These issues are particularly apparent where livestock travel through urban centres en-route to live-export ports, abattoirs and saleyards. Live-export facilities, abattoirs and saleyards are usually located in urban centres and, with population increase, have been encroached by residential land uses. Impacts typically occur where the conflicting land uses adjoin. Road livestock transport represents the closest proximity of animals and animal waste to most urban Australians. Zoonotic organisms from animals can cause health impacts with humans and the potential threat of disease transfer via livestock transport is a risk.

Livestock are transported in Australia in a variety of vehicles ranging from body trucks to semi-trailers, B-doubles and road trains. Older vehicles had detachable crates while most modern vehicles have the crate built as an integral part of the trailer. For simplicity, these will be generically referred to as livestock transport trailers. Traditionally, most livestock transport trailers were not designed to retain the excretions of the livestock on the trailer. More recently, effluent containment is common with trailers designed to retain effluent on the floor of the trailer allowing a gradual release of the effluent to the road during travel. While not mandatory, effluent holding tanks are being installed in Australia on an increasing number of new commercial livestock trailers. However, they are not common on older trailers and small owner-operator livestock transport trailers.

On occasion, effluent discharges have resulted in community complaints, though there is little consensus on who is responsible and who needs to address the issue. This has resulted in localised solutions being implemented without a coordinated industry approach to the problem.

The issue of sheep limb protrusion during livestock transport is of particular concern for the Western Australian live-export industry and has been raised by animal rights and liberation groups on numerous occasions. The issue largely relates to the use of old style stock trailers that were designed with wide rail spacing to improve air flow and minimise the risk of limb fracture if limb protrusion occurs. While welfare codes have been developed for livestock transport in Australia, there is not sufficient detail in these codes with respect to trailer design to address this issue.

To address these issues, the project objectives were to:

- summarise current knowledge and opinion from stakeholders regarding livestock effluent spillage;
- consider livestock limb protrusion from livestock transport vehicles (road and rail); and
- provide a recommended way forward on these issues.

To further understand the issues of effluent spillage and limb protrusion during livestock transport, a consultation and survey process was conducted with key stakeholders. The key stakeholders were identified via a mapping process to identify the major beef cattle and sheep road transport routes in Australia using spatial and statistical data on cattle and sheep production areas, cattle feedlot locations, saleyards locations, abattoirs locations and live-export facilities.

A literature review was also conducted to complement the survey and consultation process and provide recommendations on a way forward with these issues. The literature review included research and information on:

- effluent spillage from livestock transport (amount and characteristics);
- costs of carrying effluent;
- overseas solutions to effluent spillage (New Zealand, Europe and North America);
- regulations and codes for controlling road livestock transport;
- biosecurity issues for livestock transport;
- quality assurance in livestock transport;
- livestock trailer design;
- effects of transport on liveweight;
- effect of curfew on liveweight, carcass weight, meat quality and animal welfare;
- livestock trailer washdown facility availability; and
- issues for effluent disposal at various sites.

Industry stakeholder consultation has identified the following potential techniques that could be used to minimise effluent spillage from livestock transport vehicles:

- curfew of livestock prior to transport;
- selective effluent containment through urban areas using drop pipes;
- compulsory effluent holding tanks;
- provision of more readily available washdown facilities;
- provision of effluent dumps where effluent from effluent holding tanks can be disposed;
- alternate routes around towns for heavy vehicles.

During the project it was observed that the issue of effluent spillage is being progressed by several groups across the country. It is recommended that the relevant stakeholders, including the regulators and industry groups progress the issue with a coordinated approach. It is recommended that a task-force of industry participants be formed to address the issue at a national and local level. This taskforce could coordinate the locally effected stakeholders to address the issue at each local level, with the industry taskforce addressing common issues and solution at a national level.

There is, however, a positive indication from survey results that an industry-wide voluntary effluent management system would be accepted.

The project found that limb protrusion is primarily a localised issue in Western Australia and relates to two main issues with transport between the live-export bulking depots and the port:

1. use of old style trailers with wide rail spacing; and
2. inappropriate handling and loading of sheep.

These issues can be addressed at an industry level, and as such there are several recommendations.

- Live export industry host a workshop with all participants involved in handling and transport of sheep to raise awareness of the issue.
- A set of minimum standards need to be developed for livestock trailers used in the transport of sheep to the port. These standards should specify a maximum rail spacing of 120 – 150 mm.
- A simple fact sheet guide to loading and handling of sheep should be developed for dissemination among drivers and personnel within the industry.
- An audit process should be considered to improve handling and loading of livestock.

These issues will continue to impact on the red meat industry unless they are addressed by all the relevant stakeholders. The most effective methods for addressing will be developed at an industry level. The alternate is to do nothing and governments will develop legislation to address the issues. This would undoubtedly lead to a less effective solution and would likely increase the cost burden for livestock producers.

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Background

1.1 Livestock transport Issues

The economic operation of the red-meat and live-export supply chains relies heavily on livestock transport. The supply chains require the transport of large numbers of livestock across significant distances on public road networks and, in Queensland, by rail. Livestock are transported between farms, feedlots, saleyards, live-export ports and abattoirs. Livestock transporters are an indispensable and crucial component of the live-export and red-meat supply chains.

Public concerns have been raised over several issues related to livestock transport, particularly effluent spillage and limb protrusion. These issues can lead to:

- aesthetic issues through effluent deposition on public roads and odour from transport vehicles;
- potential community exposure to health risks from effluent deposition;
- potential environmental contamination from livestock effluent and manure;
- animal welfare concerns from limb protrusion and possible entrapment through the sides of livestock trailers.

These issues are particularly apparent where livestock travel through urban centres en-route to live-export ports, abattoirs and saleyards. Live-export facilities, abattoirs and saleyards are usually located in urban centres and, with population increase, have been encroached by residential land uses. Impacts typically occur where the conflicting land uses adjoin. Road livestock transport represents the closest proximity of animals and animal waste to most urban Australians. Zoonotic organisms from animals can cause health impacts with humans and the potential threat of disease transfer via livestock transport is a risk.

Livestock are transported in Australia in a variety of vehicles ranging from body trucks to semi-trailers, B-doubles and road trains. Older vehicles had detachable crates while most modern vehicles have the crate built as an integral part of the trailer. For simplicity, these will be generically referred to as livestock transport trailers. Traditionally, most livestock transport trailers were not designed to retain the excretions of the livestock on the trailer. More recently, effluent containment is common with trailers designed to retain effluent on the floor of the trailer allowing a gradual release of the effluent to the road during travel. While not mandatory, effluent holding tanks are being installed on an increasing number of new commercial livestock trailers. However, they are not common on older trailers and small owner-operator livestock transport trailers.

On occasion, effluent discharges have resulted in community complaints, though there is little consensus on who is responsible and who needs to address the issue. This has resulted in localised solutions being implemented without a coordinated industry approach to the problem.

This issue is not isolated to Australia. New Zealand has developed a voluntary code of practice to address the issue of effluent spillage from livestock transport (NSEWG 2003a - released 1999) and this has been adopted through the supply chain. The key features of the code include:

- Livestock are stood off feed (curfewed) for at least 4 hours before transport to minimise effluent volume.
- Livestock transport trailers are equipped with effluent holding tanks to contain effluent during travel.

- Effluent dump stations are available at a limited number of points along major livestock transport routes.
- Effluent dump stations are available at points of livestock delivery.

These New Zealand approaches may be difficult to implement in Australia for a number of reasons, e.g. the long distances that livestock need to travel in Australia, differing climatic conditions, potential negative impact of curfewing cattle on meat quality and lack of consensus between key stakeholders in providing an integrated solution with shared responsibility. However, the New Zealand example demonstrates what can be achieved with the coordination of all industry and community stakeholders.

The second issue of concern relates to animal welfare, specifically targeted at sheep limb protrusion during livestock transport. This issue is of particular concern for the Western Australian live-export industry and has been raised by animal rights and liberation groups on numerous occasions. The issue largely relates to the use of old-style livestock trailers that were designed with wide rail spacing to improve air flow and minimise the risk of limb fracture if limb protrusion occurs. While welfare codes have been developed for livestock transport in Australia, there is not sufficient detail in these codes with respect to trailer design to address this issue.

1.2 The Australian livestock transport industry

1.2.1 Location of cattle and sheep supply chain components

The transport of livestock via Australia's road and rail networks is an integral part of supplying high-quality beef and sheep meat via abattoirs to the domestic and international markets. Coupled with this is the growing market of live-export cattle and sheep to overseas markets, particularly in Asia and the Middle East. To enable the industry to be efficient and effective, livestock need to be transported from farm to farm, and from properties to feedlots or saleyards. Transport may occur between several of these points in the life of an animal, terminating at an abattoir or live-export facility. Road transport accounts for the majority of livestock movement in Australia. This is due to the large distances animals are required to travel from paddock to final destination, poor access to rail transport, and the efficiency of road transport by trucks.

In order to obtain an understanding of major beef cattle and sheep transport routes in Australia, spatial and statistical data were obtained on the following major supply chain components:

- Cattle and sheep production areas.
- Cattle feedlot locations.
- Saleyards.
- Abattoirs.
- Live-export facilities.

1.2.2 Beef cattle supply chain components

Beef cattle production in Australia is dominated by Queensland, New South Wales and Victoria (Table 1). There is also a significant northern cattle industry based in north Western Australia and the Northern Territory. **Error! Reference source not found.** identifies cattle production density by statistical local area (SLA) for 2006 reported by the agricultural census of Australia

(ABS 2006).

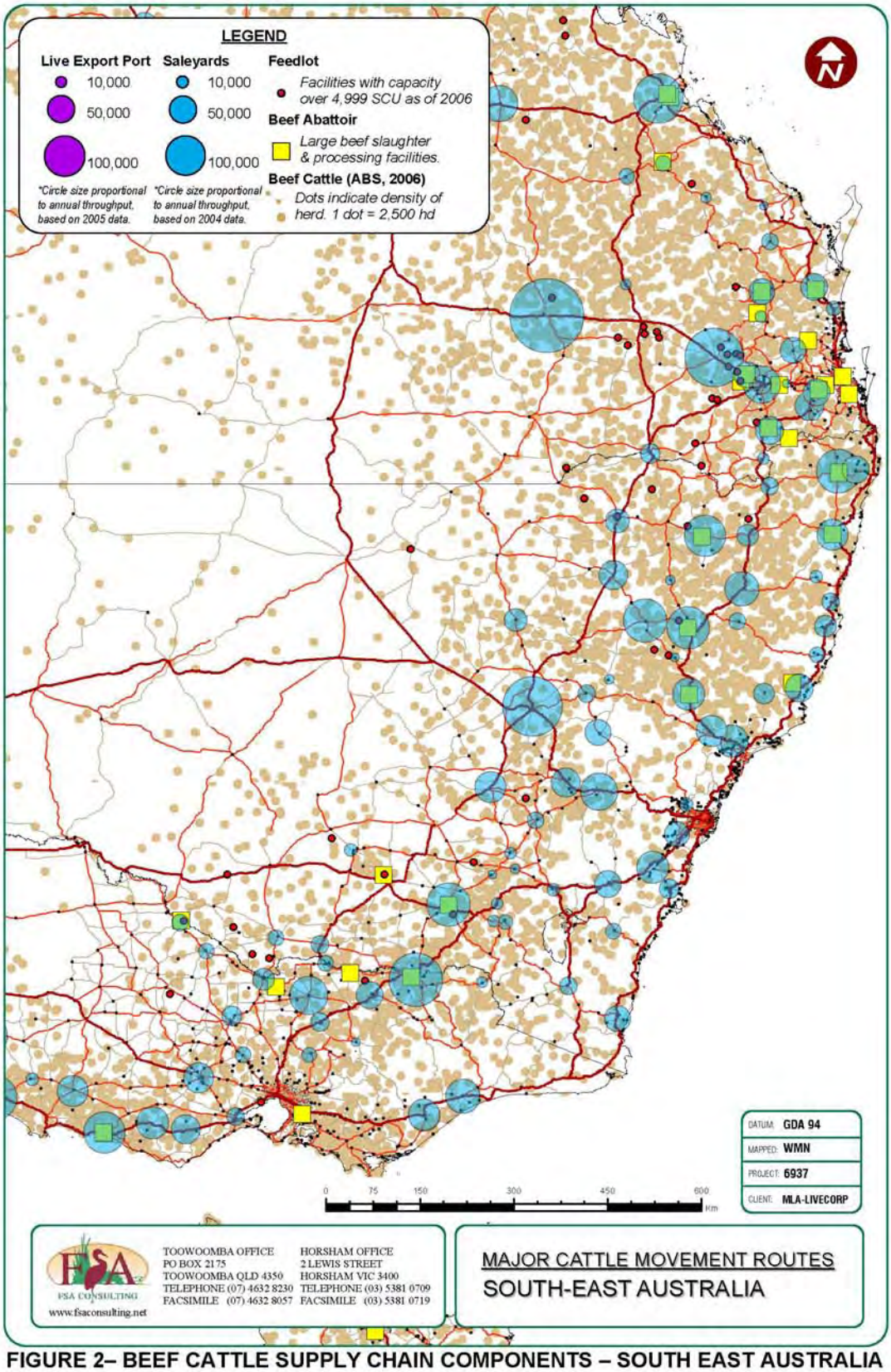

FIGURE 2– BEEF CATTLE SUPPLY CHAIN COMPONENTS – SOUTH EAST AUSTRALIA

provides the same data for south-eastern Australia.

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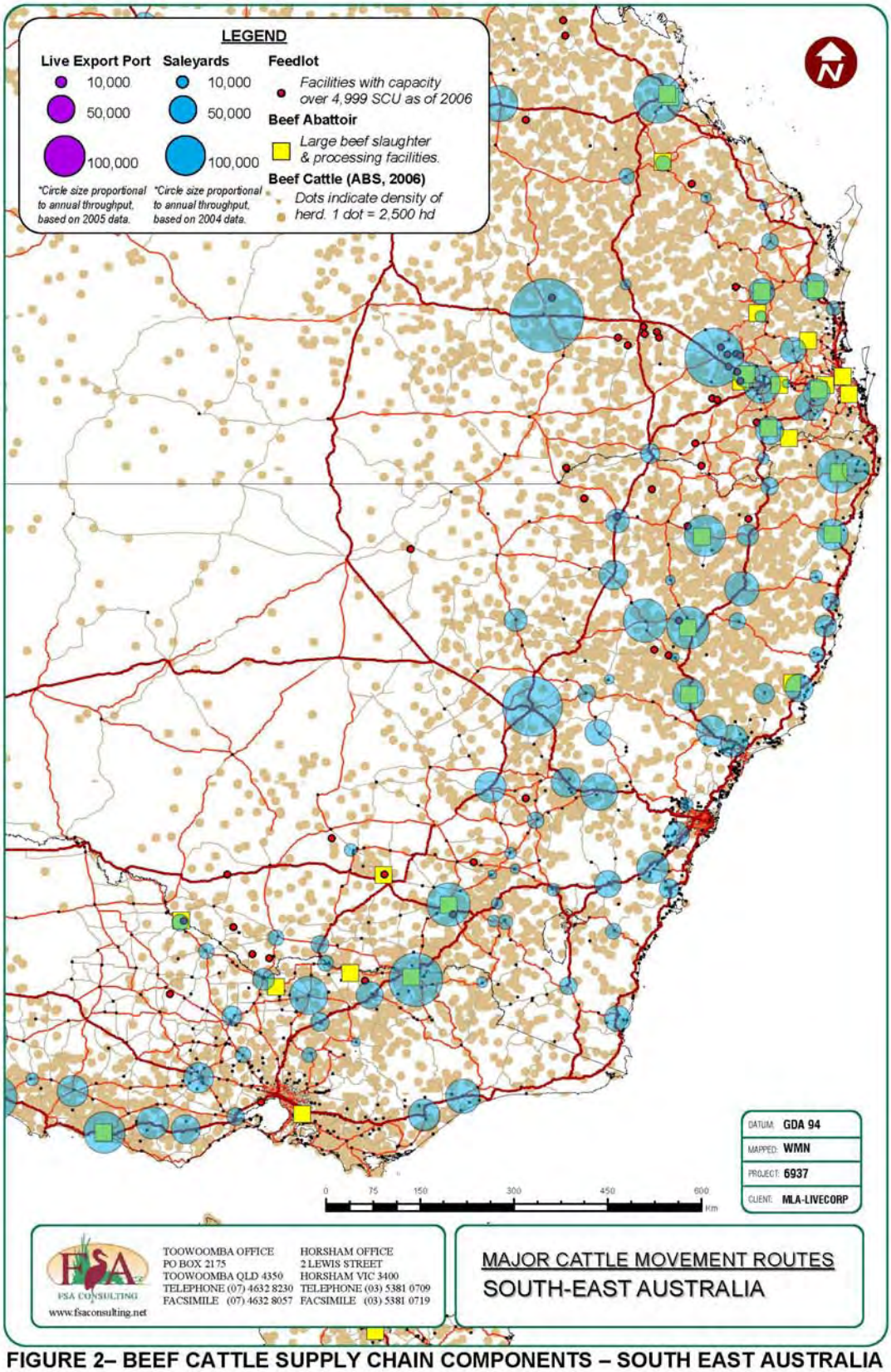

FIGURE 2– BEEF CATTLE SUPPLY CHAIN COMPONENTS – SOUTH EAST AUSTRALIA

show the location of beef feedlots of greater than 4999 SCU capacity. The majority of these sized feedlots are located in eastern Queensland, New South Wales and Victoria.

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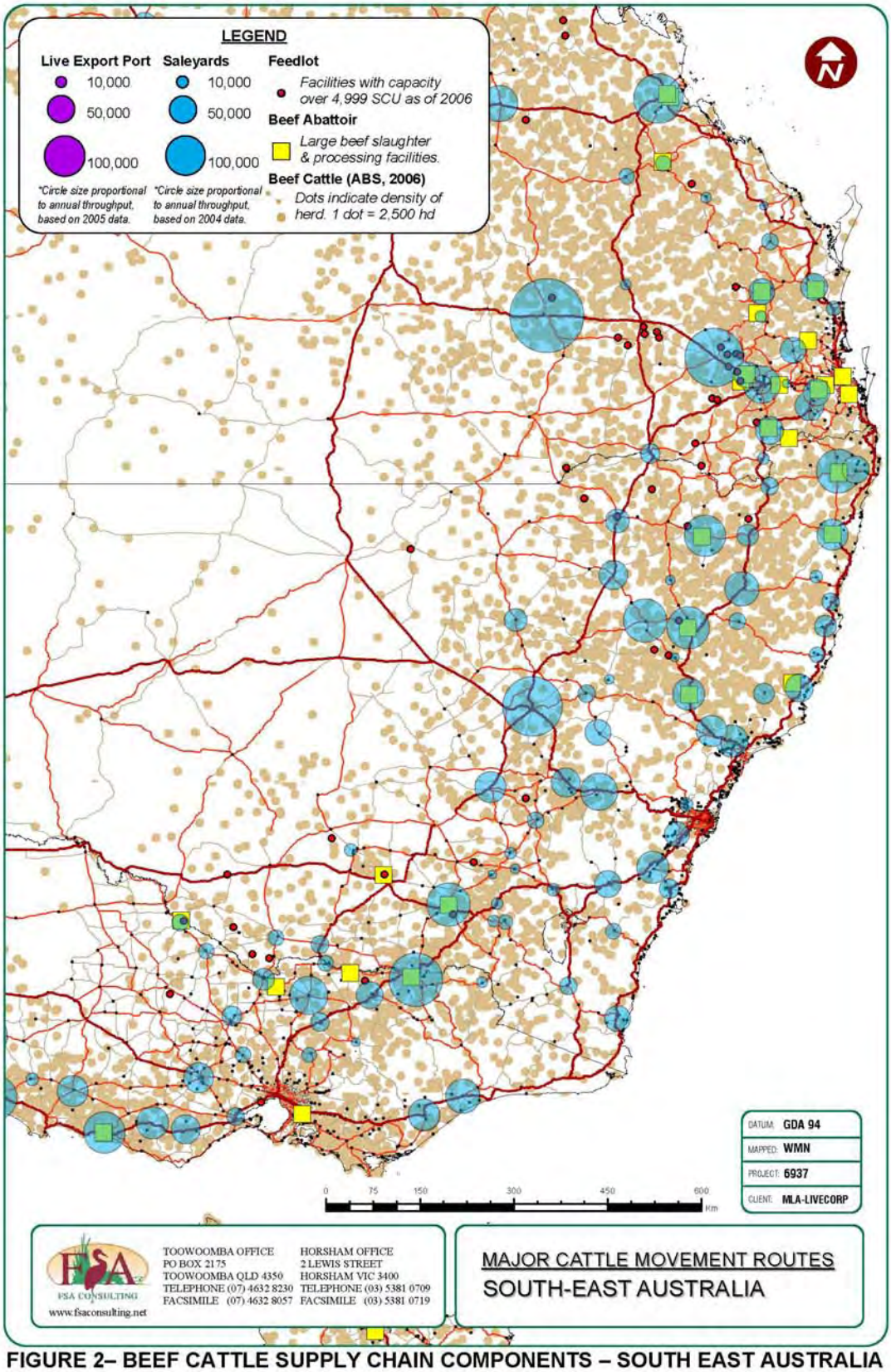

FIGURE 2– BEEF CATTLE SUPPLY CHAIN COMPONENTS – SOUTH EAST AUSTRALIA

show the major cattle saleyards in Australia and 2003-2004 annual throughput. Based on 2003-2004 data, 5,863,974 head of cattle were sold through Australian saleyards. The largest of these are the Roma saleyards (throughput of 358,549 head of cattle), Dubbo saleyards (231,654 head) and Wodonga saleyards (185,846 head).

Table 1 – Australian cattle numbers (2005-2006)

State	No. of Head (2005-2006)*
Queensland	11,547,521
New South Wales	6,211,187
Victoria	4,403,231
Western Australia	2,390,941
Northern Territory	1,798,172
South Australia	1,329,119
Tasmania	704,003
Australian Capital Territory	9,226
TOTAL	**28,393,480**

*ABS (2006).This figure also includes dairy cattle (approximately 1.8 million cows)

Live-export ports are situated at major cities around Australia and towns on the Western Australian coast. **Error! Reference source not found.** and

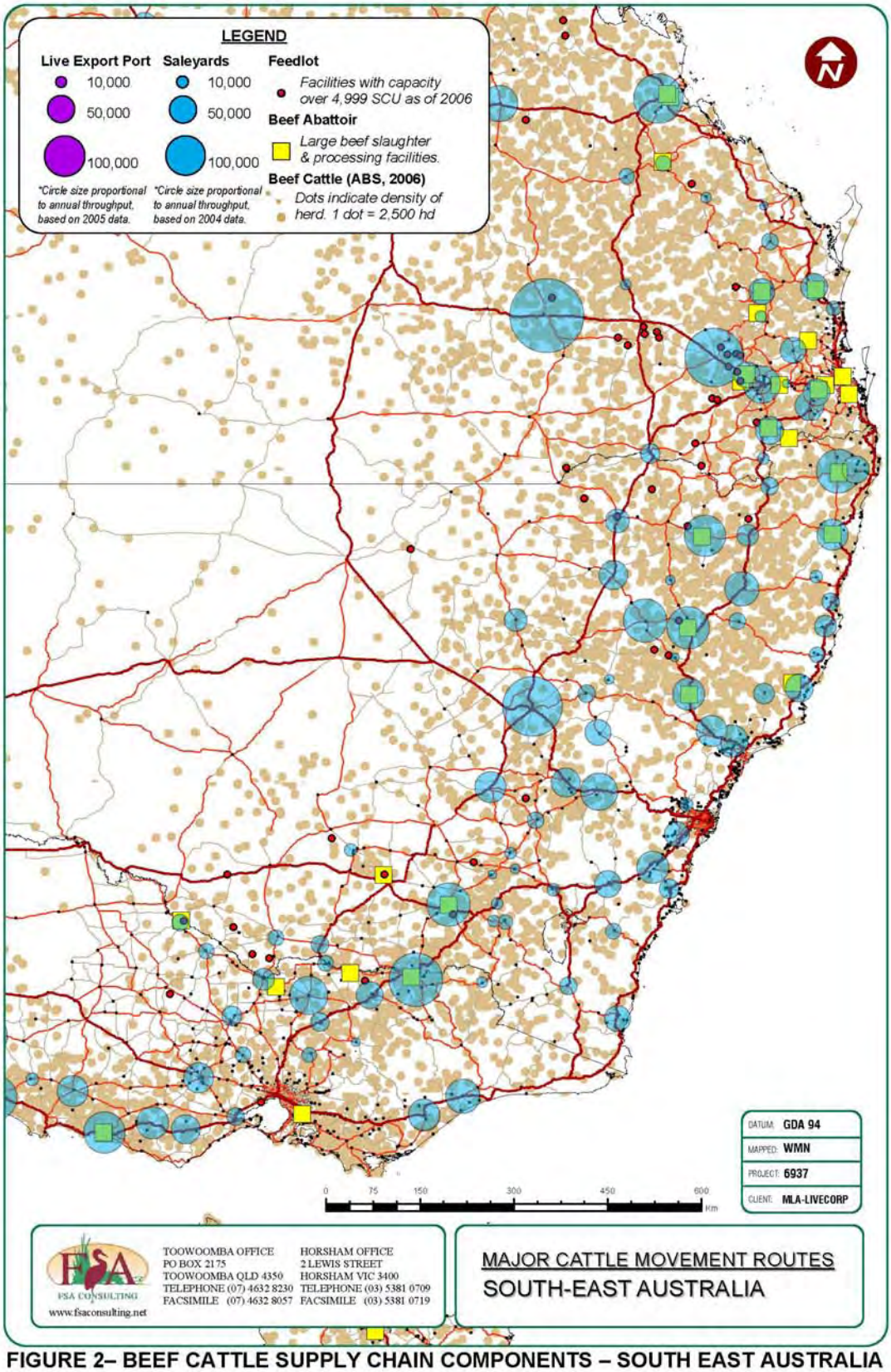

FIGURE 2– BEEF CATTLE SUPPLY CHAIN COMPONENTS – SOUTH EAST AUSTRALIA

show the annual throughput of cattle live-export ports for 2005 (MLA 2006a). A total of 566,830 head of cattle were exported from Australian ports in 2005, with the largest ports being Darwin (209,274 head) and Broome (98,138 head). This demonstrates that a large number of cattle produced in the Northern Territory and Western Australia are destined for the live-export market.

Abattoir facilities follow a similar pattern to the saleyard locations. **Error! Reference source not found.** and

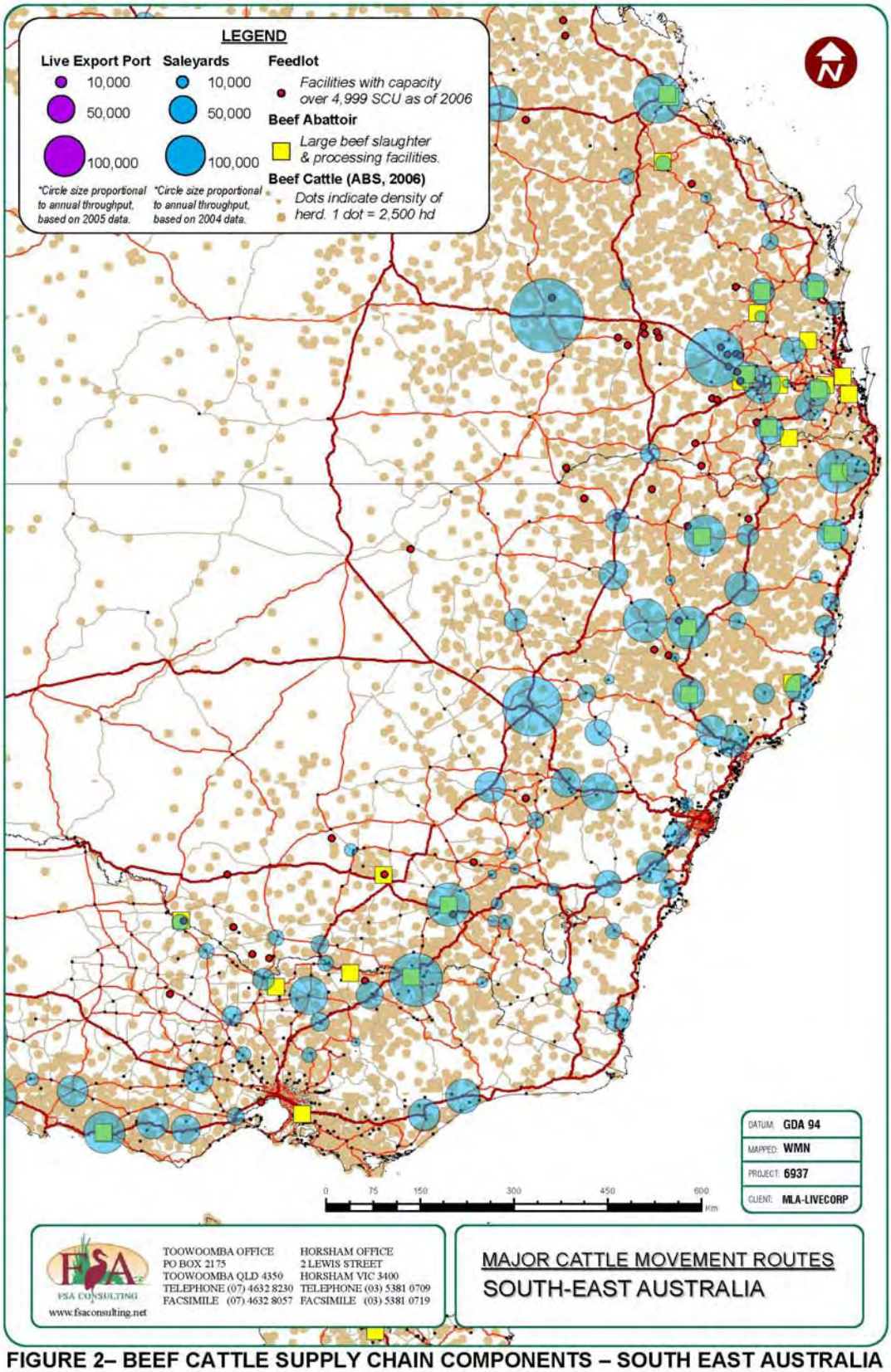

FIGURE 2– BEEF CATTLE SUPPLY CHAIN COMPONENTS – SOUTH EAST AUSTRALIA

show the location of the large abattoirs in Queensland, New South Wales, Victoria, Tasmania and South Australia and southern Western Australia. Due to the lack of available up to date data on abattoir slaughter numbers, abattoirs were simply classified as small, medium or large based on available industry data.

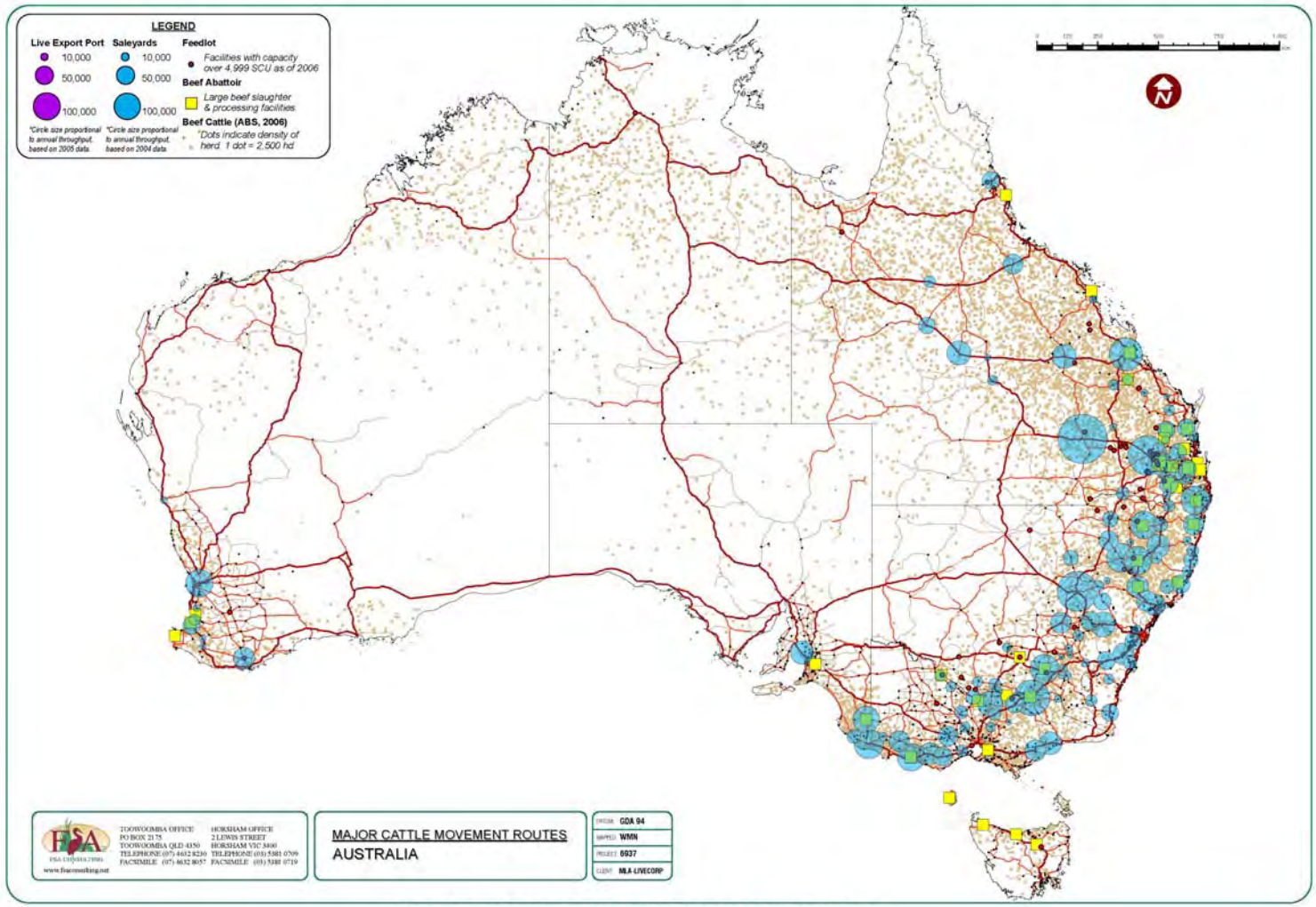

FIGURE 1– BEEF CATTLE SUPPLY CHAIN COMPONENTS - AUSTRALIA

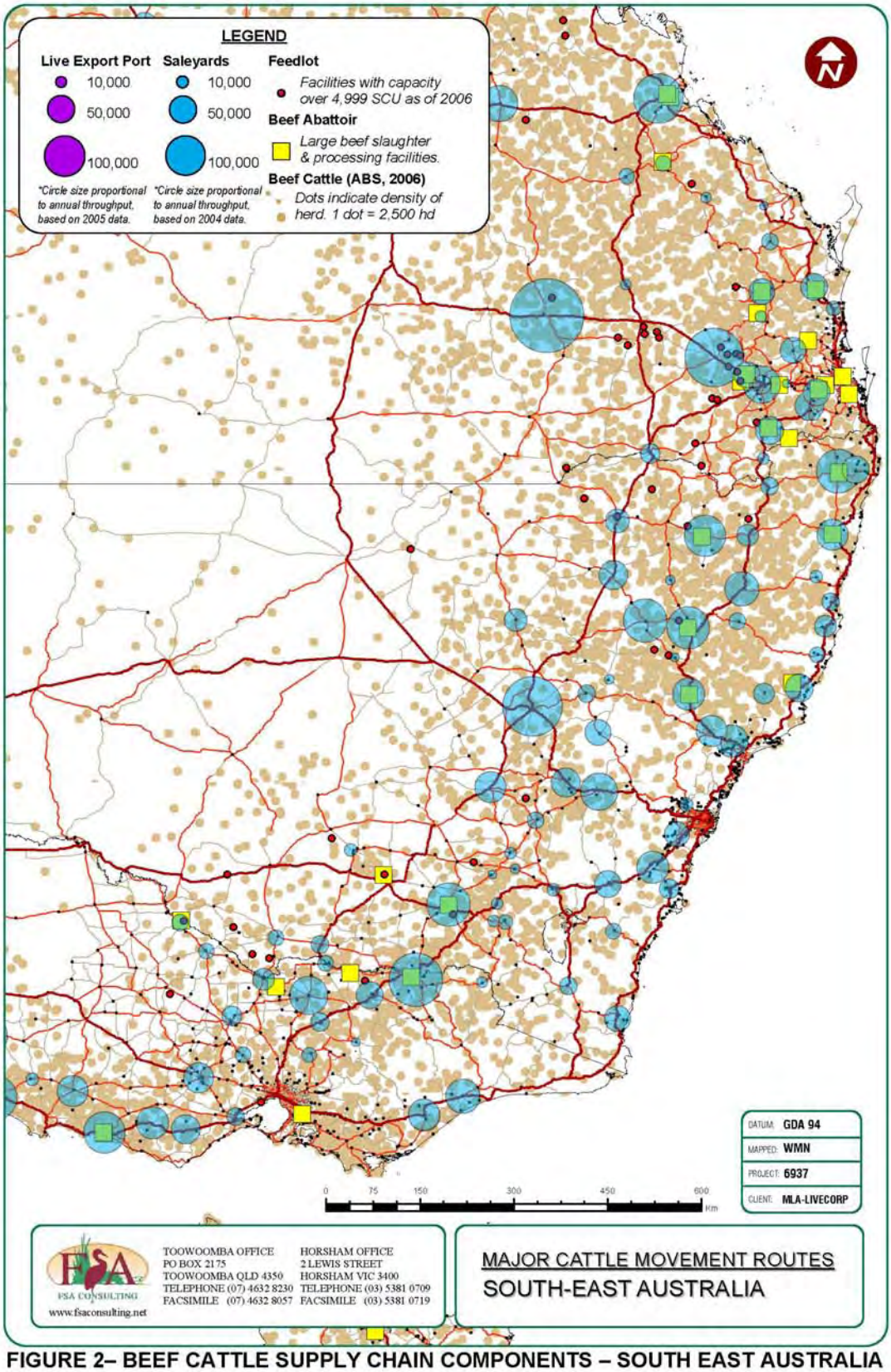

FIGURE 2– BEEF CATTLE SUPPLY CHAIN COMPONENTS – SOUTH EAST AUSTRALIA

1.2.3 Sheep supply chain components

Figure 3, obtained from the ABS (2006), highlights the following;

- sheep production;
- major sheep live export in Australia;
- major sheep saleyards in Australia based on 2003-04 annual throughout and;
- sheep abattoir production capacity for Australia

Figure 4 and Figure 5 show the same data but for South East Australia and South West Australia respectively.

Sheep production mainly occurs in NSW, southern WA and Victoria. Table 2 shows sheep production by state for 2005-2006 (ABS 2006).

Table 2 – Australian sheep numbers (2005-2006)

State	Sheep Numbers (2005-2006)*
New South Wales	32,145,630
Western Australia	22,129,245
Victoria	17,908,435
South Australia	11,330,849
Queensland	4,465,713
Tasmania	2,963,390
Australian Capital Territory	83,934
Northern Territory	1,212
TOTAL	**91,028,408**

*ABS (2006)

In 2005, 4,184,938 sheep were exported from Australian ports. The Fremantle facility is the largest in Australia, exporting 3,430,268 sheep in 2005. Smaller sheep live-export ports are located in Port Adelaide, Portland and Devonport.

In 2003-2004, Australian sheep saleyards had a throughput of 2,790,111 sheep. The largest throughputs for 2003-2004 were at the Midland (802,650 head) and Naracoorte (628,126 head) saleyards.

Sheep abattoir production capacity has been estimated based on available data. The abattoirs are located nearby the major saleyard facilities in NSW, Victoria, Tasmania, South Australia and Western Australia.

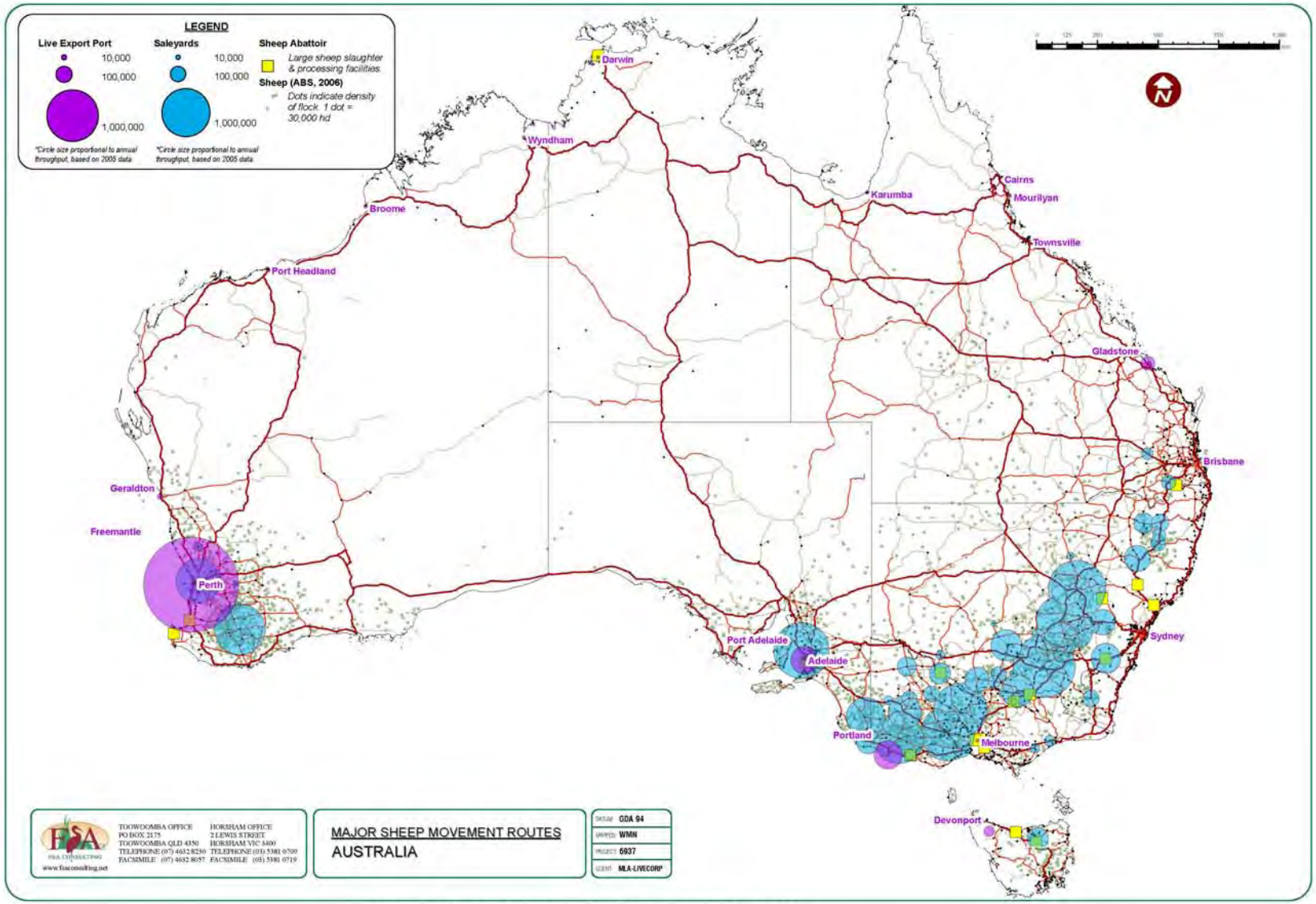

FIGURE 3– SHEEP SUPPLY CHAIN COMPONENTS - AUSTRALIA

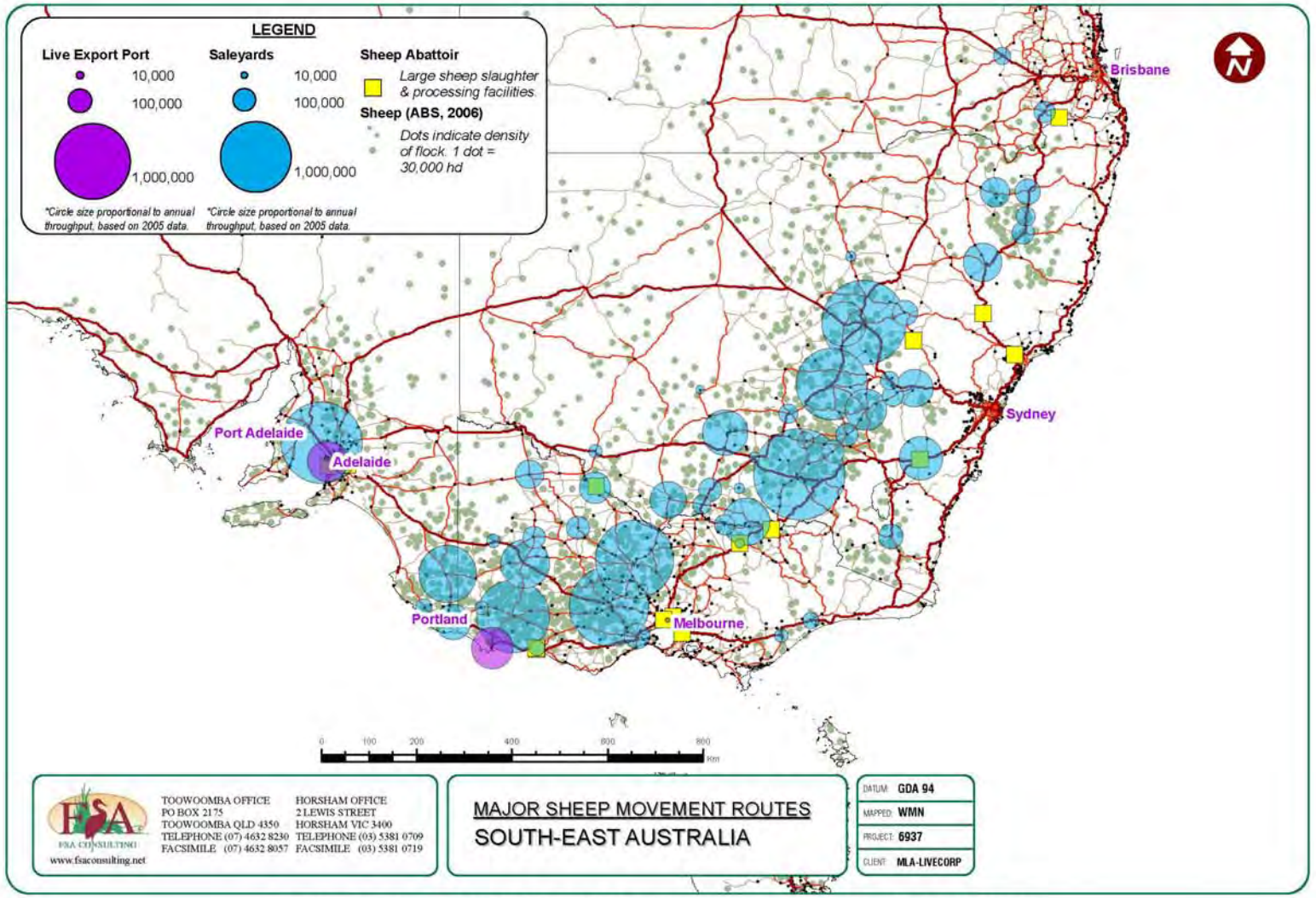

FIGURE 4– SHEEP SUPPLY CHAIN COMPONENTS – SOUTH EAST AUSTRALIA

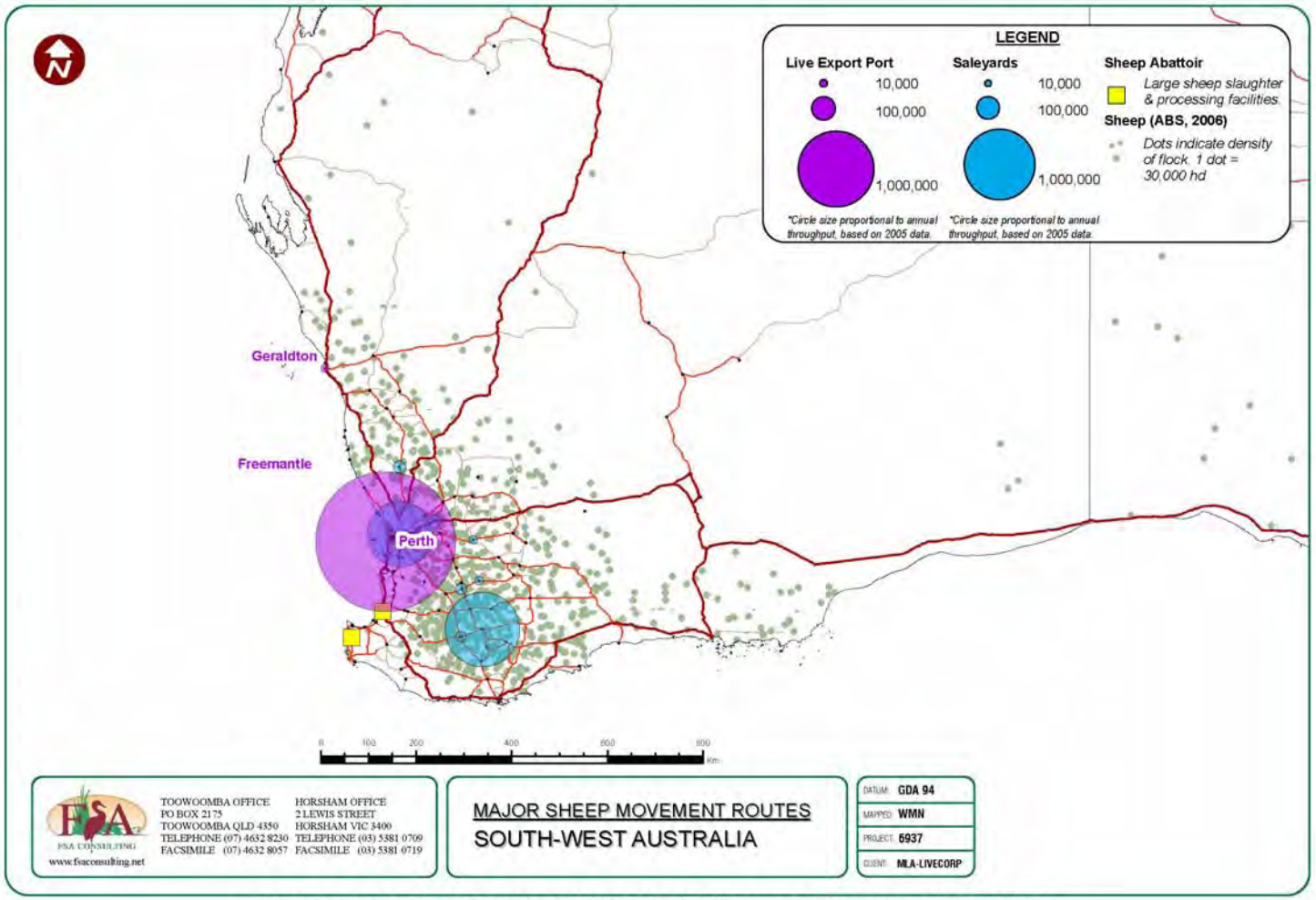

FIGURE 5– SHEEP SUPPLY CHAIN COMPONENTS – SOUTH WEST AUSTRALIA

1.2.4 Livestock transport routes

Figure 1 shows the major highways and roads of Australia. The major highways used for long-distance livestock transport are those between areas of cattle and sheep production and facilities such as saleyards, live-export ports and abattoirs. A reasonable estimate of transport routes can be made from a knowledge of livestock distribution, trade routes and destinations.

Figure 2 identifies the B-Double and road train routes of Australia (taken from Warwick Yates and Associates 2007). These routes are preferentially used for livestock transport because of the higher cost efficiency achieved by these configurations.

Table 3 identifies the major national highways likely to move most livestock based on routes and other factors such as B-Double and road train routes.

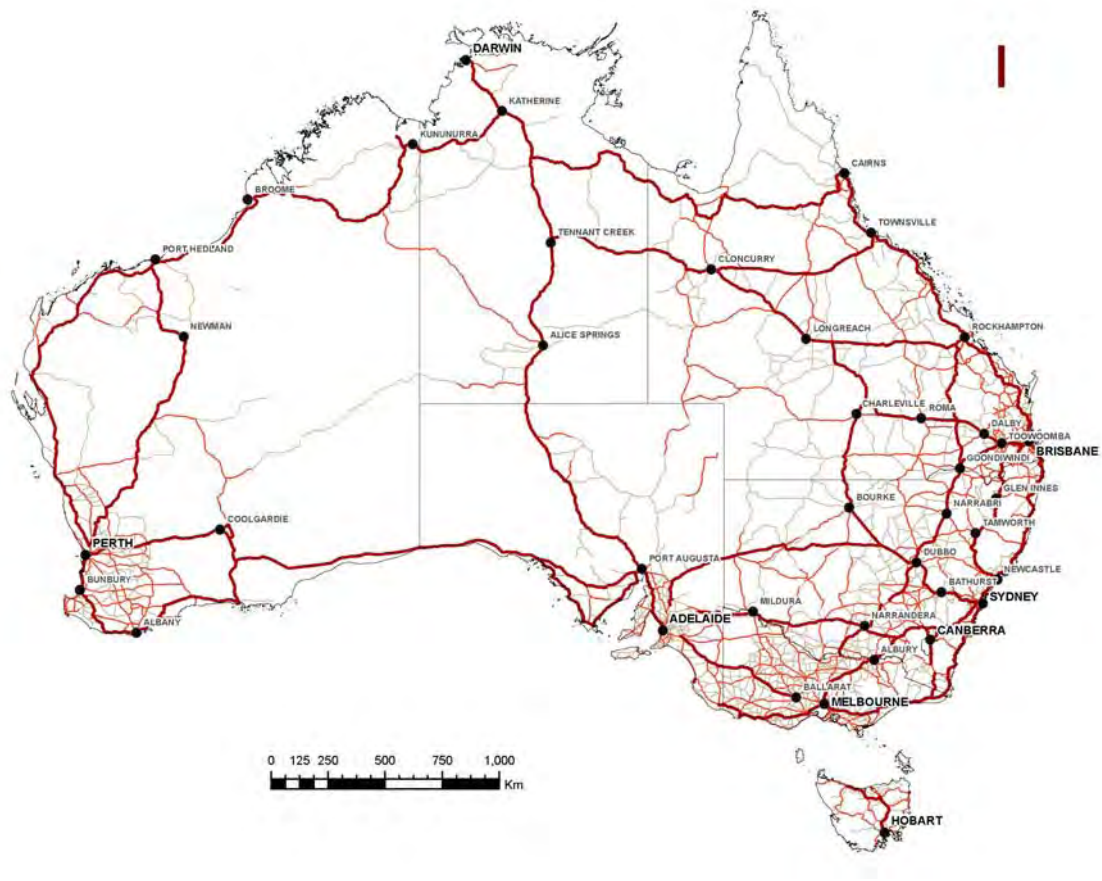

Figure 1 – Major highways and roads of Australia

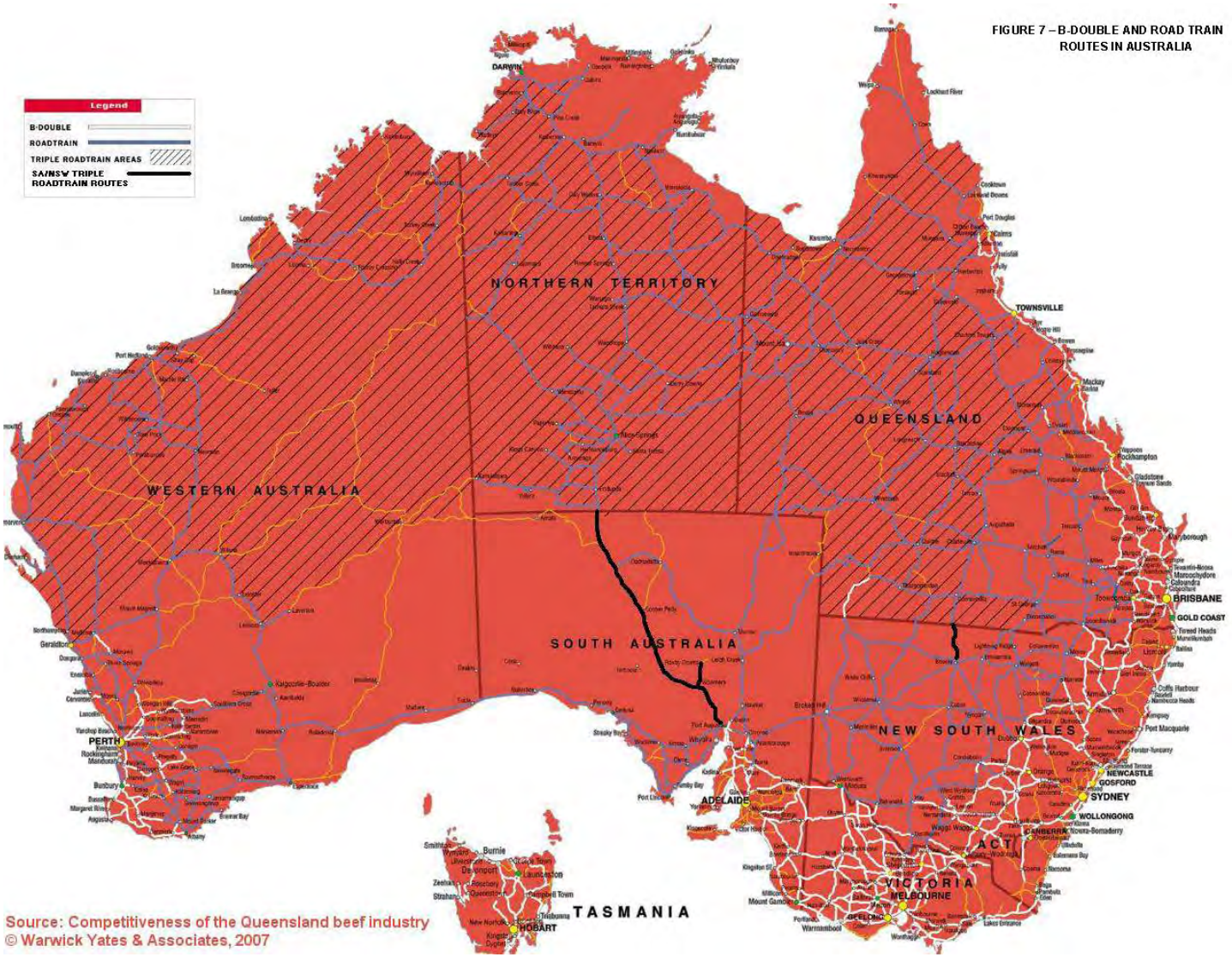

Figure 2 – B-Double and road train routes in Australia

Table 3 – Major national highway routes of Australia

State	Major Highway and Highway Number
Queensland	Bruce (1)
	Warrego (A2)
New South Wales	Newell (39)
	New England (15)
	Hume (31)
	Sturt (20)
Victoria	Hume (31)
	Western (A8)
	Dukes (A8)
South Australia	Western (A8)
	Dukes (A8)
	Sturt (20)
	Princes (A1)
	Stuart (A87)
Tasmania	Booker (1)
	Midland (1)
	Bass (1)
Western Australia	Eyre (1)
	Great Eastern (94)
	Great Northern (95)
	Victoria (1)
Northern Territory	Stuart (87)
	Barkly (66)

Towns with major saleyards, abattoirs or live-export facilities are major thoroughfares for livestock transport and have the potential to become areas of concern. There is great potential for conflict due to the large quantity of livestock transport vehicles and highly populated access roads within urban areas.

This being said, the actual route used for livestock transport to points, such as a saleyard, can be difficult to accurately assess. For example, **Error! Reference source not found.** shows the cattle movements to Roma Saleyards during August 2005 based on NLIS data (National Livestock Identification System 2009). This map shows the substantial distances cattle travel to get to the Roma saleyards and the different routes. During this month, cattle were moving from all parts of the state (mainly south of the tick line). This highlights the difficulty in making a generalised assessment of cattle movements. It is probable that this would be similar for other saleyards in Australia.

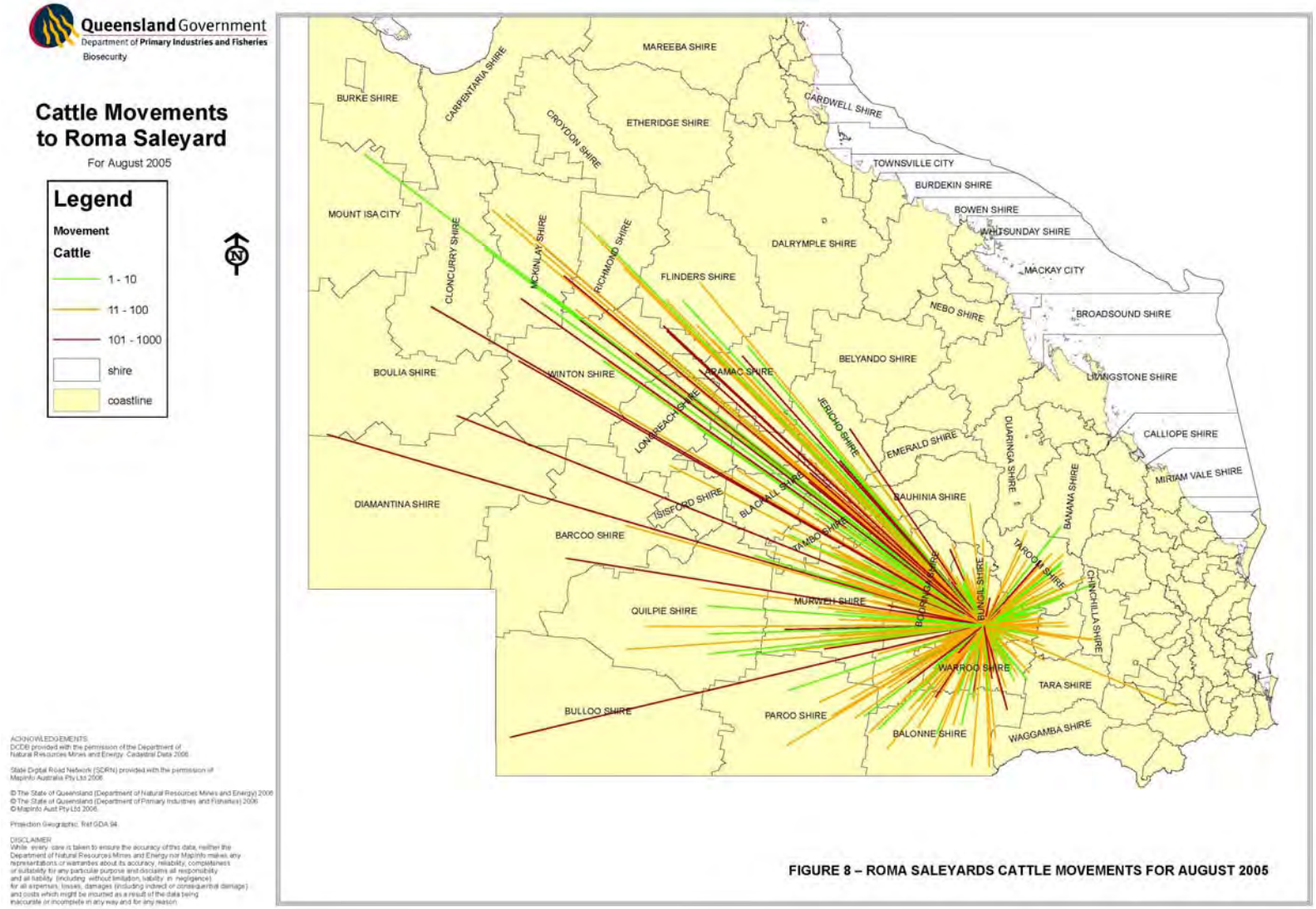

FIGURE 8 – ROMA SALEYARDS CATTLE MOVEMENTS FOR AUGUST 2005

1.2.5 Rail transport

At present, Queensland is the only state that transports livestock by rail. The other states have ceased livestock transport due to welfare concerns and cost issues. There are currently moves by Queensland Rail to discontinue its livestock transport service. Over recent years, an annual average of about 400,000 cattle has been transported by rail from northern Queensland to south-east Queensland for restocking or for slaughter. Most movements take place during the dry season from May to August (AustVet Animal Health Services 2006).

Discussions were held with Mr David Rathbone, Livestock Account Executive, Queensland Rail (QR) regarding effluent spillage and welfare concerns on rail transport. Mr Rathbone said that, to his knowledge, QR had never had a complaint about effluent spillage. This is most likely because there are very few rail movements carrying livestock through populated areas. Hence, effluent drains out of the trains in remote areas onto land under the control of QR and is not cited as a concern. However, train movements into abattoirs such as Rockhampton have greater potential for issues related to effluent spillage as trains must travel through residential areas for some distance prior to disembarkation.

With regard to animal welfare issues, QR has its own welfare statement and stock handling guidelines. These guidelines cover all aspects of the animal's welfare before, during and on unloading after the rail journey. Emphasis is put on the owner or agent having healthy animals to load. QR can refuse to load animals if necessary, and animals are checked on-route and unloaded if necessary. QR does not carry sheep or pigs and is very particular about what type of horses they carry. There are no set curfew requirements, although QR prefers that animals are not curfewed at all. Livestock trailers designed for rail transport of cattle are adequately designed to minimise limb protrusion and allow for air flow. Sheep are not carried by rail in Australia and limb protrusion for rail is considered a negligible issue.

Photograph 1 – Rail trailer for cattle transport in Queensland (DPI&F 2008)

Queensland Rail have adequately addressed effluent spillage and limb protrusion on livestock trailers and therefore no further discussion is required in this report on rail transport of cattle.

2 Project objectives and outcomes

This project aimed to provide an assessment of the issues of livestock effluent spillage and sheep limb protrusion from livestock transport vehicles. The assessment would provide a platform for future risk management approaches.

The project objectives were to:

- Summarise current knowledge and opinion from stakeholders regarding livestock effluent spillage.
- Consider livestock limb protrusion from livestock transport vehicles (road and rail); and
- Provide a recommended way forward on these issues.

The outcome of the project was to produce a discussion document and a short summary of review findings to inform and equip stakeholders to progress both issues. The document includes recommendations, further information needs and the preferred strategy for addressing the issue, including the extension of research outcomes into industry.

3 Project methodology

3.1 Terms of reference methodology

The project methodology, as described in the Terms of Reference, was as follows:

1. Identify key stakeholders and other experts associated with the issues of livestock effluent spillage and limb protrusion during livestock transport.
2. After consultation with MLA, undertake discussions with key Australian stakeholders and other experts to scope the issue. In particular, the focus should include:
    - Identification of the degree to which stakeholders believe that livestock effluent spillage is an issue for them and their surrounding community.
    - Provision of an order-of-magnitude estimate of the quantities of effluent generated during livestock transport in Australia on some useful basis perhaps litres effluent/standard transport vehicle per hour or similar. Differences in animal type and feedlot vs. grass-fed animals should be identified where possible.
    - Thorough identification of existing practices and technologies used to manage in-travel effluent generation in livestock transport vehicles and their effectiveness in preventing or minimising effluent spillage.
    - Review of the availability, cost and usage of existing vehicle designs (including alterations to pre-existing vehicles) that prevent the protrusion of livestock body parts through vehicle sidewalls.
    - Identification of technical resources that can provide advice to owners of existing livestock trailers on cost-effective measures to enhance their equipment.
3. Explore approaches to the issue of livestock effluent spillage from livestock transport adopted overseas. As a minimum, approaches taken in North America, European Union and New Zealand must be assessed.
4. Evaluate potential options for addressing the problem of effluent spillage during livestock transport in an Australian context. Economic, logistical, animal welfare and meat quality impacts must be qualitatively evaluated for each approach discussed.

5. Evaluate potential options, including any international approaches, for addressing limb protrusion during livestock transport in an Australian context. Economic, logistical, animal welfare and meat quality impacts must be qualitatively evaluated for each approach discussed.
6. Produce a discussion document and a short summary of review findings that summarises the information and equips stakeholders to progress both issues. The document must include recommendations concerning further information needs and the preferred strategy for addressing the issue, including the extension of research outcomes into industry.

This report is structured to present information from the literature, followed by the results of the survey. The methodology for the consultation and surveying is provided in the following section.

3.2 Stakeholder consultation and survey

3.2.1 Summary of survey methodology

The methodology of the stakeholder survey was to:

- Form a Steering Committee of MLA, LiveCorp and ALTA.
- Identify key industry stakeholders.
- Undertake preliminary consultation with stakeholders to clarify issues.
- Develop a stakeholder survey form.
- Circulate the stakeholder survey form widely.
- Collate and analyse survey returns.

3.2.2 Identification of key stakeholders

The Steering Committee for the project was proposed by Meat and Livestock Australia (MLA) and comprised members from MLA, LiveCorp and the Australian Livestock Transporters Association (ALTA). Table 4 identifies stakeholders and potential issues that relate to the stakeholder in regards to effluent spillage and limb protrusion.

Initial spatial mapping was undertaken to identify the location of major supply chain components (**Error! Reference source not found.** and

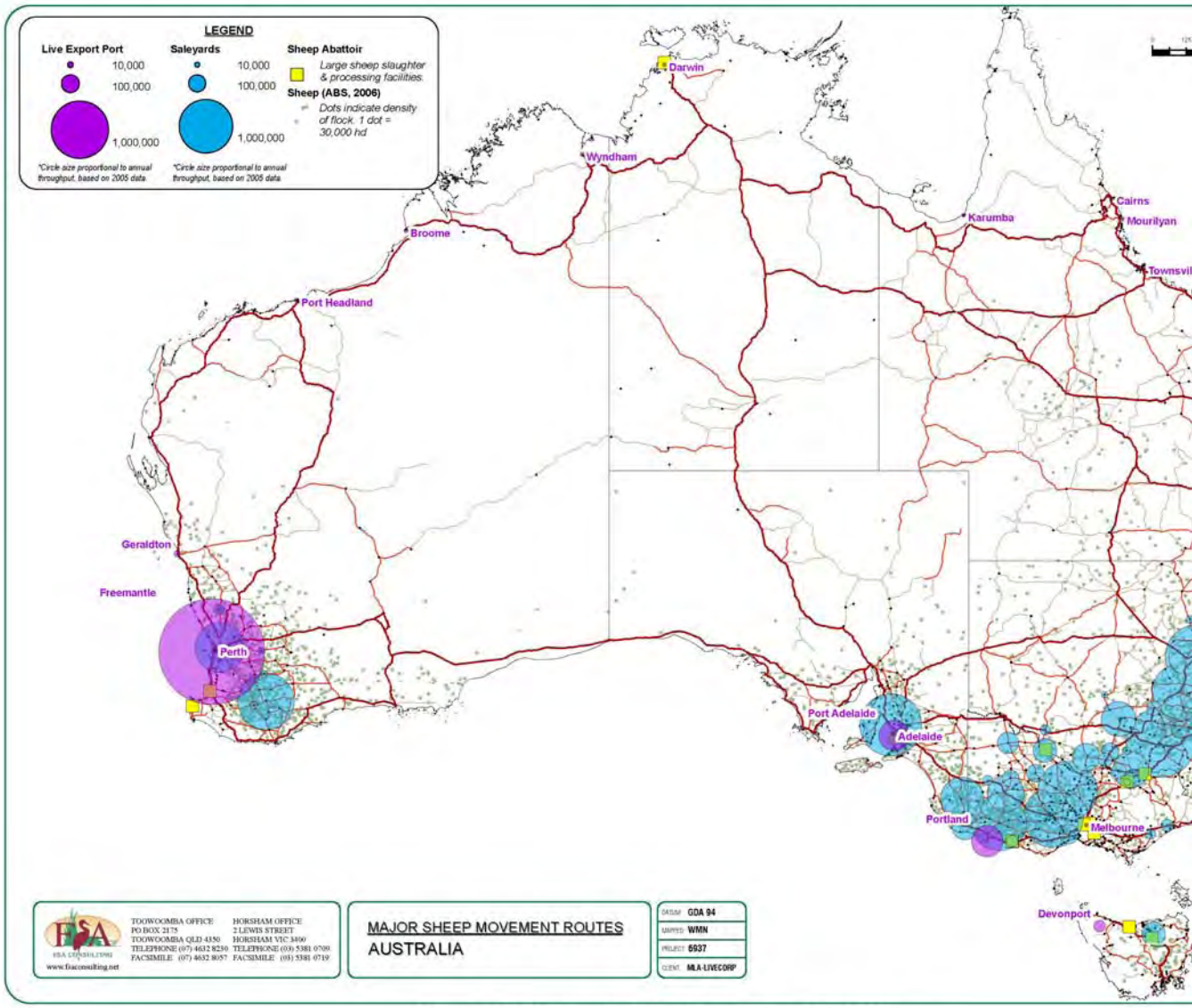

FIGURE 3– SHEEP SUPPLY CHAIN COMPONENTS - AUSTRALIA

). This was used to focus on specific areas where effluent spillage and animal welfare may be a problem to help identify key stakeholders. These areas included:

- Major routes between animal production areas and destinations
- Major towns and cities where livestock transport would enter to travel to destinations. This included towns with large saleyards, abattoirs or live-export facilities

From this spatial mapping, local government councils were identified for consultation if there were saleyards, live-export ports or abattoirs within the council boundary.

Similarly, the saleyard, live-export and abattoir stakeholders were identified using these maps. The throughput of the facility was used as an indicator of the potential effluent spillage and animal welfare issues. It was assumed that the greater the capacity or throughput of the facility, the larger the potential issue.

Informal consultation was undertaken with a number of selected stakeholders to get a general indication of what the main issues were for survey development. Section 0 outlines the details of these informal consultation discussions.

Table 4 – Identified stakeholders and possible issues

Stakeholder	Possible Issues	
	Effluent Spillage / Containment	Animal Welfare / Performance
Graziers	Enhancement of the industry's "clean, green and delicious" image Management issues (feed and water curfew) Costs associated with trailer design changes Increased fuel usage (carrying effluent) Increased management / training for truck operators Time delays due to effluent dumping	Reduced losses and injuries Improved public perception on welfare Meat quality issues if animals curfewed
Lot Feeder (ALFA, individual lot feeders)	Enhancement of the industry's "clean, green and delicious" image Probable need to handle effluent dumping at feedlot Increased water usage due to truck cleaning Time delays due to effluent dumping Management issues (feed and water curfew)	Reduced losses and injuries Improved public perception on welfare Meat quality issues if animals curfewed
Saleyards/ Livestock Agents	Probable need to handle effluent dumping at saleyards Increased water usage due to truck cleaning Time delays due to effluent dumping Infrastructure costs Improved community relationships Proactive stance seeks to prevent future compulsory regulation of the industry	Reduced losses and injuries Improved public perception on welfare
Live-exporters (LiveCorp)	Enhancement of the industry's "clean, green and delicious" image Probable need to handle effluent dumping at export facility Infrastructure costs Increased water usage due to truck cleaning Time delays due to effluent dumping Improved community relationships Proactive stance seeks to prevent future compulsory regulation of the industry	Reduced losses and injuries Improved public perception on welfare

Stakeholder	Possible Issues	
	Effluent Spillage / Containment	**Animal Welfare / Performance**
Abattoir	Probable need to handle effluent dumping at abattoir Increased water usage due to truck cleaning Infrastructure costs Time delays due to effluent dumping Improved community relationships Proactive stance seeks to prevent future compulsory regulation of the industry	Reduced losses and injuries Improved public perception on welfare
Livestock Transporter (ALTA, individual transport companies, small operators)	Costs associated with trailer design changes Increased fuel usage (carrying effluent) Increased management / training for truck operators Time delays due to effluent dumping Proactive stance seeks to prevent future compulsory regulation of the industry Reduced livestock loading rates due to increased weight / volume of effluent storage tank	Reduced losses and injuries Improved public perception on welfare Costs associated with design changes
Livestock Trailer Manufacturer	Costs associated with design changes for effluent storage Proactive stance seeks to prevent future compulsory regulation of the industry Reduced livestock loading rates due to increased weight / volume of effluent storage tank	Costs associated with design changes for improved animal welfare
General Public	Road safety (effluent on roads) Potential exposure of the community to health risks from effluent deposition Aesthetic issues, reduced environmental pollution	Improved perception on animal welfare
State Department of Primary Industries		Improved animal welfare Improved meat quality
State Environmental Protection Agency	Reduced environmental pollution Legislative framework Need to license effluent dumping sites	
RSPCA		Improved animal welfare
Local Government (particularly those with saleyards, abattoirs and live-export facilities)	Improved community amenity Reduced pollution Need to cater for / license effluent dumping sites Improved road safety Improved community relationships	Improved animal welfare
Experts from CSIRO, State Departments, DAFF		Improved animal welfare Improved meat quality

3.2.3 Preliminary informal stakeholder consultation

The preliminary informal stakeholder consultation included:

- selected individuals;
- a facilitated workshop in Western Australia;
- selected local governments.

3.2.4 Selected stakeholder consultation

Eleven Queensland lot feeders and two Queensland graziers were consulted as part of the informal consultation phase of the project. These stakeholders were contacted by phone and were asked a series of questions in relation to:

- perceived public health issues from effluent spillage;
- perceived animal welfare issues during livestock transport;
- perceived biosecurity issues for their operation in terms of having an effluent containment facility on-site, or truck washdown facility;
- perceived truck / trailer design issues in terms of animal welfare;
- whether they curfew livestock prior to transportation and if this was due to external requirements or personal preference;
- any other comments relating to either the effluent spillage or animal welfare issues, including localised issues that have occurred in their area.

Table 5 and Table 6 provide a brief description of the issues raised by lot feeders and graziers. Table 7 identifies the livestock transporter groups consulted. One livestock transporter was contacted to discuss the requirements of TruckCare and interests of livestock transporters. Truck design and animal welfare were important issues for the transporter. TruckCare accreditation was considered to be very important for the transporting industry to provide a format for continual improvement for the sector.

Five abattoirs in South East Queensland were contacted for informal consultation. They were asked similar questions to the lot feeders and graziers.

Table 8 outlines the concerns of the abattoir stakeholder group discussed in the informal consultation.

Table 9 identifies the government stakeholders contacted. Two researchers from the DPI&F Queensland were consulted for any new research and development into effluent spillage and animal welfare issues. One researcher stated that a new standard for animal welfare is being developed in Queensland so that animal welfare compliance can be legally enforced. This will be aimed at those industries with no current code of practice or best practice management recommendations in place. The other researcher identified that there may be a large environmental issue due to effluent spillage and truck washdown. How much water is used during truck washdown and how is it treated were questions posed by the researcher. He also suggested that road safety issues are isolated to particular locations.

Queensland Rail was contacted for information on transport of animals by rail in Queensland. Table 9 and Section 1.2.5 outline details of this discussion.

A southeast Queensland livestock transport trailer manufacturer was visited at their Toowoomba office. They described the current trailer designs in terms of effluent containment and animal welfare. They also provided information on the improvements in trailer design over the last few years.

Table 10 identifies the live-export stakeholders that were contacted during the informal consultation stage. A recurring theme of sheep welfare issues related to older trailers. Further detail of discussions with Western Australian livestock transporters is included in Section 4.8.4.

Table 5 – Feedlot stakeholder informal consultation results

Participant	Public health an issue	Welfare an issue	Biosecurity an issue	Road safety an issue	Truck design an issue	Curfew animal prior to transport	Other
Feedlot A	Yes – in regards to Q fever	-	-	Yes	-	-	Dump sites along highway preferred solution, AVDATA good system, their truck washdown uses treated effluent.
Feedlot B	-	-	Yes	-	-	-	Don't allow trucks to washout on-site as they don't have much water. Cannon Hill abattoir has strict rules on washing trucks and minimising effluent. Warwick truck wash is only one bay and waiting in line deters truck from washing out.
Feedlot C	-	Has declined over last 18 years due to increased driver training, truck design change and fit to load standards	No	-	-	-	Feedlot has a two bay truck wash. Knows of effluent spillage issues at a local abattoir on the southern Darling Downs.

Participant	Public health an issue	Welfare an issue	Biosecurity an issue	Road safety an issue	Truck design an issue	Curfew animal prior to transport	Other
Feedlot E	Not for the country areas. Issue for urban areas	-	No	-	-	Curfew from water, but hay is accessible.	Truck trailers are enclosed to minimise effluent spillage. Does not specify trucks to have containment. No biosecurity requirements. Washes truck every fortnight if used heavily. Specifies one stop for animals on long haul trip.
Feedlot F	No	Yes Heat stress Long haulage Driver training and experience	No	Yes	-	Yes (both water and feed) required for Coles contract	Uses a transporter that has effluent tanks on all new trailers.
Feedlot G	No	Yes – overloading and long haulage	No	Yes	No	Used to curfew for 6hrs prior to transport, now don't as they think it causes dark cutters.	New feedlot down the road had to put in a truck washdown as part of council conditions. Feedlot G uses a transporter with all new trucks having effluent holding tanks.
Feedlot D	Yes	Main issue is heat stress during long distance transport.	No requirement for effluent containment on-site. There was a truck wash on-site but they removed it for biosecurity concerns.	-	-	No (both feed and water accessible)	Trucks not required to washdown prior to entry, they reject excessively dirty trucks.

Participant	Public health an issue	Welfare an issue	Biosecurity an issue	Road safety an issue	Truck design an issue	Curfew animal prior to transport	Other
Feedlot H	No	Yes - Overloading on trucks due to increasing freight costs	Yes they don't load excessive dirty trucks	Yes – all trucks going to a Brisbane abattoir need effluent holding tanks and pull down curtains due to previous complaints and part of EPA conditions of the abattoir.	No	Yes held off feed and water prior to transport to abattoir.	Effluent dump point (government funded) at a Brisbane abattoir, effluent goes into waste stream.
Feedlot I	No	Yes – don't allow excessive prodder use, need truck drivers with 'cattle sense', long haulage is an issue.	No	No	No	No	Have understanding with trucking company the level of cleanliness expected
Feedlot J	No	Yes with curfewed animals	No	Yes – public concern re animal urinating in convertible.	Yes – pull down curtains could lead to heat stress issues.	No - believes it results in dark cutters	Consignee declaration a good idea.

Participant	Public health an issue	Welfare an issue	Biosecurity an issue	Road safety an issue	Truck design an issue	Curfew animal prior to transport	Other
Feedlot K	No	No	No	Thought that most big transport companies had effluent containment already.	No	No	Effluent spillage is the transporters responsibility, it is their business.

Table 6 – Grazier stakeholder informal consultation results

Participant	Public health an issue	Welfare an issue	Biosecurity an issue	Road safety an issue	Truck design an issue	Recommend Curfew	Other
Grazier A	Not in rural areas, can understand problems in urban areas.	No	No	No	No	Curfew water the day before transport. Does not curfew feed.	Wash their trucks for cleanliness and health reasons.
Grazier B	No	Yes – There should be a declaration of fitness for animals undertaking long haul journey. Less animals on truck for long haul so they can lie down. Spelling coincides with driver rest stops.	No	No	No	Yes – 24hrs for feed, 12-24 hrs for water.	Has an understanding with the transport company of acceptable level of cleanliness.
Pastoralists and Graziers Association of WA	For trucks travelling through Fremantle and Broome.	Old trailers used on export run are a problem for animal welfare. Long haulage an issue to Murray Bridge.	Yes for grazier/farmers.	Yes on hills The Great Eastern and Great Northern routes are the issues. Sheep effluent not a problem, cattle effluent is the problem.	Yes with old truck trailers. Panels in sheep trailers an issue for leg protrusion. If you seal it up there is heat stress issue.	Yes - 24 hrs preferable for transport companies. No - for live-export as they are sold liveweight. Graziers/farmers reluctant to curfew feed.	Wash out of trucks is a significant cost $500/truck. Feedlots are seen as the big problem as they don't curfew animals. Education needed. Rubber flaps over gaps in trailers, let your hand in but not let leg out potential solution. Not many saleyards or abattoirs have a washdown facility. Need flexible guidelines -Nth vs. Sth, East vs. West.

Table 7 – Livestock transporter stakeholder informal consultation results

Participant	Public health an issue	Welfare an issue	Biosecurity an issue	Road safety an issue	Truck design an issue	Recommend Curfew	Other
Livestock Transporter – TruckCare Accredited Service Provider	-	TruckCare focus is traceability and fit to load.	-	-	Supermarket chains require TruckCare accredited transporters as part of contract conditions.	-	Feedlot sector curfew is only solution for trucking companies. Washdown facilities at a number of abattoirs in Qld. Not many at saleyards.
WA Livestock Transporters Association and Country Bulk Carriers	No	No	No	Yes between feedlots and live-export ports in southern WA.	Yes – with northern transporters bringing trailers with no tanks to the south in the off-season.	Research between Murdoch University and Esperance DPI measuring stress levels and pH of curfewed and non-curfewed animals.	Lot feeders should return to curfewing animals even just for 3-4 hrs to reduce effluent production. Lot feeders need hard facts to support this.

Table 8 – Abattoir stakeholder informal consultation results

Participant	Public health an issue	Welfare an issue	Biosecurity an issue	Road safety an issue	Truck design an issue	Recommend Curfew	Other
Abattoir A	Yes	No	-	-	-	Yes – stipulate 12-24hrs off feed	Has a truck washdown facility for processed meat trucks, not for livestock trucks. Does not want effluent dumping facility at abattoir, transport companies should have their own facility.
Abattoir B	-	-	-	-	-	Yes – 24 hrs off feed, then another 12 hrs when they get to abattoir.	Most professional transport companies have effluent containment on trucks. No truck wash at Abattoir B, and they don't want one. They report to stock owners any suspect poor handling of transport companies.
Abattoir C	No	No	-	Yes - Council received complaints about manure through closest town and approached Abattoir C.	-	No – prefer full, believes it is detrimental to meat quality	Requires trucks to washdown on-site prior to leaving property. Effluent holding tanks installed on trucks. Send complaints to transporters if excessively dirty. Most transporters are proactive and have effluent holding tanks.

Participant	Public health an issue	Welfare an issue	Biosecurity an issue	Road safety an issue	Truck design an issue	Recommend Curfew	Other
Abattoir D	No	No	Doesn't want effluent disposal dump at abattoir.	Yes – Wallace and Wood St in Warwick a bad spot for effluent spillage due to traffic lights and corner.	No	Don't require curfew.	Washdown facility for processed meat trucks, not livestock trucks. Thinks that professional transporters should contain effluent, unfair for small operators to have same requirements for effluent containment.
Abattoir E	Yes	No	Yes	No	No	-	All professional transporters should have effluent containment. There are washdown facilities at the abattoir, but trucks don't always washout due to time required.

Table 9 – Research/government stakeholder informal consultation results

Participant	Public health an issue	Welfare an issue	Biosecurity an issue	Road safety an issue	Truck design an issue	Recommend Curfew	Other
DPI&F Principal Project Officer – Welfare	-	Yes	-	-	-	-	New 'standard' for animal welfare being created so it can be legally enforced.
DPI&F Researcher	How much water is used in effluent washdown and where does it go? Is there an environmental cost for effluent washdown?	No	No	Isolated to particular areas e.g. Townsville, Portland, and Adelaide.	No	Curfew less of a problem with feedlot cattle. He believes cattle don't eat or drink a lot when they are rested on long trips therefore low effluent when they get back on.	Qld still has volume loading but there is a limit. Thinks the issue is more environmental than road safety which is why Main Roads aren't interested. Water Deprivation Time is an important factor.
Queensland Rail (QR)	No	Rare – onus is on the owner to have healthy animals. Animals checked on route and unloaded if required. Do not carry sheep or pigs, and are careful what horses they carry.	-	No	No	Prefer no curfew. No requirements.	QR has a welfare policy for animal transport. Effluent spillage not an issue as the spillage occurs on the tracks which is QR land. Few rail movements through populated areas except Rockhampton.

Table 10 – Live-export stakeholder informal consultation results

Participant	Public health an issue	Welfare an issue	Biosecurity an issue	Road safety an issue	Truck design an issue	Recommend Curfew	Other
Live-export Holding Yard Operator	Not in drier northern areas.	Not with cattle, sheep welfare is a problem in older trailers. New trailers are better designed.	No – the facility is not easily accessible to public.	No	Yes with older sheep trailers.	Yes – 12 hrs off feed and water	Live-export facilities don't have effluent containment requirements. He has washdown requirements for trucks coming to the facility. Grazier education needed on transport best practice.
WA Live-export Company	-	Perceived issue by public as limbs move freely in and out. Issues with older trailers.	-	-	-	-	Nearest washdown is at Midland Saleyards
WA Livestock Trailer Manufacturer	-	-	-	-	Trailer design to enable limb movement in and out of trailer without getting caught.	-	Could retro fit trailers. Trailer turnover is 15-40 yrs.

3.2.4.1 Western Australian facilitated workshop

Consultation in Western Australia covered three main groups, livestock transporters, members of the Pastoralist and Graziers Association of WA (PGA) and live-exporters. A list of consulted stakeholders from the livestock transport industry, live-exporters and the Pastoralist and Graziers Association of WA is included in Table 11.

Major stakeholders concerned with limb protrusion were consulted in face-to-face meetings held in Western Australia in March 2008. The livestock transporters were engaged through a workshop held at the offices of the Livestock Transporters Association of Western Australia (LTA WA), with a total of 90 members being invited. The workshop presented background on the project and provided a forum for open discussion between stakeholders. Face-to-face consultation was seen as a preferred option to discuss limb protrusion because of the regional focus to this issue. The workshop was also a useful forum to discuss effluent spillage from trucks, as many stakeholders had an interest in both topics.

Live-exporters were contacted via phone and in face-to-face meetings where possible. Two site visits (Wellard's bulking depot and SFM Engineering) were undertaken.

A meeting was also held with Mike Norton, who handles the animal welfare portfolio for the WA PGA. A summary of this consultation is reported in the results section.

Table 11 – Stakeholder consultation in Western Australia

Name	Industry Sector
David Kerr – Wellards	Sheep Export
Wayne Grigson – Grigson Livestock	Livestock Transporter
John Leeds – Leeds Cattle Transport	Livestock Transporter
Nick Clawson	Livestock Transporter
Hamptons Transport representative	Livestock Transporter
Miotti Transport representative	Livestock Transporter
Tim Darcy	PGA
Mike Norton	PGA
Giulio Lombard – SFM Engineering	Trailer manufacturer
LTA WA representative	LTA WA

3.2.4.2 Local government consultation

The local government councils were selected to represent the community views in a specific area. It was assumed that any concerns or complaints from the public regarding effluent spillage from livestock trailers would have been directed to the council. Councils were chosen based on the mapping undertaken in Section 1.2. Those council areas with saleyards, abattoirs or live-export ports were contacted.

The selected councils were contacted by phone and were asked whether effluent spillage was an issue in the area and if they had received any complaints from the public regarding effluent spillage. The local government councils were asked a series of questions in relation to:

- perceived public health issues from effluent spillage;
- perceived animal welfare issues during livestock transport;

- if they had a truck washdown facility in their council area;
- if they would be capable of operating an effluent dump facility in their council area;
- any other comments relating to either the effluent spillage or animal welfare issues, including localised issues that have occurred in their area.

The councils were all asked if they would be willing to take part in the survey whether effluent spillage or animal welfare was considered an issue or not. The survey would be addressed to a particular person at the council and not sent to the general mailing address to maximise response rates.

Community responses to effluent spillage and animal welfare were also investigated through several articles published in newspapers and magazines. This identified specific areas where issues had arisen and the local governments involved were contacted to gain more information. The community response reflects the public image of the industry regarding effluent spillage and animal welfare.

An outcome of the consultation process with both stakeholders and local government is the recognition that effluent spillage is not an issue across most of Australia. It only becomes an issue where livestock vehicles pass through urban areas and, even then, issues only arise in particular “hot spots”.

Table 12 – Summary of communication with local government councils

Local Government Council	Reason Contacted	Response	Survey Sent
Armidale Shire Council	Armidale Livestock Selling Agents Pty Ltd	No official complaints on effluent spillage or odour from effluent trucks. The survey will be looked at by council and road safety to give more accurate feedback. The Armidale saleyards are well placed on a quiet road to avoid problems.	Yes
Beaudesert (Scenic Rim Regional Council)	Beaudesert Saleyards	No serious issues but happy to do survey	Yes
Bega Valley Council	Bega Valley Saleyards	No comment, send survey	Yes
Ballarat City Council	Ballarat Livestock Selling Centre	No issues but will take part in survey	Yes
Berrigan Shire Council	Finley Livestock Exchange	No comment, send survey	Yes
Bendigo City Council	Bendigo Livestock Exchange	Effluent in livestock trailers is a very serious problem. On farm curfews are very important prior to 3-4 hour journey. Effluent volumes are a problem at Saleyard. Trucks use alternate route to bypass town. Council runs saleyard.	Yes
Brisbane City Council	Abattoirs	Many livestock trailers travel on the M1 and the Gateway highway but any complaints from there would be directed to Main Roads not the council. They have never received any complaints as a result of effluent or odour from cattle trucks.	No
Camden Shire Council	Camden Livestock Selling Complex	No issues. All livestock are transported along rural roads and don't go through towns. The roads are wide and saleyard is situated in a good area away from town. People accept there will be effluent on the roads on occasion.	Yes
Charters Towers Regional Council	Dalrymple Saleyard	No issues with effluent, but will do the survey	Yes
Cloncurry Shire Council	Cloncurry Saleyard	Not a real issue. In summer effluent dries quickly but in winter it can be more of a problem. Don't have time to do the survey.	Yes

Local Government Council	Reason Contacted	Response	Survey SentT
Colac-Otway Shire Council	Colac Saleyards	They have no issues with effluent. They are a dairy community and a little effluent on the roads is considered part of the lifestyle.	No
Cooloola Shire Council	Gympie Saleyards	Not sure if they have ever received any complaints. Will do some investigation into the last 12 months and comment on the survey. Effluent or odour does not seem to be a concern for the council.	Yes
Coonabarabran (Warrumbungle Shire Council)	Coonabarabran Regional Saleyards	There are no real issues. There are good truck wash facilities at saleyards. The roads around saleyard are generally very clean. The limb protrusion from sheep is not considered a problem even though it does happen on occasion. The trucks cannot be closed to prevent this but it has come a long way with the drivers being trained to work with stock and look out for problems such as legs sticking out along the way.	Yes
Cowra Shire Council	Cowra Saleyards	Left message but council has not returned call.	
Dalby Regional Council	Dalby Saleyard	Council will take the survey along to the saleyard advisory committee meeting to get comments.	Yes
Dubbo City Council	Dubbo Regional Livestock Markets	The only complaint they have received is an odour complaint from a cattle truck that was parked in a residential area.	Yes
Central Highlands Regional Council	Emerald Saleyard	Effluent is an issue. Not a serious issue but they have received complaints. The two main problem areas are Hospital road and Claremont road in Emerald. Complaints occur mostly when trucks stop to get some supplies at the bakery and effluent leaks out while parked. They have also received complaints from effluent splashing onto windscreens. The council forwards the complaints to main roads as they don't know what can be done. It's not in their control. Council operates a washdown for trucks at a cost to the transporters. The main function of the washdown facility is the prevention of weed seed spread - mainly Parthenium. However, if dumping effluent was made regulatory council would probably be happy to adapt the washdown to handle effluent and manage the facility. The other concern would be that they would require 3 effluent dump sites at each entry to Emerald. Council will most likely co-operate in finding a solution.	Yes

Local Government Council	Reason Contacted	Response	Survey Sent
Fremantle Shire Council	Export docks	Post survey to Department Environmental and Health. The council has received complaints regarding odour from livestock trailers standing at the docks but not of effluent spillage on the roads.	Yes
Gloucester Shire Council	Gloucester Livestock Exchange Centre	No complaints have been received; the issue has not been brought up in meetings.	Yes
Gunnedah Shire Council	Gunnedah Regional Saleyards	Left message. Council has not returned call.	
Horsham Shire Council	Horsham Regional Saleyard	No complaints, the saleyard has a washdown. The saleyard mostly receives sheep; the cattle that are brought to saleyard are transported in smaller trailers with bedding not big B-Doubles. Sheep do occasionally stick their legs through trailers but it is not considered an issue.	Yes
Inverell Shire Council	Inverell Regional Livestock Exchange	Effluent spillage is a serious problem in Inverell. The effluent spillage causes a road safety issue as well health concerns. The main health concerns are zoonotic disease such as Q-Fever and Brucellosis that can be spread through cattle manure. The community has approached the council to take action about preventing effluent spillage in town. The council has approached RTA who has approached the Minister for solutions. The council suggests effluent holding tanks for all new trailers and effluent dump site that should be run by councils. They are requesting national regulations and not just state by state as livestock are transported interstate.	Yes
Katanning Shire	Katanning saleyard	The saleyards only receive sheep and not cattle. Therefore, only the sheep welfare part will apply. Will look at survey.	Yes
Kempsey Shire Council	Kempsey Regional Sale	Left message and emailed survey to council member who was recommended by service desk.	Yes

Local Government Council	Reason Ccontacted	Response	Survey Sent
Lismore City Council	Lismore saleyards	Left message. Council has not returned call.	No
Longreach Regional Council	Longreach Saleyards	No issues with effluent, but will do the survey.	Yes
Moree Plains Shire Council	Moree Saleyard	Yes can be an issue, trucks drive past outdoor diner.	Yes
Nambucca Shire Council	Macksville Saleyard	No issues. Not interested in doing the survey.	No
Palerang Council	Braidwood Saleyards	Saleyard does not receive any sheep only cattle. There is a washdown about 1km from the saleyard. They have not received any complaints from public about effluent on the road. The saleyard falls under the Sydney Catchment Authority who contacts the saleyard about the effluent at the yard itself not anything on the roads. The noise from the cattle in the yard before sale is more likely to receive a complaint but the area is a rural area and people accept that noise at yards, effluent on roads and odour are part of the lifestyle.	Yes
Rockhampton Shire	Gracemere Saleyards Complex	Council does not receive complaints regarding effluent or odour from livestock trailers. They suggested calling the saleyard.	Yes
Roma Regional Council	Roma saleyards	Council did not comment other than say to contact saleyard	No
Shepparton	Shepparton Regional Saleyard	They are not aware of any such issues but will have a look at the survey.	Yes

Local Government Council	Reason Contacted	Response	Survey Sent
Singleton Shire Council	Singleton Regional Livestock Market	They have not received any complaints about effluent spillage or limb protrusion in the last 12 months. Sheep do stick their legs through sides of trailers on occasion but it is not seen as an issue.	Yes
South Burnett Regional Council (Kingaroy)	Saleyards and abattoir	There have been several complaints in the Kingaroy area. There is an abattoir and two saleyards (one in Murgon) in the area. There are several cattle and pig trucks that regularly pass through the area. They had received complaints regarding effluent spillage at the lights and on sharp turns. The complaints are forwarded to Queensland Transport as the council has no control over the road or traffic. The complaints are then forwarded to the abattoir mostly or to specific transporters if they can be identified. Qld transport inspectors will talk to producers or transport companies to encourage them to washout before leaving each site but there is no legislation that can be applied. The effluent on the street is cleaned by street sweepers. The problem is more before the animals are unloaded at the abattoir.	Yes
Tamworth Shire	Tamworth Regional Livestock Marketing Centre	No issues – contact saleyards	Yes
Tenterfield Shire		This is a major issue in Tenterfield. There are three main issues: 1. Road safety - The trucks drive through the main road in town that is very narrow and has three pedestrian crossings where trucks have to stop on occasion. The effluent spills out when the brake and pull away and therefore some trucks refuse to stop and pedestrian crossing. 2. There are coffee shops and restaurants along the main road and odour is an issue when trucks drive past. 3. Effluent spillage at pedestrian crossing and when they turn at right angles when heading to the saleyards.	Yes

Local Government Council	Reason Contacted	Response	Survey Sent
Wagga Wagga	Wagga Wagga Livestock Marketing Centre	The saleyards have a washdown. Effluent is treated (take solids out) then goes into sewer. No real issues but will do survey.	Yes
Wangaratta	Wangaratta Saleyard	No issues. Not interested in doing survey.	No
Southern Downs Regional Council	Warwick Saleyards	Left message but council has not replied.	No
Western Australian Meat Industry Authority	Saleyards	They operate saleyards that are going to be moved away from metropolitan areas. Consulting with councils is not recommended as that will open a can of worms as most councils don't have a real understanding of livestock transport. Most of the cattle they receive come from up north and effluent is therefore not such a big problem. Limb protrusion from trucks is not considered a problem but sheep do stick limbs out of trailers on occasion and then pull them back into truck. Some "mums and dads" may see that as a problem but it is not really an issue.	Yes
Wodonga Shire Council	Wodonga Livestock Exchange	Never received any complaints in Health Department or Environmental Department.	No
Yarriambiack Shire Council	Warracknabeal Regional Livestock Exchange	The saleyards have invested in a good washdown facility. The council has not received any complaints of odour or effluent. The council will fill in the survey.	Yes

3.2.5 Stakeholder survey form development

A survey form was developed to try to gauge the significance of the issues and seek reactions and potential solutions. Background information complemented the survey to outline the potential issues to participants and stimulate thoughts on the topics. The survey identified the potential road safety, public health and environmental pollution issues with effluent spillage and provided example newspaper articles where this has been a problem. Sheep limb protrusion, via high loading densities and wide rail spacing, was identified as an issue. Pictures were included to demonstrate examples and provide visual stimuli for participants.

The survey aimed to identify the most relevant issues and concerns for all stakeholders. The survey intended to engage all stakeholders, but some questions were specifically designed for certain stakeholders, e.g. questions relating to curfew practices were only relevant to graziers and lot feeders.

Information on the New Zealand model of voluntary effluent containment and local council operated effluent dumping stations was explained to show participants one system that had been developed in another country. Questions on animal curfew or diet modification practices prior to transport were included, particularly for graziers and lot feeders, to receive information on current practices.

A draft stakeholder survey form was distributed to MLA and LiveCorp initially for comment and for approval for distribution. The survey form had two versions – one for industry stakeholders and one for local governments.

The draft industry survey form was then distributed to a pilot group of 11 participants for comment and completion. This group were a mix of lot feeders, graziers, livestock transporters, abattoir and live-export operators. Comments were received from these participants and relevant changes made to the survey.

A separate survey form was produced for local government to identify specific issues and solutions appropriate for councils. This survey concentrated on:

- availability of transport vehicle washdown facilities;
- whether effluent spillage or animal welfare is an issue in their council area;
- whether the councils could implement a New Zealand-style approach to effluent spillage issues in their council area.

This survey did not include questions on curfewing or truck washdown. It concentrated more on the community perception of effluent spillage and animal welfare, and the impact of participating in an industry-wide voluntary scheme. A draft local government survey was distributed to MLA and LiveCorp initially for comment and approval for distribution.

Appendix A includes a copy of the industry stakeholder survey form.

3.2.6 Stakeholder survey form distribution

The final industry survey forms were distributed to stakeholder representative organisations for circulation to their members. Table 13 identifies the organisations that were asked to distribute the surveys to a selection of their member base.

Stakeholders contacted in the informal consultation who indicated that they would participate in the survey were sent a survey form. Other individual stakeholders were contacted.

The local government survey was sent to councils contacted during the informal consultation that indicated they would complete the survey. The majority of councils contacted did not want to complete a survey as they did not regard the issue as significant. Additional councils were selected based on if they had a saleyard, abattoir or live-export port in their area. It was assumed that regular livestock transport would be occurring through or around the council where these facilities were located. These councils were more likely to have received feedback from the community regarding effluent spillage or animal welfare from livestock transport.

The results of the survey were analysed. The qualitative results from comment sections and from phone calls were documented. The quantitative results from the survey are presented in the Section 5.

Table 13 – Industry representative organisations involved in survey distribution

Industry	Participant Industry Representative Organisations
Livestock Transporters	Australian Livestock Transport Association
	Livestock Transporters Association of NSW
	Livestock Transporters Association of VIC
	Livestock Transporters Association of TAS
	Livestock Transporters Association of WA
	Livestock Transporters Association of QLD
	Livestock Transporters Association of SA
Live-export	Australian Livestock Exporters Council
	LiveCorp
Producer Associations	Meat and Livestock Australia
	Sheep Meat Council of Australia
	Cattle Council of Australia
	National Farmers Federation
	Victorian Farmers Association
	Pastoralists' and Graziers' Association of Western Australia
	WA Farmers Federation
	Agforce Queensland
	Northern Territory Cattleman’s Association
	NSW Farmers Association
	SA Farmers Federation
	Australian Lot Feeders Association
	Australian Meat Industry Council
	Animal Welfare Advisory Committee
Livestock Agents	Australian Livestock and Property Agents Association
Saleyards	Saleyard Operators Australia

4 Literature review

4.1 Effluent production and characteristics during transport

The spillage of effluent from livestock transport trailers has been identified as a public amenity issue in terms of odour and the visual aspect of manure spilling from the trailer. These impacts also lead to the community perceiving health impacts from exposure to effluent from livestock trailers. The health impacts of effluent spillage have not been fully quantified. However, zoonotic organisms from animals do have the potential to transfer disease to humans. These diseases can be spread via inhalation of airborne particles, such as Q-Fever, or ingestion of animal bodily fluids. Livestock transport trailers can potentially be a vector for disease transmission along major transport routes.

Another significant issue in relation to effluent spillage is road safety through the generation of slippery road surfaces and the splashing of effluent onto vehicle windscreens. These 'hot-spots' of effluent spillage on roads generally occur on corners and when road inclines are encountered after a significant distance on relatively flat road topography. Similarly, traffic lights are potential areas for hazard due to the stopping and starting of loaded trailers.

The other identified issue is in relation to environmental pollution from effluent. The concentration of spilt effluent can cause contamination of waterways with increased organic and nutrient loads. This may be an issue with selective containment of effluent and subsequent high-load dumping on the outskirts of towns.

The transport and handling procedures and the associated deprivation of feed and water imposed on livestock during the course of marketing are significant contributors to transport stress syndrome, characterised by loss of appetite and body mass and compromised immune function (Murata, 1989; Atkinson 1992). Transport stress has led to liveweight loss en route, and greater carcass shrink (Schafer et al. 1992), whereas it is also accepted that animals dehydrate with increasing transit time (Sinclair et al. 1992; Tarrant et al. 1992, Knowles et al. 1999). Many studies have investigated management strategies for dealing with the problems caused by transport stress such as preconditioning regimes (Pritchard and Mendes, 1990), rest periods during and after transport (Whythes et al. 1988), and the use of electrolyte solutions (Gortel et al. 1992); Phillips, 1997; Schafer et al. 1997).

4.1.1 Typical livestock transport trailer configuration

The quantity of effluent produced in a livestock trailer is dependent on a range of variables including cattle numbers, type and liveweight, and travel time. In order to have a point of reference for further discussions, it is proposed that a representative livestock transport trailer configuration is a typical B-Double configuration loaded with 500 kg cattle under Queensland volume loading conditions on a 2-hour journey. With this configuration, key data are:

- Tare weight of prime mover and empty trailer = 32,000 kg (without fuel)
- Floor area for livestock (4 decks) = 87.8 m^2
- Number of 500 kg cattle in a full load = 71 cattle
- Stocking density = 1.23 m^2/head
- Total liveweight of cattle on loading = 35,500 kg
- Gross vehicle weight at time of loading = 67,500 kg

Clearly, there is an infinite combination of other livestock transport configurations and subsequent calculations need to be adjusted accordingly.

4.1.2 Manure production rates

In order to make management and design decisions on the issue of effluent spillage, it is important to ascertain the amount of effluent (manure) production during transport and the factors (stress, diet) that affect the amount and consistency of manure produced.

Fresh manure is defined as the composite product of faeces and urine discharged by ruminants. Excretion of manure is the direct product of feed consumption and is related to the size and type of the animal. Cattle normally defecate about 12 times per day, with a range of 11 to 16 times per day recorded in different studies (Phillips 1993, cited in Johns and Johns 2006).

Very little literature is available on the amount of manure (faeces and urine) that animals produce during transit, though some studies have investigated transport and curfewing. Phillips et al. (1991) cited in Thull (1999) investigated the relationship between fasting and transport plus fasting and its effects on weight loss for calves (220 kg). Over 48 hours, a weight loss of 8.25% was recorded, where 68.3% or 12.78 kg were faeces and urine output. Shorthose (1965), cited in Thull (1999), states that defecation and urination usually occurs at a maximum rate in the early stages of transport and becomes less as the amount of feed and water remaining in the gut declines. However, further studies show faeces are produced during fasts of up to 5 days, although, towards the end, the rates are reduced to 15 – 20% of those prior to fasting.

Thull (1999) investigated the rate of manure production for truckloads of New Zealand cattle that had been curfewed for approximately 4 hours prior to transport compared to those not curfewed. These data represent the average of a range of data for different animal types (dairy cows, bulls, heifers and steers) and pasture types. Effluent production for the vehicle (presumably a typical truck and dog configuration from New Zealand (see Photograph 5) that has an equivalent deck area to an Australian 2-deck semi-trailer) was measured over a 500 km journey. Effluent production was halved for the curfewed cattle compared to the full cattle (100 L versus 200 L) for the first 100 km. At 200 km, the difference in effluent production was 180 L for curfewed cattle versus 400 L for full cattle. By the end of the journey (500 km), effluent production for the full cattle was approximately 2.5 times that of the curfewed cattle (520 L versus 210 L). Rates of effluent production appear to rapidly decline at about 250 km (presumably about 3 hours) into the journey for the curfewed cattle. The rate of decline appeared to be less pronounced for the full cattle.

Table 14 shows the average and total manure production rates during transport (L/hr) when converted to the typical B-Double configuration (extrapolated from Thull 1999).

Table 14 – Average and total manure production for cattle

Length of Journey (hrs)	Average Manure Production (L/hr)		Total Manure Production (L/journey)	
	Curfewed	Full	Curfewed	Full
1	120	240	120	240
2.5	93	186	233	465
3.75	72	160	270	600
5	60	144	300	720
6.25	50	125	315	780

Adapted from Thull (1999)

Gregory et al. (2000) evaluated four treatments in which pasture-fed Angus steers (approximately 500 kg liveweight) were driven 2 hours to an abattoir and held before slaughter. The four treatments were:

1. Fed for 48 hours on hay before transport
2. Fed for 24 hours on hay before transport
3. Taken directly from pasture and loaded
4. Curfewed (feed only) for 24 hours before transport

The curfewed treatment had a substantially lower production of effluent during transport than the other three fed treatments. The amount of effluent in the truck (kg/animal) for the four respective treatments was 7.2 kg/animal (48 hr hay), 4.7 kg/animal (24 hr hay), 5.8 kg/animal (pasture) and 1.7 kg/animal (24 hr curfew). These values can be converted to an effluent production (L/hr) for the typical B-Double configuration by assuming a density of effluent of 1 kg/L. The effluent production is approximately 260 L/hr for the 48 hrs on hay treatment, 170 L/hr for the 24 hrs on hay treatment, 200 L/hr for the pasture treatment and 60 L/hr for the 24-hour curfewed treatment.

For the whole journey, the volume of effluent produced would be 520 L, 340 L, 400 L and 120 L respectively. This is similar to the data in Table 14 , which, for a 2.5-hour journey, the total effluent produced would be 233 L for curfewed cattle and 465 L for full cattle.

The manure estimation and nutrient mass balance model, Beef-bal, was also used to estimate likely manure production of feedlot cattle. A typical sorghum/wheat based diet was used in the analysis. Beef-bal predicted likely manure production rates of approximately 60 L/hr for a B-Double load of 600 kg animals (60 head), assuming a manure (urine and faeces) moisture content of 90%. This is in the same order of those predicted by Thull (1999) of curfewed cattle transported for 5 hours. Thus, manure production for short trips (1 hr) for feedlot cattle is likely to be in the order of 120 L/hr. However, this has not been validated with direct measurement and should be used with caution.

Other text book values were also used to estimate likely manure production of beef cattle, including the MidWest Plan Service (1985) and the American Society of Agricultural and Biological Engineers (2005) standards. These estimated manure production at approximately 90 L/hr and 80 L/hr for the B-Double configuration respectively.

4.1.3 Significance of the manure load

Using the data in Section 4.1.2, the effluent produced by non-curfewed cattle would be about 500 kg in a 2-hour journey. This represents about 0.7 % of the initial gross loaded weight of the vehicle and represents about 6 mm of effluent evenly spread across the floor of the trailers. For curfewed cattle, the effluent produced would be about 250 kg which is 0.35 % of gross loaded weight and represents about 3 mm of effluent evenly spread across the floor of the trailers.

4.1.4 Manure chemical characteristics

To investigate the likely environmental impact of this manure, it is worth considering the amount of nutrients (nitrogen, phosphorus and potassium) that are produced in the effluent. The Beef-bal model was used to estimate the percentage of these nutrients relative to the total manure. Beef-bal predicts the nitrogen, phosphorus and potassium concentration of the manure is 8 g/L, 0.7 g/L and 3.7 g/L respectively. This is in line with ASABE predictions of nitrogen, phosphorus and potassium concentration of the manure of 5.6 g/L, 0.7 g/L and 3.8 g/L respectively. Thus, for trips of 5 hours, the amount of nitrogen, phosphorus and potassium produced for a B-Double is likely to be in the order of 460 g/hr, 70 g/hr and 210 g/hr respectively (assuming a manure density of 1 kg/L). For short trips (1 hr), the amount of nitrogen, phosphorus and potassium produced for a B-Double is likely to be in the order of 920 g/hr, 140 g/hr and 420 g/hr respectively (assuming a manure density of 1 kg/L).

These are very low nutrient production rates and are not likely to have a significant impact on the environment.

4.1.5 Manure physical characteristics

Johns and Johns (2006) reported that the curfewing of cattle off feed has a pronounced influence on the consistency of manure. When cattle are fasted before transport, the weight of gut contents decreases, but the material usually becomes more liquid (Bass and Duganzich 1980, cited in Johns and Johns 2006). These authors noted that the moisture content of stomach contents increased from 86.2% at time zero to 93.4% after 48 hours.

Gregory et al. (2000) found that curfewed cattle usually have a higher moisture content in the rumen, but the cattle that were fed up to the time of trucking (especially on pasture) had the most liquid manure. This was attributed to higher levels of stress in non-curfewed animals. Jacobsen and Cook (1997) found that bulls when transported in a fed state, were more likely to be stressed, resulting in runny faces. Gregory et al. (2000) found that pasture-fed angus steers had runnier faeces when compared with hay (48-hr and 24-hr) and fasted cattle and this was thought to be responsible for the higher levels of fresh faecal soiling on the hide. Consequently, cattle fed pasture up to the time of transport adversely effects cattle faeces consistency and stock cleanliness. Johns and Johns (2006) concluded that a 24 hour curfew before transport is the most beneficial in reducing poor consistency manure.

Simply reducing hide contamination however may not reduce microbial contamination of the hide. Pointon et al (2006) concluded from their review of food safety and carcass hygiene that while off-feed curfew reduces the potential for faecal contamination of hides/pelts during transport, the additive effect of increasing time-off-feed (including on-farm curfew) on unwanted microbial growth produces a countervailing effect. This review found that time-off-feed including an on-farm Curfew for cattle for as little as 24 h can result in increasing levels of *Salmonella* spp. and *E. coli* in the gastrointestinal tract. When hay fed cattle (with no feed curfew pre-transport) were compared to pasture fed cattle with 40 hours off-feed, the latter curfewed cattle had a 3 $\log_{10}$ increase in *E. coli* counts above hay-fed, non-curfewed stock. Johns and Johns (2006) also concluded that “as the elevated shedding of some pathogens occurs under stresses associated with curfew and transport activities and the shed parasite load is independent of volume, curfew may in fact increase discharge of parasite egg and microorganism loads”.

4.1.6 Effect of animal stress on manure production

Anecdotally, the stress of an animal is likely to influence the rate of manure production. Animal stress during livestock handling (transport) can be divided into two categories:

1. Psychological (restraint handling or novelty),
2. Physical (hunger, thirst, fatigue, injury or thermal extremes).

Grandin and Gallo (2007) found that the reaction of an animal to the stress of transport may be extremely variable and for intensively raised cattle that are accustomed to close contact with people, riding in the vehicle (transportation) may be more stressful than walking up the loading ramp. For wild, extensively raised cattle, just the opposite may be true: loading and unloading may be the most stressful part of the trip.

Thull (1999) reports that cattle and sheep are herd animals that are accustomed to their social order within the herd. Separation from the herd or flock, or mixing with other groups prior to or during transit, will cause stress until the social order is restored. Thull (1999) reports numerous studies that have shown the importance of yarding livestock prior to transport. As animals are not

always likely to be yarded in the group that they come from in the paddock or feedlot pen, yarding. Hence, yarding is important in order to calm them down, to allow sufficient time for livestock to familiarise themselves with other animals and to get used to the new restrained environment. Stephens (1982), cited in Thull (1999), reports that animals break the bond with the herd as they leave their farm of origin which causes emotional stress that is often overlooked. Thull (1999) also noted that some authors mention that yarding time should not be too long and should not exceed 24 hours, as animals become fatigued and less able to cope with the transport (Eldridge 1988, cited in Thull 1999).

Grandin and Gallo (1997) describes loading and unloading events as novelties for animals which cause stress, unless they have been trained and shifted beforehand, with loading/unloading ramp design being a major stress factor for animals. Grandin and Gallo (2007) cite numerous studies on the importance of correct stocking density in minimising falls, trampling and consequently bruising. High stocking densities restricts cattle from facing their preferred orientation (perpendicular to travel) during transit, impacting on stress levels.

Fisher et al (2008) reviewed the impact of land transport on animal welfare. They categorised welfare during transport into three areas:

1. Handling, loading and novelty of the transport environment and experience can induce a physiological stress response
2. Withdrawal of feed and water, and the need to stand and maintain balance can cause a physiological and fatigue challenge.
3. Thermal and physical conditions of the vehicle and journey can pose a physical risk.

This review concluded that animals will exhibit some level of stress during loading and the initial stages of transport unless they have been extensively transported and that that this initial level of stress will decline within 1 to 2 hours with good practice transport. This initial psychological stress tend to give way to challenges associated with journey duration although there is relatively little knowledge on the fatigue effects during transport.

They also emphasise the importance of correct stocking density in minimizes bruising, as well as lessening the effects of hot conditions on animal welfare.

Thull (1999) reports on several studies on the importance on livestock transporter driver education on animal welfare and meat quality. As cattle have a high centre of gravity, they are exposed to centrifugal forces during a journey full of bends, where keeping upright is a constant struggle due to their high body weight and thin legs. He cites work by van Holleben (1998) where it is possible to recognise particularly ruthless truck drivers through measurement of carcass pH one hour after slaughter. Work by Eldridge (1988) and Honkavaara et al. (1994), cited in Thull (1999), describe how travel distance in itself does not affect the physiological stress level, as animals tend to calm down after a while.

Kilgour & Mullord (1973) provided recommendations on reducing stress during the transport of calves in New Zealand. This included feeding dry feed material instead of grass before transportation to add to the comfort of the animals in transit and help maintain better standards of hide cleanliness. Tarrant et al. (1993), cited in Thull (1999), describe that high frequency of urination is associated with fear – a strong stressor.

There appears to be little research investigating a direct correlation between excretion of faeces and urine and fear / animal stress. However, ALTA (see Appendix B) states that “overwhelming industry experience suggests that stock loaded with full bellies are less steady on their feet and find transport more trying”.

4.1.7 Summary and knowledge gaps

No Australian studies could be found that measured the amount and timing of effluent produced by livestock during transport. No studies could be found that quantified the amount of effluent lost from livestock vehicles during journeys. Hence, all predictions of effluent load in Australian livestock vehicles need to be treated with caution.

A study in New Zealand by Thull (1999) showed that manure production rates can be reduced by half during transit if cattle are curfewed for 4 hours before transport. When these manure production rates are extrapolated to a B-Double, it equates to 120, 230 and 300 L/hr for curfewed animals and 240, 470 and 720 L/hr for full cattle on 1, 2.5 and 5 hour journeys respectively.

Further work by Gregory et al. (2000) in New Zealand predicts manure production rates of 60 L/hr for 24-hour curfewed cattle compared to 200 L/hr for full cattle when extrapolated to a B-Double over a 2-hr trip.

The Beef-bal model predicts manure production rates for a B-Double of 60 L/hr for feedlot cattle. This is likely to be in the order of 120 L/hr for short trips (1 hr). However, this has not been validated.

Notwithstanding the uncertainties regarding effluent production, the additional load caused by rainfall is not known. Clearly, rainfall onto a livestock trailer during transport increases the load in the trailer. However, the effluent load in livestock trucks may be reduced if the effluent becomes more fluid and thus potentially flows more easily out of the trailer (assuming no implementation of complete containment). No data exists on the effect of rainfall on effluent loads in livestock trucks.

The moisture content of the gut increases when animals are fasted for long periods and produces watery manure. However, the effect of shorter curfews (less than 24 hours) compared to feeding fresh pasture up to the point of transport is likely to reduce manure moisture content during transport. Watery manure can lead to hide contamination.

Little scientific work has been conducted that attempts to correlate the amount of manure production to the level of fear or stress before or during transport. Research in this area would likely reinforce the other positive benefits in relation to improved meat quality and a lower incidence of dark cutting meat by minimising stress.

No work appears to have been done on the health risk of manure specifically in relation to effluent spillage during transport of livestock.

4.2 Effect of transport on livestock liveweight

4.2.1 Liveweight reduction during transport

Livestock transport typically results in a loss of liveweight and in some cases, carcass weight of beef cattle. This can have both economic and welfare implications depending on the severity of weight loss and the destination of the livestock.

Liveweight loss (shrinkage) is generally in response to excretion of urine and faeces, evaporation and respiration. Most of the liveweight loss during transportation may be attributed to the effect of the withdrawal of feed and water (animal gut contents account for 12 – 25 % of liveweight, Grandin & Gallo 2007).

A summary of several studies of liveweight loss and subsequent recovery show:

- 2 % and 6.3 % liveweight loss of slaughter-weight cattle transported 5 and 26 hours respectively (Mayes et al. 1979 cited in Grandin & Gallo 2007)
- 8 % loss in liveweight during 24-hour journeys by road (Shorthose 1965; Lambooy & Hulsegge 1988; Tarrant et al. 1992 – cited in Grandin & Gallo 2007).
- Liveweight loss of 4.6, 6.5 and 7 % after 5, 10 and 15 hours travel respectively (Wariss et al. 1995 – cited in Thull 1999).
- 5 days were required to recover to pre-transport body weight (Wariss et al 1995 – cited in Grandin and Gallo 2007).

The diet of the animal will affect gut fill. Thull (1999) reports several literature studies on the greater percentage of gut fill of cattle grazed on high-roughage pasture compared to a concentrated grain diet. Grandin & Gallo (2007) states that dehydration is a factor in not only liveweight loss, but also on carcass weight during transportation. This is due to the dehydration of both muscle and fat tissues. Studies to support this include Wythes (1982), cited in Grandin & Gallo (2007) where cattle with access to water for 3.5 hours or longer before slaughter allowed muscle water content to increase, which was reflected in heavier carcass weight. The withholding of feed also changes the catabolism of muscle and fat tissues. The result is that cattle need to draw on their body tissue to supply their water and energy needs (Wythes et al. 1984, cited in Thull 1999).

Liveweight loss during transport will be due to the combination of excretion of urine and faeces, evaporation and respiration. Dehydration will not only cause liveweight loss during transportation, but carcass weight, due to the dehydration of both muscle and fat tissues. The use of electrolyte solutions for minimising the effects of stressors on animals in the marketing process has been advocated in the sheep and beef industries without a full understanding of the effects of transport stress on the acid-base physiology of ruminants (Schaefer, 1997).

The application of electrolyte solutions, particularly the use of high dietary potassium levels, to minimise transport stress in cattle has been extensively investigated (Schaefer et al., 1988; Gortel et al., 1992; Phillips, 1997). There is a trend in the literature for increases in the extracellular fluid, carcass weight, and body weight of cattle when electrolyte solutions are fed vs. when no fluids offered post-transport. The effects of the electrolyte solutions fed in these studies were to replenish lost total body water in the animals involved (Schaefer et al., 1992; 1997; Gortel et al., 1992). Similarly, the same effects can be seen when cattle are offered water post-transport (Wythes et al., 1980; 1983).

As part of the Elders Livestock Management Solutions program, Elders market two products aimed at minimising shrinkage during transport and minimising manure production. These electrolyte products are used in conjunction with each other – 800 g of “Travel & Yard” pellets per head fed with hay and / or 150-200 ml of “Prime Mover” liquid within 48 hours of transport. Prime Mover Liquid is said to contain “essential vitamins and trace elements and is designed to be poured over hay or other feed for easy consumption in a yard situation”. However, no data are available to support the claims made by the company.

4.2.2 Summary and knowledge gaps

It is known that transport generally causes reductions in animal liveweight due to the combination of excretion of urine and faeces, evaporation and respiration. Dehydration will not only cause liveweight loss during transportation, but carcass weight, due to the dehydration of both muscle and fat tissues.

The use of electrolytes has been suggested to reduce liveweight loss and minimise manure production during transport but this has not been scientifically validated.

4.3 Effect of curfew on livestock liveweight, carcass weight, meat quality and animal welfare

Pethick (2006) reviewed literature on curfews (feed and water) as they apply to land and sea transport of ruminant livestock within Australia. Pethick (2006) defined curfew time as the time period 'on farm' where animals are deprived of feed and/or water before transport. However, most scientific studies reported in the review consider the total time off feed and/or water which is the cumulative time that may involve mustering, 'on farm' curfew, transportation, sale yards and abattoir lairage. From an 'effluent' spillage perspective it is the 'on farm' curfew that is of most importance.

4.3.1 Effect of curfew on liveweight and carcass weight

Curfewing animals will clearly have an effect on liveweight, as animals will excrete manure and urine as well as respire during this period. Wythes (1982), cited in Grandin & Gallo (2007) reported liveweight loss from steers of 6, 8, 12 and 14 % when fasted for 12, 24, 48 and 96 hours respectively.

Feed curfew

Phillips et al. (1991) examined the effects of fasting alone or fasting and transport (both for a total of 48 hours) on the amount and source of liveweight loss in feeder steers. Faecal and urinary excretions accounted for between 38% and 65% of total weight loss in two separate experiments. Weight loss associated with fasting plus transport was no different to that due to fasting alone. While both treatments caused mobilisation of body nutrients and loss of body weight, these effects were quickly reversed during the post-stress period.

Ferguson (2006) reported that during the initial 24 – 48 hours of fasting, the majority of weight lost originates from excretion of gastrointestinal tract contents and urine. He reported a study by Phillips et al. (1991) that the combined weight of urine and faeces excreted accounted for 61 – 64 % of the total liveweight lost after 48 hr of food and water deprivation.

The effect of curfewing on carcass weight loss is less understood due to the fact that the carcass weight needs to be estimated before curfew. Wythes (1990) reviewed the literature on carcass weight losses, estimating that daily carcass weight loss was 1.3% for cattle withheld from feed after mustering for 2 to 11 days. For cattle that had access to feed and water after mustering, daily carcass weight loss was 0.66%. Early studies by Shorthose (1965) found that losses in carcass weight in ruminants began only after the first day (24 hours) of withholding feed and average about 0.75% per day after this first day. Thull (1999) summarised several studies that did not show carcass weight losses for cattle that had been withheld feed for less than 24 hours.

Warner (2006) concluded that curfew from feed up to 24 hours has little effect on carcass weight. However, cattle kept off feed will start to catabolise their fat and muscle tissue after 1-3 days and this will reduce carcass yield. Feeding is recommended for cattle in transit for longer than 2-3 days. The challenge with feeding cattle in spell paddocks or lairage pens at the abattoir or at saleyards is the quality of the feed and whether the cattle are settling down and eating properly, or actually still catabolising body tissue. The conclusion is that the time between mustering and slaughter has a greater effect on losses in carcass weight than either distance travelled or transportation alone.

Contrary to these early studies and reviews, Janloo et al. (1998) conducted experiments on a feed yard in the United States to study the effects of withholding feed from feedlot steers for 24 hours on liveweight, shrink, and carcass measurements. Three pens of about 190 steers were used for each treatment (with and without feed). The steers were transported 320 km (assumed approximately 4 hours) to the abattoir. Average liveweight was reduced by 1.3% and average carcass weight was reduced by 0.8%. They concluded that economically, the reduced carcass weight combined with a higher incidence of dark cutting outweighed the advantages in reduced costs for feed (one day saving) and waste disposal. Although this report talks about a curfew period of 24 hours, the total time off feed is unknown, with a transport time of presumably 4 hours and an unknown lairage time.

Water curfew

Warner (2006) concluded that cattle kept off water between farm and slaughter, and not given an opportunity to rehydrate, will produce lower carcass yields. Cattle off water for 12 hours prior to slaughter have lower carcass yields. Thus, it was recommended that access to water is provided at all times. When cattle have access to water, they will rehydrate fairly quickly although it is not clear how long they need access to water to allow sufficient rehydration to eliminate carcass yield differences.

Schaefer et al. (1992) showed that in an experiment with 89 bulls (495 kg average liveweight) held without water for 0, 12, 24, or 36 hours and with and without electrolyte, cattle with access to electrolyte had 1.5% less liveweight loss and resulted in an improved retention of cold carcass weight of between 2.2 kg (12-hour group) and 7.6 kg (36-h group).

Numerous studies cited in Thull (1999) found dehydrated cattle have a much lower carcass weight than those who had access to water.

4.3.2 Effect of curfew on meat quality

Jones et al. (1988) studied the effect of mixing unfamiliar cattle and curfew on meat quality using 50 Hereford steers. Treatment 1 animals were not mixed with unfamiliar animals, were fasted for 24 hours and slaughtered. Treatment 2 animals were initially fasted for 24 hours, mixed, transported for 320 km and held in lairage until total time off feed reached 48 hours. Treatment 3 animals were fasted for 24 hours, mixed, transported for 320 km on 2 consecutive days and held in lairage until total time off feed reached 72 hours. The study found that treatment had no effect on muscle pH, expressible juice, muscle fat content or weight losses of steaks during retail display. Meat colour both for the loin eye muscle at 24 hours and for retail steaks was significantly darker in Treatments 2 and 3 compared with Treatment 1, but the change was not of sufficient magnitude to result in dark, firm and dry meat. It was concluded that the main effect of fasting and transportation in beef cattle was a loss in carcass weight and gut fill.

Warner (2006) reviewed the literature on the effect of curfew on meat quality and concluded that there is little information of the effect of curfews on beef meat quality. The information that is available suggests that there is limited evidence that time off feed and water have an influence on meat quality *per se*. For example, long transport, saleyard selling and lairage beyond 2 days can all increase the incidence of dark-cutters and all involve elements of time off feed and/or water. However, there is evidence that the conditions surrounding any time off and/or water can detrimentally affect meat quality, in particular the incidence of dark-cutting beef carcasses. Attention must be concentrated on ensuring that the conditions of mustering, penning on the farm, loading, transport (including stocking density, duration, road type), unloading, saleyard management (where applicable) and abattoir lairage (stocking density, provision of quality feed and water, duration, flooring, ‘restfulness’) are optimised. An example of this is that the lairage pens at abattoirs are supposedly where the cattle rest and recuperate. However, if the pens are

not conducive to rest, the longer the period spent in lairage (off feed, with variable access to water) the greater the detrimental impact on both the carcass yield and the meat quality.

Janloo et al. (1998) found carcass grade and yield grade both tended to increase with feed withdrawal although these changes were not statistically significant. They concluded that these changes might reflect a slight decrease in muscle fluid retention. Although the total incidence of all classes of dark cutting carcasses was not altered between steers with feed withdrawn for 24-hr period (1.75%) and not withdrawn (1.68%), the incidence of full dark cutting carcasses was nearly tripled (1.04% versus 0.35%). They concluded that economically, the reduced carcass weight and higher dark cutting incidence outweigh current advantages in reduced costs for feed (one day saving) and waste disposal. Although this report talks about a curfew period of 24 hours, the total time off feed is unknown, with a transport time of presumably 4 hours and an unknown lairage time.

4.3.3 Effect of transport on meat quality

Transport of cattle is inevitably associated with a degree of quantifiable stress. Tennessen et al. (1984), who studied short-haul road transport of cattle, and Eldridge et al. (1988), who measured heart rates of cattle during road transport at different loading densities, had also concluded that, once cattle adapted to the journey, road transport was not a major physical or psychological stressor. However, the effect of transport as an imposed time off feed and water on meat quality has been documented by a number of studies.

Whythes et al. (1981) demonstrated that steers trucked for 125km and rested for 26.5hr quietly with feed either in transit or in lairage, compared with only 2.5 hr, improved tenderness by 15%. They demonstrated that cows transported for 2055 km had higher loin pHu than cows transported for 460km, even though the total time from farm to slaughter (8 days) and time on feed and water standardised. The beneficial effects of longer holding periods were lost if the animals were not allowed to rest but were periodically disturbed.
Tarrant et al. (1992) reported that stocking densities above about 550 kg/m2 are unacceptable for slaughter steers in the liveweight range of 537 to 900 kg on long (1,000 km) journeys; at medium and low density, the physiological data suggest that any increase in journey time or deterioration in transport conditions would be detrimental to welfare.

Honkavaara et al (2003) evaluated the effect of transport time up to 14 hours and the effects of vehicle design on animal welfare, stress and meat quality on 486 slaughter heifers and bulls. They found that the amount of severe carcass bruising was highest in animals transported over short times and loaded into groups of four cattle. Mean DFD (dark, firm, dry) meat occurrence was 2,1 % and DFD frequency was lowest after short (4hrs), then after long (14 hours) and highest after medium (8hr) distance transports.

Nanni Costa et al. (2003) transported slaughter bulls for 1 or 3 hr and reported that neither incidence of carcass bruising nor beef quality was affected by the journey time or by the environmental conditions. Gallo et al. (2003) transported slaughter steers for 3 or 16 hr and held them in lairage for 3, 6, 12 or 24 hr and reported that the longer journey was associated with a significantly larger liveweight loss and lairage after 16 hr of transport increased muscle pH, decreased muscle luminosity and increased the proportion of “dark-cutter” carcasses.

4.3.4 Effect of curfew on animal welfare

Ferguson (2006) reviewed the literature on the effect of curfewing on animal welfare during transport to support the anecdotal evidence from livestock transporters that livestock travel better when curfewed. It was found that there is insufficient scientific evidence to conclude that pre-transport curfew improves the capacity of ruminants to cope with transport. Ferguson (2006)

concluded that the application of pre-transport curfews will result in less excreta in trucks, but it is not clear whether this reduces the amount of slipping during the journey and hence impact on welfare during transport. Earlier recommendations by Wythes, cited in Grandin & Gallo (2007) state that it is advisable to withhold water during the last 6 hours before loading to reduce the incidence of slipping in transit. Ferguson (2006) recommended that research be conducted to quantify the effects of curfew on the behavioural (especially slippage and lying behaviour) and physiological responses to transport. In particular, this research would assess whether curfews facilitate improvements in the capacity of animals to cope with transport greater than 12 hours in duration. This research is central to any informed judgment of the impact of curfews on animal welfare during transport. Ferguson (2006) concluded that the immediate effect of a short-term curfew (6 – 12 hours) prior to transport is unlikely to be of significant concern on animal welfare grounds. However, during marketing or movement of livestock, the cumulative period of food and water deprivation extends well beyond that associated with the pre-transport curfew period. When the total period of water deprivation, in particular, extends beyond 48 hours in mature cattle, animal welfare is likely to be compromised due to dehydration.

Ferguson and Fisher (2008) reported on the effect of curfewing yearling beef cattle and six-month old lambs when exposed to 0, 12 or 24 hr curfew (feed and water), followed by 12 or 24 hours transport. They found that subjecting healthy, grass fed cattle or lambs to pre-transport curfews did not enhance the capacity of the animals to cope with transport. They also found that the curfew period did not in itself affect the animal welfare, but simply added to the overall feed and water deprivation period and its associated effects. They concluded that pre-transport curfew needs to consider the nutritional background of the animals, the duration of transport and whether the animals are going to slaughter.

4.3.5 Summary and knowledge gaps

A 24-hour curfew off feed and water would decrease the mass of faeces and urine excreted, resulting in a reduction in the effluent expelled or required to be contained on transport.

Any time of curfew will increase liveweight loss due to the excretion of urine and faeces, as well as respiration; however, this does not necessarily correspond to a carcass weight loss.
Most of the evidence suggests that curfewing up to 24 hours will not affect carcass weight. However, the diet of the animal (i.e. lot feeding of a concentrated diet) may have some effect on liveweight and the incidence of dark cutting, and this needs investigation.

The New Zealand guidelines for reducing effluent spillage recommend curfewing animals from feed for between 4 and 8 hours prior to transport and claim that this will have minimal effect on carcass weight.

Short-term curfew (6 – 12 hours) prior to transport is unlikely to be of significant concern on animal welfare grounds. The total time off feed (mustering, curfew, transport and lairage) needs to be considered to ensure that a curfew time before transport does not have detrimental effects on carcass weight, the incidence of dark cutters and animal welfare.

The stakeholder survey (see Section 5.4) suggested that the main reason why many stakeholders do not curfew livestock is concerns over meat quality. There is insufficient research and/or extension to clearly demonstrate the effect of curfewing on liveweight and meat quality. The MSA Tips and Tools for handling cattle suggests cattle have free access to water before dispatch and have free access to feed until dispatch, other than a minimum period required for preparation through yards.

What is not clear from the scientific literature is a firm view on the impact on the weight and composition of manure from animals other than cattle (sheep) and the rate of reduction of the weight of faeces with varying duration 'on farm' water and /or feed curfews.

4.4 Overseas solutions to effluent spillage

Approaches to the issue of livestock effluent spillage from livestock transport in an overseas context have been explored. North American, European Union and New Zealand examples have been assessed.

4.4.1 Europe

It is estimated that more than 30 million cattle are transported within the European Union per year. Animals are mostly transported directly from farm to abattoir, or from farm to market to abattoir. Cattle are exported outside the EU to Northern Africa, the Middle East and Eastern Europe. Animal transport is usually undertaken by road for short distances within the EU. Combined travel by road and ship is used for long distance travel overseas. Animals are transported by animal transport ships, or can be loaded with the transport vehicle and stay on the vehicle during shipping (roll on – roll off). Very little animal transport is carried out by train, with German Rail ceasing animal transport in 2000 (European Commission 2002).

The European Commission EU Regulation 1/2005 'Welfare of Animals during Transport' was introduced in January 2007. This regulation applies to all sectors involved in transport of vertebrate animals for economic activity. It outlines requirements for transporter authorisation, driver competence certification, and vehicle specifications and approval.

Under the regulation, all vehicles and trailers need to be inspected and approved for transport by the relevant authority. All vehicles and trailers need to have a flooring surface that is anti-slip and minimise leakage of urine and faeces from the vehicle. Anti-slip provision can be chequer-plate flooring, a covering of sand or other material, or fixed or removable matting. Minimising leakage of urine and faeces does not mean that the floor has to be 'watertight'. Floors should be kept as dry as possible and it is preferable for excess liquid to drain into a sump or holding tank. Bedding is also required in all transport vehicles for comfort and adequate absorption of urine and faeces when transporting young animals. Appropriate litter is recommended over bare flooring if bedding is not used for older animals.

Additional requirements for vehicles and trailers used for long distance transport (over 8 hours) are outlined in the regulation. This includes provisions for feed and water during transport. Bedding is a requirement for all animals on long distance transport. The bedding must absorb urine and faeces adequately.

A literature search for effluent spillage events in Europe provided little insight into whether this is an issue. It is assumed that if effluent spillage does occur, it is a localised problem. Photograph **2** and Photograph 3 show that the livestock transport vehicle design common in Europe has a fully enclosed lower section of the trailer. Only a few slats are left open for natural air flow and forced ventilation is required for long distance transport. This may mean that effluent and manure are not able to come out of the trailer during transport in similar quantities to Australian conditions. The requirement for bedding for long distance transport may also minimise potential for effluent and manure spillage from the vehicle. This would absorb the majority of effluent during the trip and minimise leakage from the vehicle. Recommendations for sumps and holding tanks are outlined in the regulation. However, it is not known the full extent of implementation of these devices. If there has been a large take-up of these devices this would further minimise effluent spillage from European livestock transport vehicles.

Photograph 2 – European body truck
Source: http://www.euro-truck.biz/cattle-trucks.php

Photograph 3 – European cattle trailer – Includes ventilation system and water system
Source: www.hankstruckpictures.com/mark_manders.htm

4.4.2 North America

USA

The USA produces the largest amount of beef in the world, with a total herd of 104.3 million head as of 2008 (NASS 2008). Figure 3 shows the distribution of cattle in the US in 2002 with the majority of cattle produced in the central (Corn Belt) states.

Live cattle are also imported from Mexico. These tend to be lighter cattle to be backgrounded and eventually finished in US feedlots. In past years, live cattle imports from Canada tended to be animals for immediate slaughter, of which approximately two-thirds were fed steers and heifers, and one-third were cows (USDA 2008).

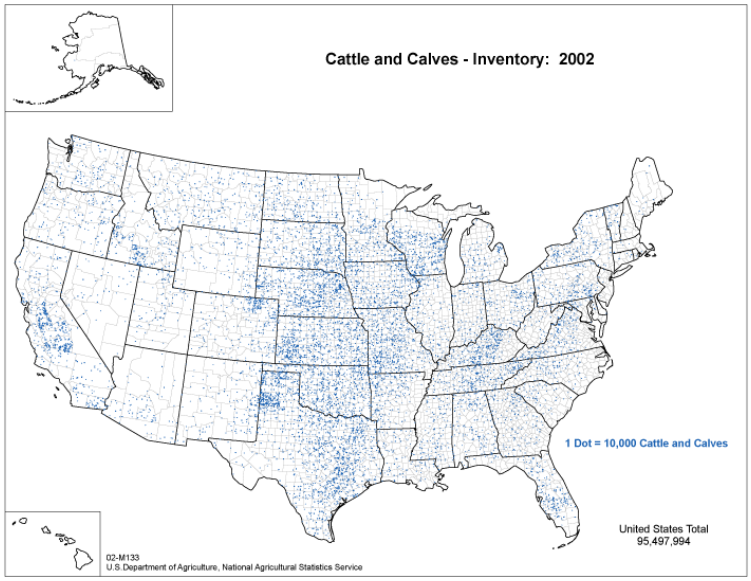

Figure 3 – Distribution of USA cattle and calves – 2002 (USDA 2008)

The Animal Welfare Act 2007 (USA) primarily deals with the use of animals for scientific research and testing. The legislation is evolving but does not currently encompass animals for agricultural production. The Animal Welfare Regulation does summarise responsibilities for transporters of animals to, from and within the US. Transporters must provide suitable transport trailers, a clean environment and appropriate litter during transport. Enclosures used to transport animals are to have solid bottoms to prevent leakage during transport, and to allow for thorough cleaning and sanitisation. The enclosure should contain clean litter of a suitable absorbent material that is non-toxic to the animal. There should be a suitable amount of the litter to absorb and cover excreta.

The 'Cattle and Swine Trucking Guide for Exporters' (Agricultural Marketing Service 1997) has been designed to provide a directive for livestock transporters. It outlines vehicle design considerations, bedding recommendations, ventilation, and loading and unloading considerations. Bedding material is recommended to absorb animal waste and provide better footing. It also helps to keep animals warm in winter and cool in the summer. Sawdust, wood shavings, straw, and sand are recommended as suitable bedding materials. Sawdust and wood shavings are recommended to be spread about 5 cm deep, straw 8-10 cm deep, and sand at least 3 cm deep on the truck floor.

During hot weather, some transporters use built-in sprinkler systems while transporting pigs. This creates additional water in the trailer that can potentially leak onto road surfaces. (This also occurs within Australia). The guideline outlines that authorities may impose fines if the effluent

spills onto the road. Effluent spillage incidences in the US may be more closely related to pig transport than cattle transport for this reason.

Canada

In 2007, there were approximately 14.2 million cattle and 879,000 sheep recorded in Canada (Agriculture and Agri-Food Canada 2008). Cattle are exported mainly to the USA (91% of cattle exports), and Mexico (5% of cattle exports) (Canfax Research Services 2008). In 2000, 62% of the total beef production was exported. The number of cattle slaughtered in federally inspected establishments in Canada in 2007 was 3.2 million.

Part XII of the Health of Animals Regulations, as part of the Health of Animals Act 1990, outlines the manner that animals are transported within, into and out of Canada. As part of these regulations, there must be provision for adequate drainage and absorption of urine within the vehicle. Sand or safe footholds, in addition to adequate bedding, are required to ensure animals are able to stand during transport. Ruminants should not be in a transport vehicle for longer than 48 hours, unless they can reach their final destination in 52 hours. In terms of curfew recommendations, an animal must not be loaded for a trip of more than 24 hours without first providing food and water within 5 hours before loading (Alberta Farm Animal Care 2008).

The Canadian Agri-Food Research Council (2001) has implemented the 'Recommended Code of Practice for the Care and Handling of Farm Animals – Transportation'. This document outlines the requirements for the care and handling of animals during transport. The code recommends that provision must be made for the drainage or absorption of urine during transport. Suitable bedding such as straw, wood shavings or matting should be added to the vehicle to assist in absorbing urine and faeces. This bedding also provides better footing for the animals and provides protection from hard flooring. Fresh bedding is required for each new load. This is recommended for all livestock transport. Typical long haul transport is undertaken using possum belly semi trailers (such as Photograph 4) or straight trailers.

A literature search for effluent spillage in Canada, the USA and Europe provided minimal information on whether this is an issue for livestock transport. Minimal literature exists for evidence of effluent spillage on roads and subsequent community issues. No direct contact was made with organisations in North America or Europe on effluent spillage issues. However, researchers were contacted at Texas A&M and the issue of effluent spillage discussed. The researchers stated that the requirement for bedding in North America (and Europe) livestock transport guidelines will minimise the potential for effluent and manure spillage from the vehicle. This bedding is designed to absorb the majority of effluent during the trip and minimise leakage from the vehicle. It is not known whether effluent holding tanks are in use in North America, but if so, then the occurrence of effluent spillage would also decrease.

Photograph 4 – North American livestock transport – possum belly semi-trailer
Source: http://www.worldofstock.com/closeups/BIN1731.php

4.4.3 New Zealand

In New Zealand, the National Stock Effluent Working Group (NSEWG) was established in 1997 by the Road Controlling Authorities' Forum with the aim of minimising the amount of stock effluent spilled from stock trucks onto roads throughout New Zealand. Membership represented all sectors of the industry including farmers, stock carriers, the meat industry, road controlling authorities, regional councils and the stock and station agents. The reasons NSEWG developed a code of practice were:

- Environmental concerns (public nuisance and run-off)
- Road safety (slippery roads and dirty windshields)
- New Zealand's 'clean green' image (aesthetics)

The NSEWG published three documents being:

- Volume 1 - Industry Code of Practice for the Minimisation of Stock Effluent Spillage from Trucks on Roads (NSEWG 2003a).
- Volume 2 - Stock Truck Effluent Disposal: A Practical Guide to Providing Effluent Disposal Facilities for Stock Trucks (NSEWG 2003b).
- Volume 3 - Stock Effluent from Trucks: Resources Management Guidelines for Local Authorities (NSEWG 2003c).

A key feature of the development process was that all stakeholders were involved and a voluntary system was introduced, thus avoiding the need for regulatory intervention. The Code was developed with a thorough identification of existing practices and technologies used to manage in-travel effluent generation in livestock transport vehicles and their effectiveness in preventing or minimising effluent spillage. Researchers from Lincoln University were part of the team (Kissling et al. n.d., Kissling and Thull 1999).

During the development of the NZ code, literature reviews and research were undertaken into various aspects of the problem.

In one of the background documents (Taranaki Regional Council 2001), it is noted that an average dairy cow (500 kg) excretes, on average, 54 kg of effluent per day when grazing on pasture. When the cow is transported, the animal undergoes stress and deposits effluent on the floor of the stock truck. Most effluent is produced within the first hour of transport. Given that each truck and trailer unit holds, on average, 40 head of cattle, the result is that significant volumes of effluent are generated if cattle are taken directly off feed and loaded onto trucks. Photograph 5 shows a typical NZ truck and trailer unit that is much smaller than typical livestock transport vehicles in Australia.

Photograph 5 – Typical NZ truck and trailer unit (40 head of cattle or 280 head of sheep)

Standing cattle off feed reduces the amount of effluent taken on to the truck by a substantial amount (by up to two thirds for cattle), depending on conditions.

Research carried out by the Ruakura Agricultural Research Centre and a literature review by Dr Jennifer R Whythes, Livestock and Meat Authority of Queensland (NSEWG 2003a) has found that standing stock off feed for the recommended time prior to transportation has minimal effect on carcass weights, and therefore prices received, as shown in Figure 4. These losses are average losses that occurred in trials involving animals that were deprived of both feed and water. With careful management, including the provision of water, the likelihood of any significant liveweight loss is reduced. These conclusions appear to be drawn mainly from the review of Wythes (1990). Standing stock off pasture also reduces stock stress (less animal bruising), and results in improved meat quality with the stock arriving in better condition.

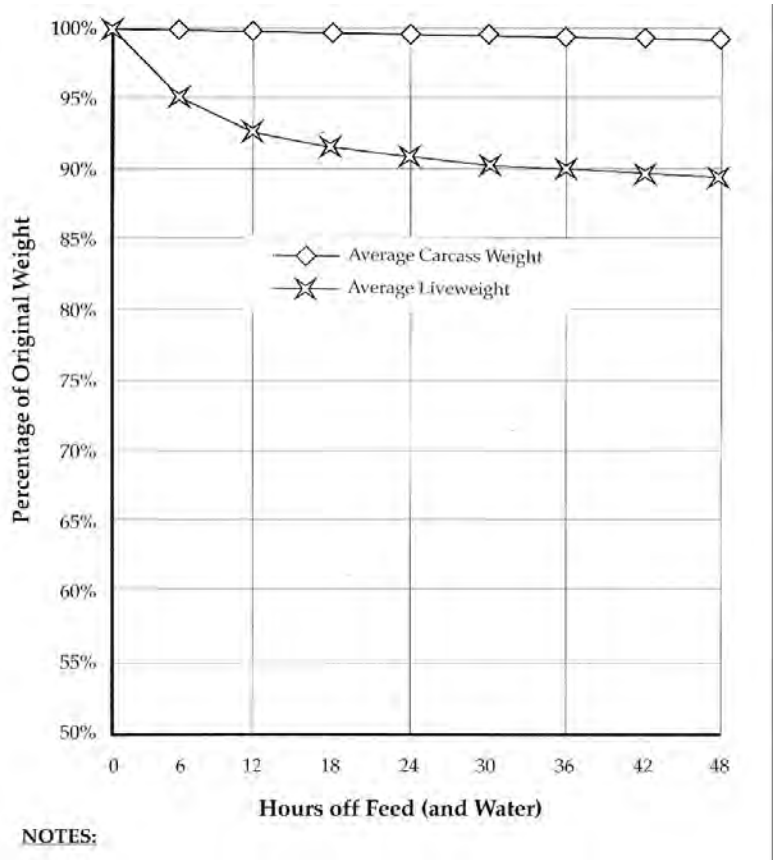

Figure 4 – Effect of standing stock off feed on liveweight and carcass weight

The New Zealand Code

The basic principles of the NZ code are:

- Stock stood (off feed for 4 – 8 hrs) before transportation.
- Simple and appropriate methods to collect and dispose of effluent from trucks delivering stock are used.
- A co-ordinated approach is in place to control this problem by good communication between all those directly and indirectly involved with the handling and transportation of stock, and the management and disposal of effluent.
    - Those directly involved with the handling and transporting stock: Farmers, Livestock Carriers, Agents, Saleyard Operators and Meat Processors.
    - Those indirectly involved: Regional Councils, Territorial Authorities and Road Controlling Authorities.

1. Standing of stock (preparation for transportation)

The following notes are provided in the NZ Code regarding preparation of stock.

- Standing of stock before they are transported will significantly reduce the amount of effluent that needs to be disposed of at destination points.
- The best way of reducing the need to collect effluent from stock being transported is to arrange for the stock to be stood before being transported.
- Dry feed such as hay, grain or meal can be used where standing stock is difficult and/or stock are being transported long distances.

Standing Stock (Curfew from feed but not water)

Prepare stock for transport by standing off pasture / crop but with access to water. This step has the most potential to minimise stock effluent. The amount of time stock should be stood off feed prior to transport is usually 4 - 8 hours. The appropriate number of hours, in excess of 4 hours, will depend on:

- condition and type of feed stock have been on prior to transportation. The supply of dry feed can be used to reduce effluent while still providing the stock with food;
- transit time (long haul transport requires extra preparation);
- the purpose of the transportation (slaughter, store, farm to farm);
- the time they will be off feed at destination; and, where appropriate,
- the time of slaughter.

2. Collection and disposal of effluent

Livestock trucks are equipped with effluent holding tanks (400 L) to contain effluent during travel (see
Photograph **6**). The effluent holding tanks have valves (see Photograph 7) that can be opened when the stock truck is parked over a disposal site grate.

Effluent disposal sites are available at a number of points along major stock routes and away from urban areas (see Photograph 8 and Photograph 9). Each disposal site has a positioning system (see Photograph 11) which consists of a series of markers either side of the grate. This allows stock truck operators to exactly position their dump valves over the grate without leaving their vehicles.

The location of these disposal stations (see Photograph 10 for disposal sites on South Island) was determined by GIS modelling undertaken by Kissling and Thull (1999). Effluent disposal stations are also available at points of livestock delivery (e.g. saleyards). The effluent disposal stations are operated by the local council (which operates an effluent irrigation system or similar) and are free.

Photograph 6 – Stock truck dumping effluent over grate (New Zealand)

Photograph 7 – Release valve underneath stock truck

Photograph 8 – Effluent containment disposal site beside highway in New Zealand

Photograph 9 – Effluent containment disposal site beside highway in New Zealand [a]
[a] Trucks pull off the highway positioning their outlet pipes over the grate, a valve is opened to release the contained effluent. When all effluent is drained, the valve is closed and the truck moves off.

Photograph 10 – Location of proposed and existing effluent disposal sites (South Island, NZ)

Photograph 11 – Positioning system at disposal site

4.5 Regulations and codes of practice controlling Australian livestock road transport

4.5.1 General transport regulations – mass and volume loading

National transport vehicle regulations are governed under the *Motor Vehicle Standards Act 1989* and *Motor Vehicle Standards Regulations 1989*.

Trailers used for livestock transport are required to meet the national dimension limitations for the relevant trailer. All livestock trailers are not to exceed 4.6 m high and 2.5 m wide. A semi-trailer length must not exceed 12.5 m and a B-Double trailer length must not exceed 18.8 m.

A National Heavy Vehicle Accreditation Scheme (NHVAS) has been established to enable operators to gain formal documentation of transport vehicle compliance and reduce the need for regulatory enforcement. Accredited operators need to demonstrate:

- An in-house quality assurance system
- Procedures for compliance
- Keep records of compliance
- Undergo independent audits regularly

The operators can be accredited under two modules: Mass Management and Maintenance Management.

Victoria, Queensland, Northern Territory, South Australia and Western Australia have state livestock loading schemes applicable to articulated vehicles, B-Doubles and road trains. These are voluntary schemes that encourage a framework for compliance of relevant state and federal vehicle standards and animal welfare loading recommendations.

The number of livestock loaded onto trailers is controlled by state regulations to prevent animal welfare and road safety being compromised. The animal welfare and road users are protected by limiting the maximum amount of livestock loaded and restricting heavy vehicles from travelling on some roads. The maximum number of animals per truck is determined by two methods depending on state. The first method is a mass limitation and the other is volume limitation. States implement either one or the other of these methods and some use a combination of both.

In addition to volume and mass loading limits, livestock transporters must always comply with the manufacturer’s rating for Gross Vehicle Mass (GVM) or Gross Combination Mass (GCM). The GVM or GCM refer to the maximum allowable mass of a vehicle with its load. When a vehicle is towing one or more trailers, the GVM is the total mass of the motor vehicle's wheels on the ground, while the Gross Combination Mass is the total mass of the motor vehicle plus all trailers. This may not be exceeded in any state. The GVM and GCM include mass rating for tyres, wheels and axles. Loading must also comply with stocking density limitations outlined in the Model Code of Practice for the Welfare of Animals – Land Transport of Cattle (SCARM 2002).

Queensland

Livestock transport vehicles in Queensland are governed by the Transport Operations (Road Use Management – Mass, Dimensions and Loading) Regulations 2005. The Guideline for Livestock Loading in Queensland (Queensland Transport 2006) has been produced to enable compliance with the regulation. All vehicles used for livestock transport are required to be registered for livestock transport.

Trailers used for livestock transport are required to meet the dimension limitations for the relevant trailer and all stock trailer heights are not to exceed 4.6 m. A semi-trailer length must not exceed 12.5 m and the tare mass of the trailer must not exceed 15 tonnes. A B-Double trailer length must not exceed 18.8 m and the tare mass of the trailers in combination must not exceed 22 tonnes.

The number of cattle per deck can be determined by the volume of the trailer and corresponding stocking density according to the Model Codes of Practice. In addition, the tare mass may not exceed the manufacturer rating for the vehicle.

Victoria

The Road Safety (Vehicles) Regulation 1999 outlines livestock vehicle requirements in Victoria. Livestock transport vehicles in Victoria are governed by a voluntary Victorian Livestock Loading Scheme. The Scheme controls the mass of livestock transport vehicles by limiting:

- Maximum trailer (trailer size) length and height
- Maximum vehicle tare mass
- The maximum number of animals determined by animal welfare codes and regulations

The maximum trailer dimensions are those of the national standard. Vehicles owned by registered operators and drivers who comply with the scheme requirements are exempt from the vehicle mass limits. However, the GVM and GCM weight may not exceed manufacturer specifications. The Victorian Livestock Loading Scheme is limited to six-axle articulated vehicles and nine-axle B-Double vehicles. Vehicles that do not participate in the scheme can still be used for livestock transport but are not exempt from complying with the vehicles mass limits.

The Victorian Livestock Loading Scheme requires driver training specific to livestock transport as part of the accreditation requirements. Drivers require training in animal welfare codes and regulations, handling animals and driving vehicles up to 4.6 m high. Driver training must be provided by a VicRoads Accredited Provider.

To successfully complete the driver training course, the driver must be able to demonstrate:

- Good understanding of animal welfare codes and regulations
- Understanding of the techniques for loading and unloading livestock vehicles
- Understanding of the legal requirements of the Victorian Livestock Loading Scheme
- Understanding the techniques for driving 4.6 m vehicles and negotiating adverse road conditions
- Use of the VicRoads publication ‘Height Clearance on Roads’ to plan a route to avoid low bridges
- Driving a high livestock vehicle in a safe manner

New South Wales

Livestock transport vehicles are subject to requirements outlined in the Road Transport (Mass, Loading and Access) Regulation 2005. Heavy vehicles are classified into two categories namely “General Access” and “Restricted Access” according to mass, dimensions and configuration.

“General Access” refers to vehicles that comply with the general mass limits (GML) and are thus permitted to travel on all roads with no restrictions. Livestock trailers that fall within this category

are restricted to a maximum length of 12.5 m, height of 4.3 m and gross mass of 42.5 tonnes. All vehicles must comply with mass limits for standard vehicles, conforming axle groups and minimum axle spacing. The loaded mass may not exceed the manufacturer's rating (GVM or GCM).

Livestock vehicles that exceed the "General Access" restrictions or exceed a length of 19 m or a height of 4.3 m are classified as "Restricted Access" vehicles. These vehicles are grouped into three classes. B-Doubles, road trains and livestock vehicles up to 4.6 m high are Class 2 vehicles. These vehicles are restricted to approved routes only.

Semi-trailers used for livestock transportation may exceed 13.7 m but not 14.63 m if they have a single deck of cattle, or two decks of sheep, goats or pigs. The lower deck must be fully loaded before the upper deck is used and the distance from the lowest deck to the top of the trailer must not exceed 2.1 m.

However, a higher mass limits (HML) scheme operates on some freight routes in NSW. 'Higher Mass Limits' is a term that describes trucks that carry slightly more mass, in return for fulfilling certain higher operator compliance standards to ensure road wear and road safety outcomes are not compromised. The 'Higher Mass Limits' refers to the maximum load that may be transported on NSW roads provided the requirements are complied with.

The HML network is available on some freight routes across the state. Higher mass limits on a B-Double truck provide an extra 6 tonnes of freight (livestock) to be loaded – an efficiency dividend of more than 10% over 'standard weight's vehicles. However, in most cases, the HML network does not extend to the whole freight task (i.e. from the feedlot, through the highway in question and to the processing plant).

From July 2006, concessional mass limits (CML) were introduced in NSW. The CML allows increased mass limits for eligible vehicles. To be able to operate under these limits, transporters need to be accredited under the NHVAS. Under CML, the GVM of vehicles with tandem and tri-axle groups will be set at 5% above general mass limits (GML), subject to:

- a maximum increase of 1 tonne for a vehicle or vehicle combination with an allowable gross mass not exceeding 55 tonnes (e.g.: 6-axle semi-trailer);
- a maximum increase of 2 tonnes for vehicle combinations with an allowable gross mass exceeding 55 tonnes (e.g. 9-axle B-Double); and
- an upper limit on axle and axle group mass as given in the table of concessional mass limits.

Australian Capital Territory

Heavy vehicles in ACT are regulated by the Road Transport (Dimensions and Mass) Act 1990. Total mass limits apply to all vehicles and combinations. The total mass of the vehicle must not exceed the lowest of:

- The sum of the axle and axle group mass limits
- The vehicles' GVM or GCM
- The sum of the manufacturer' mass limits for the prime mover (GVM) and the trailers GTM it is towing
- The applicable total mass limit

However, under paragraph 31A(1) of the Act vehicles or combinations that are being operated by an operator accredited under the National Heavy Vehicle Accreditation Scheme (NHVAS) are exempt from the requirements of sections 24 and 25 of the Act which determines:

(a) the gross mass (in tonnes) of a vehicle, or of a motor vehicle and a trailer or semi-trailer coupled to it in relation to the class of vehicles or class of combination; and

(b) the mass carried by the wheel of a vehicle, the axle load of an axle, or the axle group load of an axle group of a vehicle in relation to the relevant class of wheels, axles or axle groups.

The vehicle must show a label that it is operating under the NHVAS.

Northern Territory

Northern Territory vehicle requirements are outlined under the Motor Vehicles Act and Motor Vehicles (Standards) Regulations 2003.

Livestock vehicles operating in the Northern Territory (Northern Territory registered and interstate registered) can operate under the voluntary Livestock Loading Scheme. The scheme is designed to allow for the safe and efficient transport of livestock at optimum loading density, while ensuring vehicle dimension and safety, as well as animal welfare requirements are strictly adhered to. The scheme is open to either double or triple road train configuration, and trucks/trailers must be fitted with dual tyred axle groups.

Any livestock transporters not operating under the scheme must present each unit (truck, trailer and dolly) for inspection, unless it is an interstate registered vehicle that is participating in a Livestock Loading Scheme in their jurisdiction.

The livestock transporters that operate under the livestock loading scheme are restricted to:

- Limited trailer length (articulated double-deck cattle vehicle – 19 m long, B-Double – 25 m long and road train – 53.5 m long),
- Livestock loads may not exceed 420 kg per square metre of deck space,

The livestock transporters that operate under the livestock loading permit-of-exemption are restricted to:

- Maximum axle mass limits of 18.5 tonnes on dual-tyred tandem axle groups,
- Maximum axle mass limits of 25 tonnes on dual-tyred tri-axle groups.

Western Australia

Western Australia vehicle requirements are outlined under the Road Traffic Act 1974 and the Road Traffic (Vehicle Standards) Rules 2002 and Road Traffic (Vehicle Standards) Regulations 2002.

The owner or operator of heavy vehicles in Western Australia requires a restricted access vehicle (RAV) permit to operate. The RAV permits are required if the vehicle exceeds one or more of the following:

- mass limit prescribed in Part 3 of the Road Traffic (Vehicle Standards) Regulations 2002; or one of the following dimension limits:
- a width of 2.5 m;
- a height of 4.3 m;
- a length of 12.5 m in the case of a motor vehicle that is not part of a combination; or
- a length of 19 m in the case of a combination;

any other dimension specified in:

- Road Traffic (Vehicle Standards) Regulations 2002; or

Road Traffic (Vehicle Standards) Rule 2002.

The livestock transporters in WA are categorised as either RAC category 1 or category 2, with class 2 or class 3 sub-categories. The vehicles are classed according to length, height, number of axle groups, minimum axle spacing and maximum mass of vehicle. The different classes are then permitted to travel on specified road networks, in particular livestock vehicles of a height greater than 4.3 m.

South Australia

The Road Traffic Act 1961 and the Road Traffic (Miscellaneous) Regulations 1999 outline standards for vehicle requirements in South Australia.

Livestock vehicles in South Australia are exempt from mass limits for articulated vehicles and B-Doubles carrying livestock (Road Traffic Act 1961). Livestock vehicles in South Australia have dimension limitations (length, height and width restrictions) as well as vehicle specification, equipment and rating limitations. The number of decks is restricted with a maximum of 2 decks for cattle, 3 decks for pigs and 4 decks for sheep. During the transport of livestock, operators and drivers are to comply with the relevant animal welfare codes of practice. In addition, the tare mass may not exceed the manufacturer's rating for the vehicle. South Australia also has route restrictions for certain heavy vehicles.

4.5.2 Animal welfare legislation

Legislative responsibility for animal welfare within Australia rests primarily with state governments. All states and territories have current and comprehensive animal welfare legislation in place.

Australian Capital Territory

The Animal Welfare Act 1992 outlines relevant animal welfare recommendations for the ACT. Transport of animals is referred to in *part 2 – section 15 - transport and containment*. This states that any person may not transport or contain an animal in circumstances under which the animal is subjected to unnecessary injury, pain or suffering.

New South Wales

The Prevention of Cruelty to Animals Act 1979 outlines animal welfare requirements for NSW. There are no specific references to transport of animals in this legislation.

Northern Territory

The Animal Welfare Act provides animal welfare recommendations for the Northern Territory. *Part 2 – section 13 – transportation* outlines that a 'person transporting an animal must do so in a manner that does not unreasonably or unnecessarily inflict suffering on the animal.'

Queensland

The Animal Care and Protection Act 2001 provide animal welfare requirements for Queensland. There is no specific reference to transport of animals in this legislation.

South Australia

The Animal Welfare Act 1985 summarises the animal welfare requirements in South Australia. There are no specific references to animal transport in this Act.

Tasmania

The Animal Welfare Act 1993 outlines the animal welfare recommendations for Tasmania. There are no specific references to animal transport in this Act.

Victoria

The Prevention of Cruelty to Animals Act 1986 provides the animal welfare recommendations for Victoria. There are no specific references to animal transport in this Act.

Western Australia

The Western Australian Animal Welfare Act 2002 outlines the animal welfare requirements. There are no specific references to animal transport in this Act.

4.5.3 Animal welfare codes of practice

The last two decades has seen significant improvement in animal welfare standards with research into the welfare needs of animals. This improved understanding and knowledge has seen the development of codes of practice and legislation that set minimum standards for animal welfare.

The Australian Model Codes of Practice for the Welfare of Animals have been developed by the Standing Committee on Agriculture and Resource Management (SCARM - animal welfare working group) and are the primary reference for sheep and cattle. The Model Codes of Practice are developed with extensive consultation with industry and are endorsed by the Primary Industries Management Council (PIMC).

Some States and Territories adopt the codes into legislation, while in other States, the courts may refer to the codes as evidence that animals have, or have not been treated appropriately.

Australian Model Code of Practice for the Welfare of Animals – Land Transport of Sheep

The Animal Welfare Committee of Standing Committee on Agriculture and Resource Management (SCARM) has developed an Australian Model Code of Practice for the Welfare of Animals – Land Transport of Sheep (SCARM 2002). This code is intended as a guide for people who are involved in transporting sheep and will replace the existing Model Code of Practice for the Welfare of Animals – Road Transport of Livestock as it relates to sheep.

The objectives of this code are to promote agreed minimal acceptable animal welfare standards for the transport of sheep and to provide guidance to people responsible for the care and welfare of sheep being transported by land. Additionally, the code aims to demonstrate to the community that the industry is properly addressing welfare during sheep transport.

The standards reflect best practice animal welfare standards that sheep producers and transport operators should follow and contains greater detail specific to sheep than the codes it replaces.

Once the code is endorsed by the Primary Industries Ministerial Council (PIMC), it will be published as a PIMC Report, and will be available for purchase by people who are involved in transporting sheep. All the Australian Model Codes of Practice for the Welfare of Animals published by the CSIRO are currently available for downloading from the Internet.

Code of Practice for the Transportation of Sheep in Western Australia

The Code of Practice for the Transportation of Sheep in Western Australia was published by the Department of Local Government and Regional Development Western Australia (2003). This code has been prepared to assist all persons handling or transporting sheep in Western Australia, and reference to this code is made in Regulations provided under Section 25 of the *Animal Welfare Act 2002* for the purposes of a defence against cruelty. It is not intended to be used for either audit or compliance purposes.

This WA Code of Practice is intended as a guide for people who are involved in transporting sheep. It emphasises the responsibilities of the owner of the sheep (or his/her agent) and drivers. It is intended to encourage considerate treatment so that transport stress and injury are minimised at all stages of the transport operation. In this code, transport includes the period immediately after mustering for loading including loading, transit, rest periods and unloading at the point of destination.

Sections of the code have detailed strategies in the areas of:

- Management to minimise stress
- Pre-transport preparation
- Loading
- Transport design
- Loading density
- Travel – including water, feed and spelling requirements
- Unloading
- Emergency euthanasia.

The only section where limb protrusion is specifically addressed is under the transport design section where it is stated that: “Side rails should be spaced at 150 mm intervals to prevent the heads and limit the chance of legs of animals protruding between them”. However, the code includes many strategies to assist in minimising the occurrence sheep lying down (and hence leg protrusion) or overloading/overcrowding. These include the following:

- Ensure sheep are fit to travel
- Sheep should only be loaded on thoroughly cleaned vehicles
- Appropriate construction to avoid soiling lower decks
- Segregating sheep by size, pregnancy etc
- Providing pen partitions to avoid overcrowding, surging and injuries, where pens are preferably 2.5 m in length and no more than 3 m
- Floors constructed of non-slip material
- Only transported without spelling for up to 24 hours and inspecting animals regularly during transit. For weaned sheep less than 12 months, the relevant time period is 12 hours. This time period includes loading and unloading and stops when the animals are not unloaded. The 24 hour transport period for mature sheep may be extended to 30 hours if, and only if, the entire journey can be completed within this time. For young sheep, the 12 hours period may be extended to 18 hours
- Water and feed must be provided at least once in every 24 hours to animals older than 12 months - the only exception is animals travelling on a journey which will be entirely completed in 30 hours
- Drivers should drive as smoothly as possible to prevent injuries and animals being thrown off their feet
- Distressed or injured animals must be assisted by the driver and every effort should be made to get fallen animals to their feet
- Inspecting consignments within 30-60 minutes of commencing a journey and checking every at least every three hours, or whenever the driver has a rest stop
- Providing a loaded density that allows fallen animals to rise without assistance

A loading density table is provided for sheep with half wool that should be adjusted accordingly for the amount of wool (see

Table 15). This density must be applied to each section in the truck.

Table 15 – Recommended Loading Densities for Sheep (WA)

Average Weight (kg)	Floor area per head (sq.m per head)	No. of head per 12.2 m deck
20	0.17	170
30	0.19	150
40	0.22	130
50	0.27	110
60	0.29	100

Australian Model Code of Practice for the Welfare of Animals – Land Transport of Cattle

The Australian Model Code of Practice for the Welfare of Animals – Land Transport of Cattle (Report 77) was developed by the Standing Committee on Agriculture and Resource Management - SCARM (2002) to guide people who are involved in the transport of cattle on appropriate treatment during transport so that stress and injury are minimised.

The code stipulates that cattle can be transported more effectively and with less stress if:

- Care is taken in cattle selection prior to transport
- Care is taken when loading and unloading and using well designed facilities
- The transport used (road and rail) is well designed
- The transport is scheduled to minimise delays

Sections of the code have detailed strategies in the areas of:

- Management to minimise stress
- Pre-transport preparation
- Loading
- Transport design
- Loading density (see Table 16)
- Travel – including water, feed and spelling requirements
- Unloading
- Emergency euthanasia

Table 16 – Recommended Loading Densities for Cattle

Average Weight (kg)	Floor area per head (sq.m per head)	No. of head per 12.2 m deck
450	1.13	26
500	1.23	24
550	1.34	22
600	1.47	20
650	1.63	18

The code specifically deals with ‘empty out time’, which is described as *the deliberate and variable period of water and/or feed deprivation aimed to minimise faecal and urine spoilage of the transport vehicle and the subsequent problems associated with slippage*. It states that the time varies between 0 and 12 hours depending on cattle condition and class, feed type and

distance to be travelled. The time needs to be negotiated between the owner and the transporter, with consideration of the time the cattle have been without feed and water prior to transport.

The code also addresses the issue of water deprivation during transport. Water deprivation time is calculated to include the holding and mustering period if applicable, and time after unloading. For mature animals, the maximum time off water is 36 hours (lesser times are specified for lactating cows, calves etc). This can be extended to 48 hours if:

- The animals are travelling well and not showing signs of fatigue, thirst or distress, and
- Adverse weather conditions are neither prevailing nor predicted and
- It will allow the entire journey to be completed within 48 hours, and animals are rested with feed and water for at least 18 hours immediately upon arrival.

The code does not recommend a maximum time of feed deprivation as it varies with condition, breed, sex of the cattle and the type of feed they have been on. The code states that cattle can generally be off feed without detriment to their welfare for a greater period of time than the stated water deprivation times.

Draft Australian Standards and Regulation for the Welfare of Animals – Land Transport of Livestock

The Australian Standards and Regulation for the Welfare of Animals – Land Transport of Livestock, is a proposed guideline developed under the new system stemming from Australian Animal Welfare Strategy (AAWS) of the Regulatory Impact Statement (RIS). The new guidelines development is led by Animal Health Australia. The intention of the new document is to replace the various existing transport model codes of practice.

Although the new guidelines will not be regulated, they may be incorporated in various jurisdictions if endorsed by the Primary Industries Ministerial Council (PIMC). The new guidelines are thus treated as if they were mandatory by the RIS.

The new guidelines debated several animal welfare issues. The following proposals and comments are being considered and if implemented may have an effect on current practices discussed in this report.

The current standards for vehicles and facilities are considered sufficient to prevent limb protrusion. There were however comments made that to prevent limb protrusion entirely the crates would have to be completely enclosed which would cause animal welfare issues. It was also suggested that any changes made should be based on science and that limb protrusion may largely be related to stocking density issues.

There were further comments that the use of bedding is mostly not relevant or practical. The washing of trucks was discussed with the outcome that current guidelines are adequate and no changes are recommended. There was a proposal that multi-deck vehicles, excluding poultry vehicles, should be constructed and maintained to prevent the soiling of animals on the lower decks.

The issue of curfews off feed and water was not specifically addressed by the guideline. However, it was commented that insufficient attention was given to curfews and that the development of guidelines should be something that needs to be done in the future. The use of curfews was not supported by all.
There were suggested changes to the maximum time off water for all species. There has not been an agreement to what the time should be changed to however most agree that 48 hours off

water for adult cattle is too long. There were additional comments that cattle should not be transported for more than 8 hours or exceeding 500km at a time and must not be transported over jurisdictional borders.

4.6 Biosecurity issues for livestock transport

There are four priority biosecurity issues that relate to livestock transport, namely:

- Weed seed transfer
- Parasite spread
- Animal disease transfer within the livestock population
- Disease transfer from livestock to humans

Disease transfer from livestock to humans (zoonotic diseases) has been omitted from this report based on a decision made by the project team in the initial stages of this project. This issue is currently being researched in a different Meat and Livestock Australia project (FLOT 333) and requires an in-depth discussion outside the scope of this project.

The main biosecurity risk with livestock transport is the spread of weeds, particularly from animals that have originated from extensive grazing. During livestock transport, weed seeds are primarily transported in the rumen, but can also be attached to hooves, hide, skin and wool.

The simplest definition for a weed is a plant out of place. Weeds are plants that are able to spread rapidly and produce unwanted economic, environmental or social impacts. In Australia, the cost of weeds to agricultural industries alone has been estimated at over $3.3 billion per annum (Barker 2005).

Seeds can survive passage through ruminant digestive tracts for several days before excretion, with harder seeds having a better chance of survival than softer seeds. Warner (1981) documented experimentally determined mean retention times for various animals (Table 17).

Table 17 – Mean retention time in the gut (warner 1981)

Animal	Mean retention time (hr)
Sheep	31-103
Cattle	54-127

Large variations in retention time within species are due to differing age, condition, feeding patterns and feed composition (Johns and Johns 2006). Feedlot animals are less likely to carry weed seeds than pasture grazed animals, as their diet consists of processed feed that is less likely to contain viable weed seeds after processing.

Johns and Johns (2006) summarised the effect of curfewing on minimising biosecurity risk from weed seeds and found that there is little available research data on the effects of curfewing animals on weed seed survival. However, since average retention times for cattle and sheep are greater than two days, curfewing periods of less than this time are unlikely to greatly reduce the risk of weed seed dispersion via excretion.

Johns and Johns (2006) investigated some of the key livestock parasite species and diseases found in Australia as described in MLA (2005). These included small brown stomach worm (Ostertagia spp), liver and stomach fluke (Fasciola hepatica), black scours (coccidia), barber's

pole worm (Haemonchus contortus), scour worm (Trichostrongylus colubriformas) and Johne's disease.

They concluded the biosecurity risk of the spread of parasites during livestock transport only occurs when effluent spillage from the vehicle causes large numbers of a parasite to infect pastures and/or watercourses close to transport routes that are accessed by stock. When spilt onto a road surface, these organisms will rapidly die-off due to the climatic conditions not being conducive to survival. There is some risk of spread of these parasites during wet weather where they are washed into nearby water and soil that is more conducive to their survival.

They also summarised the effect of curfewing on minimising biosecurity risk associated with the spread of parasites and disease during livestock transport and found that there is little recorded information regarding the effect of curfew on parasite excretion. Studies have shown that curfew reduces manure load excreted by the animal. However, the excretion of parasitic eggs generally remains constant by infected animals, and is not affected by feed quantity or type. The reduction in manure load excreted can concentrate the egg count potentially causing more problems.

It was concluded that it is unlikely that curfewing would have any effect on the transmissions of Johne's disease, as restricting animal excretion to zero during transport is not achievable. By contrast, levels of some bacteria, such as *E. coli*, increase following fasting, and there could be the possibility that a similar phenomena occurs for the bacteria responsible for Johne's disease. Faeces and contaminated run-off are known to spread Johne's disease between farms. It is possible that water sources may be contaminated through the excreta of infected animals (ruminant and non-ruminant). Animals in transit are therefore equally likely to transmit infection through manure deposited on the roadside and surrounding areas.

4.7 Quality assurance in the livestock transporting industry

4.7.1 TruckCare

TruckCare (Australian Livestock Transporters Association, 2008) is the livestock transport industry's independently-audited quality assurance program. The program is built around the quality assurance principles contained in international standards and also uses hazard analysis of critical control points (HACCP). TruckCare is designed to integrate with other quality programs including CattleCare, FlockCare, National Saleyard Quality Assurance and TruckSafe.

The program is aimed at raising awareness, introducing quality management, implementing a quality management system that can be audited by customers, or by an externally qualified auditor and integrating with customers or road transport quality assurance programs.

ALTA developed TruckCare in response to the need to improve animal welfare, OH&S and biosecurity risks in the livestock transport industry. TruckCare is administered by ALTA but is audited by independent auditors. TruckCare has several elements specific to animal welfare, including:

- Stock trailer maintenance and management of associated livestock transporting equipment
- Livestock welfare and animal transport – including reference to the animal welfare standards
- Planning requirements for journeys
- Livestock handling and competency
- Selection of livestock for transport – “Fit to Load’ recommendations
- Handling, loading, transportation and unloading of livestock to minimise stress or injuries

4.7.2 ‘Fit to Load’ national guide

Each state and territory has its own animal welfare Act and accompanying regulations that affect people who own or work with animals including farmers, livestock transporters, livestock exporters, saleyard personnel and processors. Under these Acts it is an offence to transport, confine, restrain or catch an animal in a way that causes, or is likely to cause, it unnecessary harm. The regulations include reference to codes of practice (codes) that define what is generally regarded as acceptable welfare practices for livestock husbandry and transport.

MLA (2006b) developed ‘Is it Fit to Load?’ in consultation with the livestock industry to assist producers and transport operators decide if an animal is fit to be loaded for transport to saleyards, abattoirs, or any other destination. This publication is designed to provide a national guide to the individual state legislative requirements and codes of practice for the transport of livestock. According to the guide, an animal is considered fit to travel if it:

- Has been prepared adequately prior to transport (yarded appropriately, access to feed and water).
- Is strong enough to undertake the journey.
- Can walk normally, bearing weight on all four legs (no lameness, deformity or arthritis).
- Is not suffering from any visible disease or injury that could cause it harm during transport (no open wound, cancer etc).
- Can keep up with the mob both at loading and unloading (no deformity, malnutrition, exhaustion etc).
- Is suitable for transport according to the relevant Codes of Practice.
- Can see out of at least one eye.
- Is not in late stages of pregnancy (ewes later than 4 months and cows later than eight months).
- Is not a newborn or young animal that requires special consideration.

The guide recommends that where there is some doubt that the animal does not comply with the above requirements, the animal should not be transported.

4.8 Review of livestock trailer design

4.8.1 Cattle trailers

Improvement in livestock trailer design is a continual process as trailer manufacturers continue to design trailers that comply with progressing animal welfare issues and livestock transport

standards. A challenge in livestock trailer design is finding a balance between trailers that are well ventilated for animal welfare yet closed enough to contain effluent and prevent limb protrusion. Trailers need adequate air flow through the trailer to reduce heat stress and provide easy access for drivers to inspect the livestock during the journey. The gaps in the side of the trailers need to be designed so that the position and size of gap does not allow limbs to protrude through the sides (Trailer design to reduce limb protrusion and ensure animal welfare will be discussed in Section 5.6.2).

Livestock trailers were not originally designed to contain effluent. Rather they were designed to prevent effluent build-up in the trailers by allowing effluent to escape. Old trailers typically do not have side panelling that is flush with the floor of the trailer. The gap between the trailer floor and the lowest panel allows effluent to continuously escape from all side of the trailer.

4.8.2 Effluent containment

More recently, livestock trailers have changed in design to incorporate solid panels to the floor of the trailer, with a gap located about 200-300 mm from the bottom to allow the operator to see into the trailer, and to provide ventilation. Effluent is contained within these trailers by these side panels and is directed to the back of the trailer. It is usually allowed to flow out of the trailer through drains on each deck. It is uncertain whether this change in design is as a result of animal welfare concerns or effluent spillage or a combination of both.

For the purposes of this report, the term effluent containment will mean the temporary storage of effluent on the floor of a trailer primarily by modification of side wall design.

With a total floor area of a typical B-Double configuration being 87.8 m^2, an effluent accumulation of 50 mm across the whole floor represents 4390 L of effluent.

Photograph 12 shows a trailer with solid side panels. Photograph 13 shows the floor of each deck is slightly sloped to allow effluent to flow towards the drains situated at the back of each deck on either side in the corner.

Photograph 12 - Trailer with solid panels and ventilation gaps

Photograph 13 – Trailer floor is sloped to allow effluent to drain to the back
*Note that a large volume of effluent can be contained on the floor of the trailer if no drainage is allowed.

The slope of the floor helps direct effluent to the back drains but the slope of the roads, and stopping and starting, may still cause effluent to flow forward. In some cases, the front of the trailer is designed with raised beams to block effluent and direct it to the sides of the trailer. Photograph **14** shows the raised beams with holes along the sides to allow effluent to drain along the sides of the trailer. The effectiveness of these drains could be reduced if frequent cleaning does not remove debris and manure completely.

Photograph 14 – Effluent drains along sides of trailer

The effluent on both the top and bottom deck is allowed to freely flow through the drains at each end of the trailer. Photograph 15 shows examples of drains at the back of each deck. The drains are covered with a grid that can be opened to facilitate cleaning or closed to prevent hooves getting stuck in the drain. Similarly, these drains and the grid can easily get blocked up with

manure and leaves if the trailer is not frequently cleaned. This would prevent the effluent draining out, leaving effluent to be contained on the trailer floor.

Photograph 15 – Different kinds of drains with grid covers at the back of each deck.

The effluent from the top deck is directed to the drain of the bottom deck by a plastic lay-flat pipe. Photograph 16 shows an example of a conduit directing effluent from the top deck to the bottom deck.

Photograph 16 – Effluent drainage from the top deck to the bottom deck via conduit

Generally, the effluent from the bottom deck freely flows onto the road. The effluent is released close to the rear wheels. A short conduit directs effluent from the bottom deck close the road to reduce splashing of effluent. Photograph 17 shows the conduit directing effluent from the bottom

deck to the road. This is a free flowing system with no control valves. Hence, effluent cannot be selectively contained, e.g. when going through towns.

On some trailer designs, this drainage system has been improved to allow for temporary containment of effluent. This has been done by adapting the drainage conduit from the bottom deck to incorporate a valve or door that allows the operator to cut off the flow of effluent from the trailer to temporarily contain effluent on the floor of the trailer. Photograph 18 shows an example of a modified drop pipe with shut off valve.

Temporary effluent containment is effective but not without its problems. With the more basic designs, this requires the driver to stop prior to entering towns to manually close the shut off door at the end of the shaft (see Photograph 18). The effluent can be contained on the deck for a short period. However, once the effluent reaches the depth of the containment at the gates or when the truck travels on slopes, effluent can escape out the back or front of the trailer.

In order to help prevent effluent spillage through gates, some trailers have been designed with gate covers or flaps to contain effluent as much as possible. Photograph 19 shows rubber covers or flaps for the trailer gates.

Photograph 17 – Conduit from the bottom deck to the road

Photograph 18 – Temporary effluent containment system (shut-off valve)

Photograph 19 – Unsealed gates on livestock trailers

Photograph 20 – Rubber mats prevent effluent spillage through gates

4.8.3 Effluent holding tanks

The next stage in trailer development is to provide effluent holding tanks for more long-term effluent storage. These tanks have an outlet control valve so that release of effluent can be controlled. They can be opened to allow free flow of effluent in non-urban areas and are closed when travelling in urban areas.

For the purposes of this report, the term effluent holding tank will mean a tank with a control valve mounted below the floor of the livestock trailer with the specific function of storage of effluent drained from the floor of the trailer. These are sometimes called “belly tanks”.

Photograph 21 demonstrates an example of an effluent holding tank. A typical B-Double configuration would have three effluent holding tanks, two small tanks on each side of the front trailer and one larger tank on the back trailer. The back trailer effluent holding tank is as wide as the trailer and is situated between the four mudguards and rear wheel. The capacity of these tanks varies with customer requirements but would typically be in the order of 100-200 L. Photograph 22 shows an effluent holding tank with an opening valve that can be operated from within the cabin of the prime mover.

These tanks are generally made of aluminium or steel. For a recently-purchased B-Double configuration, steel effluent holding tanks weighed about 200 kg in total and this added 0.6% to the 32,000 kg tare weight of the trailer / prime mover configuration. These tanks have an 800 L capacity (say 800 kg of effluent). This effluent would add about 1.2% more to the gross loaded weight of 67,500 kg.

Photograph 21 – Effluent holding tanks on livestock trailers

Photograph 22 – Effluent holding tank with cabin-actuated opening valve

4.8.4 Sheep trailers

Limb Protrusion Issues

Photograph 23 and **Photograph 24** show older sheep trailers typical of those used in WA for the transport of sheep from live-export bulking facilities to the port. These older style trailers were designed with openings to assist in airflow and provide adequate ventilation for the animals. They were also designed to allow relatively free movement of limbs through the railings with low risk of limb fractures because the wide rail spacing reduces the risk of entrapment. This being said, they generally result in larger numbers of limb protrusions than trailers with narrower rail spacing.

The Code of Practice for the Transportation of Sheep in Western Australia specifies that rails should be placed at 150 mm intervals to prevent the heads and limit the limbs from protruding. Gaps on older style trailers are up to 180 mm. Currently, many trucks used for transporting sheep to the port are older style trailers such as those designed by SFM, many of which would not comply with the rail width restrictions.

Photograph 23 – Old Sheep Trailer with Large Gaps

Photograph 24 – Older Style Sheep Trailer

Photograph 25 shows the floor of the bottom deck of an older style trailer, note the rail that goes to the floor. Photograph 26 shows the upper deck of the trailer.

Photograph 27 shows a newer style sheep trailer. These trailers minimise limb protrusion by having smaller gaps between the rails and a side wall from the floor of the trailer. These trailers allow for suitable air flow for long-distance travel. Photograph 29 shows a newer trailer manufactured by SFM Engineering Pty Ltd, with maximum rail spacing of 120 mm. The trailer is designed to transport sheep and cattle, with convertible decks. The rails are slightly wider, and the side wall from the floor is also slightly higher than older trailers. These trailers are reported to contain sheep limbs to a greater extent than the older style trailers.

Photograph 25 – Lower deck of the older style sheep trailer and side rail

Photograph 26 – Upper deck of the older style sheep trailer

Photograph 27 – Newer style sheep trailer

Photograph 28 – New combination sheep /cattle trailer

Photograph 29 – Gaps in New Combination Sheep / Cattle Trailer Rails (approx 120 mm)

Effluent spillage issues

Sheep manure has a completely different consistency to cattle manure. The pellet form of sheep manure allows for it to be cleaned relatively easily from a solid floor trailer. Effluent spillage from sheep trailers has not been identified as a significant issue during the consultation process.

Photograph 30 shows the floor of an older-style sheep trailer floor that has a mesh floor with solid metal liner to capture manure.

Photograph 31 shows the floor of a new combination sheep/cattle trailer. Effluent spillage from these trailers may be an issue during cattle transportation but is unlikely for sheep. The solid floor is more conducive to easy cleaning of both sheep and cattle manure. The new combination trailers generally have an effluent drainage point on the bottom deck with a drainage pipe to the road (Photograph 32). It is assumed that trailers could be modified to have a selective containment function installed if required.

Photograph 30 – Upper deck of older-style sheep trailer showing manure containment

Photograph 31 – Solid floor in new combination sheep /cattle trailer

Photograph 32 – Effluent drainage point

4.9 Capital and operating costs of carrying effluent

ALTA has stated that carrying effluent in holding tanks “add a significant compliance cost to the industry, in terms of purchase, fitting and ongoing maintenance.” (see Appendix B). It was suggested by ALTA that the extra weight of the effluent holding tank increases the tare weight of the vehicle and that this has implications for reducing the number of livestock that can be carried and therefore reducing the freight productivity.

Clearly, any increase in capital or operating cost that might occur as a result of changes to effluent containment or limb protrusion need to be quantified and taken into consideration. The direct capital and operational costs borne by livestock transporters due to effluent holding tank installation could be significant in terms of increased labour costs to clean and maintain tanks. These costs will be passed onto the livestock producers potentially increasing livestock transport freight costs.

4.9.1 Capital costs

The addition of effluent holding tanks is an additional cost to a new or old retro-fitted livestock trailer. This cost is relative to the volume of the tank, the number that are installed, installation costs, and whether it has a manual or automated opening system. Approximate cost to manufacture, sandblast, paint and install is $3,500 per tank (David Garnsey, Dickinson Trailers, pers. comm. via email, 12 January 2009). This includes an automated air ram opening system. Cannon Trailers suggests an approximate cost of $3,200 for effluent holding tanks on a B-Double. Thull (1999) on a review of the capital and operating costs associated with capturing effluent on trucks via a network of dump sites in New Zealand. Estimates of fitting effluent holding tanks were $2,000 (NZ) per truck and trailer unit, with little difference in price between 300 and 400 litre tanks.

For a B-Double, the estimated cost of effluent holding tanks on a new trailer would be about $3,200 per tank on top of an estimated cost of $210,000 to $260,000 for a new B-Double trailer configuration. Therefore, if 2 tanks are installed, this represents an additional 3.0% of the trailer capital cost for effluent holding tanks.

Significant capital costs are associated with the design and construction of effluent disposal sites to dump effluent from these tanks. Effluent could be dumped at some existing truck washdown facilities if they are appropriately designed. The capital cost of these facilities is highly variable and is dependent on water availability, proximity to major roads and towns, labour costs, site-specific design parameters including legislative requirements for effluent disposal, and construction materials used for the disposal site. These sites may be constructed and operated by local councils or larger private operations such as abattoirs, livestock transport companies or saleyards. A ‘user-pays’ system is usually installed to compensate for capital and operating costs.

Thull (1999) also investigated the likely capital cost of the installation of an effluent discharge facility. The price ranged between $31,000 and $86,000 (NZ), depending on whether existing infrastructure was available (e.g. weighbridge, location within speed reduced zone, truck stop, saleyard, signage required). These costs did not include land purchase, administrative and planning fees and goods and services tax (GST).

4.9.2 Operating costs

Direct operating costs associated with effluent containment on livestock transport vehicles can include:

- Higher fuel consumption due to increased tare and loaded weight,
- Increased labour costs associated with cleaning effluent holding tanks,
- Increased labour costs associated with stopping and dumping effluent from the tanks,
- Maintenance costs.

4.9.2.1 Livestock vehicle fuel costs

There are a number of factors affecting vehicle fuel consumption. They can be broken into four categories including:

- Truck Efficiency e.g. Engine size, Auxiliaries, Aerodynamics, Tyres, Drivetrain losses
- Road Conditions e.g. Traffic flow, Surface, Slope, Straightness
- Driving Practices e.g. Acceleration, Anticipation, Speed
- Maintenance Practices e.g. Injectors, Bearings, Wheel alignment, Tyre pressures

In simple terms, the engine power requirement is proportional to the aerodynamics and the speed of the vehicle. Tyre losses are proportional to the weight carried and speed and there is a slight increase in drivetrain losses with speed.

A number of simple models have been developed to estimate fuel usage for a number of vehicle stereotypes in litres of fuel consumed per unit of distance traveled. These models use speed, road geometry, road type and condition, vehicle mass and traffic to estimate fuel use. However, it is difficult when using these models to compute the combined direct and indirect effects that a particular traffic parameter may have on fuel use. For example, an increase in average gradient will directly increase fuel consumption by a specified amount at every travel speed, but may also indirectly affect fuel use through a reduction in estimated speed of travel.

There are two methods of estimating fuel consumption. These include a linear additive structure approach as used in NAASRA Improved Model for Project Assessment and Costing (NIMPAC) style models and the mechanistic approach as used in Highway Design Models (HDM) style models in which fuel usage is derived from equations used in physics and engineering (ARRB Transport Research Ltd, 2005).

The NIMPAC style models have a relatively simple linear additive structure and are employed to estimate fuel use as determined by vehicle speed, road geometry, road type and condition, and traffic. However, in this approach an effective vehicle mass (GVM) and tare mass for the stereotype vehicle is assumed which represents an estimated typical operating mass when loaded and unloaded respectively. In this method, the basic fuel/speed relationship is a function of speed and constant parameters estimated from the loaded and unloaded mass of each stereotype vehicle.

The HDM style models utilise vehicle speed, air resistance, road geometry, road type and condition, and vehicle mass as parameters. Hence, a simulated scenario can be undertaken whereby an identical vehicle can be modelled with a changing vehicle mass between unloaded and fully loaded.

Some sectors of the livestock transport industry suggest that effluent containment on livestock vehicles will significantly increase the fuel consumption of vehicles and hence, the cost of transport. Hence, simulated journeys have been modelled to estimate the fuel consumption of a vehicle with effluent containment compared with no effluent containment.

The relationship used to estimate the fuel consumption was a general form of the relationship used to calculate fuel consumption in Australian HDM III based models. The relationship is given in equation 1.

Fuel Use Algorithm Structure HDM III Models (ARRB Transport Research Ltd, 2005)

$$FC = EE \times \left[I_{FU} + \left((GA + RRA) \times VM \times S \right) + \left(AR \times S^2 \right) \right]$$

Where:

FC = Fuel Consumption (L/100km)
I_{FU} = Idle Fuel Use
GA = Grade Adjustment
RRA = Road Roughness adjustment
VM = Vehicle Mass
AR = Air Resistance (Drag)
S = Vehicle Speed

Example design journey

A hypothetical design journey was developed with an appropriate vehicle for modeling purposes. The design journey modelled was a 100 km trip from Dalby to Toowoomba and return to Dalby. The vehicle will be fully loaded on the journey to Toowoomba and will be empty upon return to Dalby.

The terrain for this journey is considered to be relatively flat with a gradient category of 4%. A road roughness adjustment factor of 0.19 was used for the vehicle. The selected vehicle is a B-Double (tri-tri axle). The air resistance for this vehicle type is 0.8, fuel use at idle is 2.1 and engine efficiency factor is 0.055. An average speed of 88 km/hr was used for this trip.

Table 18 outlines the vehicle mass used in each modelling scenario.

Table 18 - B-Double (tri-tri) weight specifications

	No Effluent Containment Weight (t)	Effluent Containment Weight (t)
Tare	32.5	32.7[a]
Loaded[b]	66[c]	68.2

[a] Total weight of belly tanks - 200 kg
[b] Loaded weight of 71 animals at 500 kg per animal
[c] Average loaded weight. Assume 140 kg of manure is retained on the trailer, remainder is lost. Based on manure production rate 60 L/hr per head.

Estimated fuel consumption

The estimated fuel consumption for the modelled scenarios are shown in Table 19 and Figure 5. The estimated values are well above the average level of about 1.5 km/L (0.66 L/km) for a B-Double livestock transport vehicle (average unloaded and loaded journey) (Frasers Transport pers comms 2008). However, the importance of the model output is the relative difference between the scenarios. For the loaded journey, the additional fuel consumption is about 3 % reducing to about 1 % for an unloaded journey.

Table 19 - Estimated fuel consumption

	No Effluent Containment L/km	Effluent Containment L/km
Unloaded	0.92	0.93
Loaded	1.84	1.89

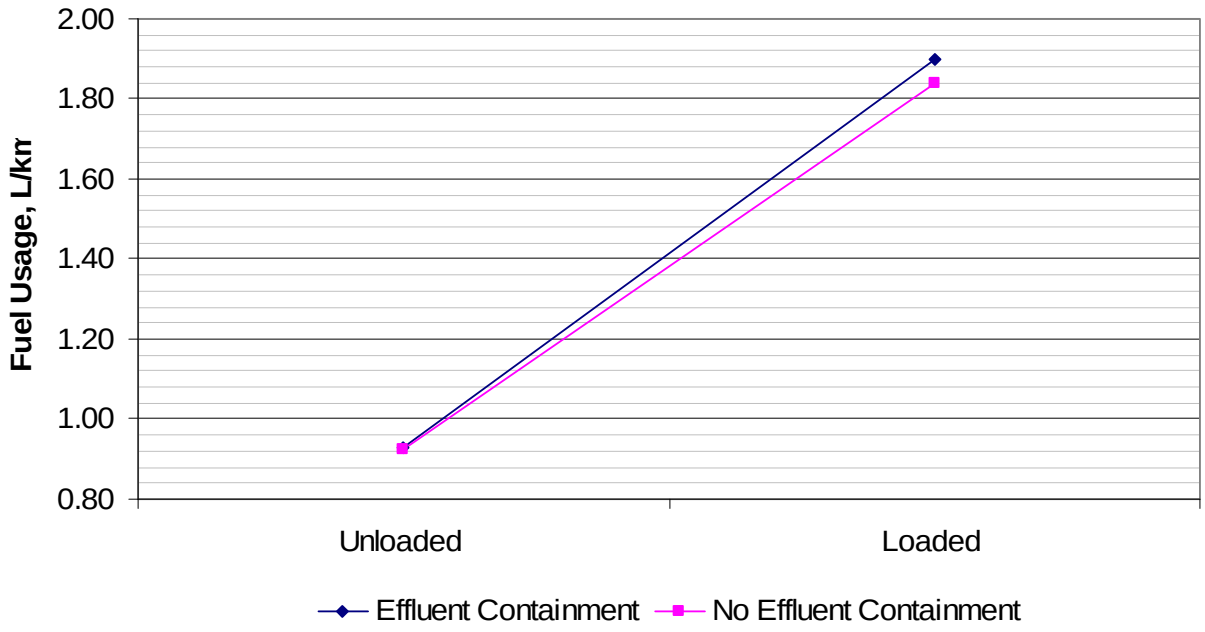

Figure 5 - Estimated fuel consumption from HDM III Model

4.9.2.2 Increased labour and operating costs

There would be increased operating costs for livestock transporters in terms of additional labour time required to clean out effluent holding tanks (in addition to the time taken to clean the trailer without a holding tank). The tanks are generally emptied by spraying from inside the trailer down the drain into the tank. The drain at the bottom of the tank is opened to allow the water and effluent to drain from the tank. Increased operating costs for livestock transporters will occur in terms of additional labour time required to stop and empty the effluent from the tank into a disposal facility. Ongoing maintenance of effluent holding tanks will be a cost incurred by livestock transporters.

Operating costs associated with effluent disposal sites can include:

- Water and energy costs
- Maintenance costs
- Effluent treatment costs (pond or treatment plant).

Depending on the disposal site, water availability may be a significant cost if water has to be stored on-site or piped to the site. Depending on the site, effluent may need to be treated to comply with relevant legislative requirements. This may require a treatment system on-site and regular maintenance. As these disposal sites have a fee for use, these costs can be passed on to the consumer.

4.9.2.3 Total operational costs of dump sites of New Zealand system

Thull (1999) investigated the total operational cost of installing and maintaining an effluent dump site in the South Island in New Zealand. The fixed operating costs include the capital cost of construction (assuming 25 year life and 6% loan) and the repair and the annual repair and maintenance. The variable operating costs included checking/cleaning and sampling (they did not include tinkering off-site). The annual total operating costs ranged between $6,762 and $11,613 (NZ), depending on the amount of infrastructure initially required.

4.9.3 Summary and knowledge gaps

Estimates were made of the likely increase in fuel consumption for trailers fitted with effluent containment tanks for a journey while the trailer is loaded and unloaded. It was predicted that fuel usage would increase by 3% and 1% for a journey on relatively flat terrain while the trailers are loaded and empty respectively.

Work from New Zealand suggests that the cost of constructing and operating an effluent dump site (assuming a 25 year life) is in the order of $6,700 and $11,600 (NZ) in 1999 dollars.

It is clear that a more detailed study is required to get the true cost of effluent containment on livestock trailers due to the large differences in capital costs of both installing tanks and providing specialised effluent dump sites where required. Also there is some disparity in estimates of fuel usage of loaded and unloaded trucks from predictive models and industry data. It is likely that trucks would need to be equipped with monitoring equipment (fuel flow, inclinometers, dataloggers) and detailed records of journeys and effluent collected/dumped in order to obtain real data for Australian situations before an informed discussion about the effect of effluent containment and holding tanks can be undertaken.

4.10 Livestock transport washdown facility availability and requirements

Livestock trailers must be periodically cleaned to remove accumulated effluent to reduce the load in the vehicle, for biosecurity reasons and to minimise hide contamination. Hence, the number, location and type of washdown facilities are important in discussing options for livestock effluent management. Furthermore, if containment and dumping is to be considered as part of the solution for livestock effluent, the capacity of washdown facilities to handle effluent dumping is important.

Privately and publicly owned washdown facilities operate at various locations throughout Australia. Each individual operation varies in size, capacity, throughput, and water usage. Some washdown facility's are only designed for biosecurity (weed transfer) control and may not be suitable for livestock truck washdown. Some washdown facilities allow drivers to wash effluent

and manure out of the livestock trailers and also clean the truck under-body free of any weed seeds. Washdown facilities are potential sites for dumping effluent and minimising spillage from livestock transports.

4.10.1 Location

Error! Reference source not found. shows the location of washdown facilities (as at 2 December 2008) that are part of the National Washdown System. The washdown facilities are predominately located in the eastern states. Washdown facilities are usually located nearby saleyards or abattoirs. **Error! Reference source not found.** does not show all washdown facilities in Australia as weed seed control washdown facilities are not necessarily included. Washdown facilities at livestock transport company depots may also not be shown.

4.10.2 Access and staffing

Facilities that are located closer to main roads are more likely to be used due to easier access. All weather access is essential. If a facility is located too far off the formed or sealed road, earthworks and access roads will also increase construction costs. Design and construction criteria including sight distance, road standard and geometry and design of turn outs from highway are usually governed by the local government authority in the area.

Many sites use a coin or magnetic tag system to operate the washdown. Therefore in many cases, staff are not required to undertake any on-site administration of the use of the washdown.

4.10.3 Cost of use

Washdown facilities are generally operated as a user-pays system. As a guide, the cost of a washdown of a B-Double would be between $5 and $15 for the washdown facilities included under the National Washdown System. The cost per minute varies substantially between locations, possibly due to the higher construction or operation costs at some sites, and therefore the recovery cost is higher.

Facilities are usually equipped with coin meters, key or card activated log-on systems as user pays systems. These systems are generally installed as a form of cost recovery for the operation and maintenance of the facility.

Effluent spillage and animal welfare during transport

FIGURE 12 – LOCATION OF EXISTING WASHDOWN FACILITIES THAT PARTICIPATE IN THE NATIONAL WASHDOWN SYSTEM

4.10.4 Security

It is important to allow ready and easy access to the facility to maximise use while also maintaining security. The hours of operation of some sites may be restricted to reduce vandalism while others may provide 24-hour operation.

Fencing around the facility is installed to:

- Provide site security
- Control access to, and movement within, the site
- Prevent grazing livestock and children entering the facility
- Protect solid waste collection and storage areas
- Protect liquid waste collection and storage systems.

4.10.5 Workplace health and safety

The facility design must provide a safe work environment. This may include making arrangements for the safe use, handling, storage and transport of plant and substances including electrical risks, working at heights, slippery surfaces, hazardous substance handling and fencing waste disposal and storage ponds.

Appropriate provision for control of dust and atmospheric contaminants are incorporated into the design of new facilities to ensure that users on-site are not adversely affected by dust. Use of high pressure air may become a housekeeping problem and a source of uncontrolled windborne contamination.

Noise may be generated by high pressure air and water equipment, and by vehicles and machinery during the facility operation.

4.10.6 Public amenity

Public amenity is an important consideration for any washdown facility. Noise, light, dust, rubbish, vermin and visual appearance can reduce the public amenity and can affect residents nearby to the facility.

If washdown facilities are available for operation 24 hours per day, the lighting installed should not create a nuisance. Dust nuisance can be a problem due to the network of unsealed roads around some facilities near saleyards.

4.11 Issues for effluent disposal at different sites

If effluent dumping is proposed, a properly designed receival and treatment facility will be required. A number of issues are associated with effluent containment on livestock transport vehicles and subsequent effluent disposal. Feedlots, saleyards, abattoirs, live-export facilities all may have site specific restrictions and the installation of effluent disposal facilities need to address:

- Water use and availability
- Power use and availability
- Biosecurity
- EPA Licensing requirements
- Local government approvals
- Workplace health and safety requirements
- Community amenity impacts - noise, odour light, dust, rubbish, vermin and visual appearance
- Infrastructure capital and operating costs
- Increased effluent in waste stream and potential requirement to upgrade system
- Increased effluent reuse areas
- Ongoing maintenance and machinery requirements for cleaning.

The same would apply to any new designated proposed new facilities that were planned to receive effluent contained in livestock transport.

5 Results and discussion

5.1 Industry informal consultation - effluent

A number of general themes were identified during the informal consultation with industry members and during the industry stakeholder survey form development process.

5.1.1 Localised effluent spillage issues

Effluent spillage concerns have been identified as a localised issue occurring within urban areas. Identified areas of concern include: Ballarat VIC, Inglewood QLD, Toowoomba QLD, Warwick QLD, Gympie QLD, Brisbane QLD, Townsville QLD, Esperance WA, Nowra NSW, Wagga Wagga NSW, Inverell NSW and Glen Innes NSW. The issues have ranged from just minor passing comments that have been passed on to livestock transport operators to, in the case of Inglewood, a truck stop being relocated out of the main town area. Some abattoirs located in urban areas have been regulated as part of their operating licence such that effluent must be contained on livestock transport vehicles coming to the abattoir.

Several issues have been raised regarding non-regular livestock transporters (e.g. graziers carting their own cattle in older trailers and without effluent holding tanks). It has been widely commented that most professional livestock transport companies have retrofitted older trailers with effluent containment, and any new trailers are generally fitted with effluent holding tanks or effluent release conduits.

5.1.2 Washdown facility availability and use

There were mixed responses in terms of providing facilities to allow transport operators to wash trucks at feedlots and abattoirs. Biosecurity and water availability are restrictions to having washdown facilities available on-site. The cost and availability of water is an increasing concern to producers and may inhibit the installation of washdown facilities. Additional effluent into the waste stream is also a concern for some operations. Many abattoirs have free vehicle washdown facilities and have minimal problems with them.

Producers that use professional livestock transport companies have a general understanding of an acceptable level of cleanliness that is expected before entering the property. Livestock transport companies are contacted if the vehicles are excessively dirty.

Trailer washdown frequency is dependent upon many factors. The level of truck usage, time available to washdown, waiting time for washdown bay and cost involved in washdown are factors that determine when trailers are washed and how frequently. Many operators have a regular washdown schedule that is undertaken whether the trailer is dirty or not.

5.1.3 Curfew practices

Curfew practices vary between individual lot feeders and graziers. From the survey results, reasons for curfewing range from reducing animal stress, the livestock travel better and buyer/transporter requirements. Reasons for not curfewing include MSA compliance, buyer requirements, effects on animal liveweight, stress level and effects on meat quality.

From the survey results, the majority of producers withhold water for 2-4 hrs prior to transport. A mixed response for time withheld from feed has been received so far, with over half the respondents indicating they curfew feed 0-4 hours prior to transport. Among the survey respondents, a trend was apparent, where livestock transporters suggest lot feeders and graziers should be responsible for the effluent production of their cattle during transport and therefore should curfew prior to transportation. Alternately, the lot feeders and graziers suggest effluent management on trucks is a better solution as it does not affect the meat quality of their animals.

There is positive indication from survey results that an industry-wide voluntary effluent management system would be accepted.

5.1.4 Community amenity issues

The perceived community amenity issues identified by industry stakeholders varied across a wide spectrum of responses. Public health issues were not considered significant by the industry stakeholders. However, there were many comments that this would be an issue in urban areas and not in rural areas.

There were comments suggesting that effluent spillage is a ‘part of living in a country that provides beef’ and that perhaps it is more of a perceived risk than an actual risk. On the other hand, some stakeholders suggested not enough was being done as an industry to encourage better effluent management and that the whole industry should take responsibility for their waste issues.

Road safety issues with effluent spillage at traffic lights, sharp corners and roundabouts, steep hills and truck stop areas was identified as of high significance within the industry stakeholders. All of these areas were identified as hazard spots.

5.1.5 Livestock transport trailer manufacturers

Consultation with a southern Queensland-central NSW livestock trailer manufacturer occurred on the 5th June 2008. This company customise trailers to the requirements of clients. The design for the new trailers contains several drop pipes from the top deck to the bottom deck. The bottom deck drains into effluent holding tanks that can be left open unless driving through sensitive areas where they provide additional containment area to prevent spills.

Spillage from livestock trailers with drop pipes occurs through the gates at the front and back of trailers when stoping or driving on hills. The addition of effluent holding tanks reduces the build-up of effluent on the deck when valves are closed. The new trailers have minor modifications to the doors and back of trailer to reduce spills when driving on hills. The doors are covered with rubber mats (see Photograph 20) to reduce spills.

In general, NSW and QLD trailers are fitted with a drop pipes similar to those in Photograph 17 and Photograph 18. Trailers designed for western areas generally do not have effluent containment options.

Consultation with a southern Queensland livestock trailer manufacturer occurred on the 6th November 2008. This company also customise trailers to suit the client. They indicated that they offer a drop pipe with manual open flap for selective effluent containment. The side panels on most trailers are approximately 300 mm high and can store a large volume of effluent in the trailer floor. They also offer an effluent holding tank option, for which 'more and more orders' are being placed. The main issue with installing effluent holding tanks is what volume they need to be and whether they will fit under the trailer. They also install RHS at the back of the trailer to seal and minimise effluent flowing out the back of the trailer when going uphill. They indicated that when carting in dry, western areas, the effluent holding tanks tend to block up.

Consultation with a central NSW livestock trailer manufacturer occurred on the 6th November 2008. This company also customise trailers to suit the client requirements. Effluent holding tanks can be fitted to trailers. Most tanks are 200 L, but depending on the space available, sometimes only 100 L tanks are used. An air-operated valve is fitted so it can be activated in the cab by the driver. These effluent holding tanks are designed to contain only a small amount of effluent so there is less effluent on the floor of the trailer. Generally, for orders that don't specify an effluent holding tank, they will fit a RHS drop pipe with a flap and it is up to the operator whether they use it or not. The side panels on these trailers are approximately 250 mm allowing effluent containment on the floor to this height, though doors may not be sealed adequately to contain all effluent.

Generally, all the livestock transport trailer manufacturers were happy to install effluent holding tanks and drop pipes, and are already installing these trailers for customers. Automatic opening of drop pipes or effluent holding tanks is also available to make the use of these options easier for the driver.

5.2 Local government informal consultation – effluent

In total, 42 councils were contacted, most of which were associated with saleyards or abattoirs. Several of the councils owned and operated the saleyards and thus were able to give good feedback. However, the councils who were situated close to saleyards or abattoirs, but did not have jurisdiction over the facility, found it difficult to comment and often did not know who at the council

would be responsible for complaints associated with these facilities. Table 12 identifies the councils contacted and a summary of their comments.

5.2.1 Council responses

The council survey form was sent out to 35 councils. In some cases, a council was contacted several times and messages left but no return call was received and it is assumed that effluent spillage from livestock trailers is not an issue in the area.

Some council's did recognise that effluent spillage from livestock trailers could potentially be an issue but they have not received any complaints from the public. Some councils were concerned that currently the towns were fairly small and rural which meant that many people considered a little effluent on the roads to be a part of the lifestyle. However, in the future, if the towns grow bigger and become more commercialised, the public may become less tolerant of effluent spillage and odour from livestock trailers.

In 26 out of 42 councils contacted, the councils simply stated that effluent spillage from livestock trailers was not an issue and they had never received a complaint from the public. The smaller town councils simply stated that most of the people in town were "farming folk" and effluent from livestock trailers was part of a rural life.

Five of the councils contacted - Tenterfield Shire Council, South Burnett Regional Council, Central Highlands Regional Council, Inverell Shire Council and Bendigo City Council - considered effluent spillage a problem.

The South Burnett Regional Council has received several complaints in the Kingaroy area. The complaints have been related to both cattle and pig trailers spilling effluent mostly on their way to the abattoir. The South Burnett Regional Council forwards the complaints regarding effluent on the road to Queensland Transport or the abattoir depending on the nature of the complaint. The Council is unable to take remedial steps in preventing the problem as there is no legislation that can be enforced. The transporters are contacted directly by Queensland Transport Inspectors to prevent further complaints. The transporters are encouraged to wash trailers prior to leaving sites to reduce effluent load in trailers and thus effluent spillage.

The City of Greater Bendigo transferred the call to the saleyard that is run by council. The saleyard reported that effluent from trailers is considered an issue not only on the roads but also at the saleyards. Effluent volumes at the saleyard are a problem. Curfewing the livestock prior to loading is encouraged and seen as an important method to reduce effluent build-up in the trailers. The effluent on the roads is not as large an issue as livestock transporters bypass the town on an alternative route to the saleyards.

The Emerald Shire Council does not consider the effluent spillage a serious issue but they have received complaints. The council already operates a washdown facility and would be interested in making some change in order for the washdown to handle effluent if required. The Emerald Shire Council has not made any specific attempt to prevent effluent spillage on the roads but would be likely to co-operate in finding a solution.

The Inverell Shire Council has started to take steps in preventing effluent spillage. The community is very concerned about the spread of zoonotic diseases such as Q-Fever and Brucellosis from cattle manure. The council approached Road Traffic Authority for assistance to implement national

regulations to prevent effluent spillage in town from livestock trailers. The Inverell Shire Council suggests all new trailers have effluent holding tanks and recommend the tanks are emptied at disposal sites run by the council.

The issue of effluent spillage is mostly considered a serious problem in councils where livestock transporters must travel through the town CBD and no bypass is available. The smaller rural towns may have effluent spillage concerns, but it is considered part of a rural lifestyle and therefore the councils don't receive any complaints. In the towns where effluent spillage is considered an issue the council have been contacted by the public on multiple occasions.

5.3 Local government survey results

While the survey form was sent to 35 councils, responses were received from only six councils. This survey response was not considered representative to undertake statistical analyses. The results of each Council survey will be briefly discussed.

Tenterfield Shire Council
The Tenterfield Shire Council pointed out three main issues effluent caused in town; road safety, odour and effluent spillage on the main highway through town. The council receives constant complaints due to odour and effluent spillage. There are three pedestrian crossings through the main street (New England Highway) of town. The livestock transport vehicles stop at the pedestrian crossings and also spill effluent in the process. Effluent spillage is also a problem at the corner of the New England Highway and Bruxner Highway There is also a tendency for drivers to try not to stop at the pedestrian crossings, which can lead to road safety issues. Along the main street, there are also restaurants and cafes with outdoor seating. Odour can be a problem with cafe patrons sitting outside.

The Tenterfield Shire Council does not operate a livestock vehicle washdown facility. Effluent from effluent holdings tanks cannot be accepted by their sewer system, as the sewer stops short of the northern and southern entry points. The council perceive there has been no change in effluent management practices over the past 10 years for livestock trailers.

The Tenterfield Shire Council identified compulsory effluent containment on livestock transport vehicles and alternate routes around towns as possible solutions to the issue. They identified that livestock transport companies and live-export companies are most responsible for solving the effluent spillage problem. The council recognised that installation and maintenance of effluent dumps would have a negative impact on their council. This council would not be willing to participate in a voluntary integrated system of the supply chain to minimise effluent spillage.

Gloucester Shire Council
The Gloucester Shire Council identifies effluent spillage as an issue but rate it of low importance. The council received only one complaint per year in regards to effluent spillage. The council perceive a change in effluent management practices has occurred in terms of providing washdown facilities, staff training of vehicle drivers and trailer design changes.

The council provide a washdown facility in their council area and a fee applies. Effluent and manure from holding tanks could be dumped within the local government area (at the saleyards) with no problems envisaged. The council would be willing to participate in a whole supply chain integrated system to minimise effluent spillage.

The Gloucester Shire Council recognise that compulsory effluent containment on livestock transport vehicles and providing effluent dumps to empty effluent holding tanks are 'very important' solutions. Animal curfew is not seen as a viable solution as this may mean that saleyards would have to provide extra feed for animals held after sales. Livestock transport companies are identified as being the most responsible for solving effluent spillage problems.

Richmond Valley Shire Council (Casino)
The Richmond Valley Shire Council recognises the overall significance of community issues associated with effluent spillage as 'very important'. Effluent spillage is seen as an issue in urban areas, on sharp corners and at traffic lights. Provision of washdown facilities was identified as a positive change in effluent management practices.

The Council provides a washdown facility in the area and a fee applies. The council could accept effluent from effluent holding tanks but a system upgrade would be required. The council sees the positive impact of installing and maintaining effluent dump sites, but there would be costs associated with this that would have a negative impact on the council. Livestock transport companies were identified as most responsible for solving effluent spillage issues. Potential solutions to effluent spillage include a combination of compulsory effluent containment, animal curfew, selective containment of effluent and more readily available washdown facilities.

Moree Plains Shire Council
The Moree Plains Shire Council did not indicate that effluent spillage is an issue in their area. They have not received complaints in the last 12 months. However, odour is sometimes an issue from livestock transport vehicles travelling through the main street (Newell Highway). The council recognise that there has been a perceived positive change in effluent management practices in the last 10 years due to effluent containment on trailers, provision of washdown facilities, staff training of drivers and livestock transport vehicle design changes.

The council does not provide a washdown facility in their area. However, they are willing to develop a facility to accept effluent from holding tanks into a dump system. Livestock transport companies were identified as being most responsible for solving effluent spillage problems. Local government was identified as not responsible for solving effluent spillage issues. Potential solutions for effluent spillage minimisation include compulsory containment of effluent on trailers and selective containment in urban areas. This council was willing to participate in a voluntary integrated system to minimise effluent spillage issues.

Greater Taree City Council
The Greater Taree City Council identifies effluent spillage issues as 'very important'. They have received complaints from the community in the last 12 months in regards to livestock transport vehicles passing through town to the Wingham abattoir. Effluent spillage occurs on an inclined roundabout on this route. Odour complaints are also received. Effluent spillage in urban areas was identified as a 'very important' issue. A perceived positive change in effluent management practices in the past 10 years in terms of livestock trailer design changes was indicated.

A washdown facility is not available in the Greater Taree City area. Currently, effluent from effluent holding tanks could not be accepted in the area, but a system could be designed to accept effluent. Livestock transport companies and live-export companies were identified as most responsible for resolving effluent spillage issues.

More readily available washdown facilities, alternate routes around towns and effluent dumps for emptying effluent holding tanks were recognised as ‘very important’ solutions to effluent spillage. Animal curfew and diet modification were identified as not suitable solutions due to welfare concerns. Compulsory usage of washdown facilities where effluent can be managed was indicated as the best approach. However, local government at the moment would not have the resources to install and maintain washdown or dump facilities. The Greater Taree City Council would be willing to participate in a voluntary integrated system for minimising effluent spillage.

Toowoomba Regional Council
Toowoomba Regional Council identified effluent spillage as ‘not an issue’. Complaints from the community have been received in the last 12 months, and have been in regards to loaded trucks parked in urban areas in the CBD area of Toowoomba. There has been a perceived positive change in effluent management practices in the past 10 years in regards to provision of washdown facilities and livestock transport vehicle design changes.

Toowoomba Regional Council has a washdown facility in its region but it is operated by a private company. The use of this facility is encouraged by the Council. A system to accept effluent from effluent holding tanks is not currently available but a system could be designed to accept effluent.

A ‘very important’ solution recommended by the Council is the selective containment of effluent in urban areas. Local government were identified as ‘not responsible’ for solving effluent spillage issues. Lot feeders, livestock transport companies, abattoirs, saleyards and live-export companies were identified as ‘most responsible’ for addressing this issue. Toowoomba Regional Council is not willing to participate in a whole supply chain approach to minimising effluent spillage.

In the past few years, there have been several articles in the local newspaper about stock trucks passing through Toowoomba highlighting effluent and odour issues. Very large numbers of livestock trucks pass through Toowoomba taking cattle from farms, feedlots and saleyards such as Roma and Dalby to the several abattoirs east of Toowoomba. All vehicles must pass through the centre of Toowoomba. There has been political lobbying for several years for a “second range crossing” which would be a CBD by-pass for heavy vehicles. The “second range crossing” would solve most of the livestock effluent issues for Toowoomba.

5.3.1 Summary

The consultation from local government has identified the following issues:

- Effluent spillage is a localised problem in some council areas
- Local government generally don't see it as their responsibility to address or find solutions to effluent spillage. They expect livestock transport companies to deal with the issues
- Councils generally agree that positive change has been perceived in the past 10 years in terms of effluent management practices
- Councils understand the positive impact that effluent dumps and washdown facilities would have but perceive negative impacts in terms of capital cost and maintenance
- Councils with effluent spillage problems don't have any legislation to enforce reductions to effluent spillage and refer the matter to the transport authorities to regulate
- Effluent containment on livestock transport vehicles seen as an important solution
- Effluent spillage problems in affected council areas needs targeted solutions relevant for the specific issues.

5.4 Industry stakeholder survey quantitative results

Figure 6 to Figure 34 are the results from 41 survey responses from industry stakeholders received during the project. The response rate for the survey was very low and these results should be treated with caution. However, these results do show the type of outcomes that would be possible from a wider ranging survey process. Appendix A gives the survey form.

Figure 6 shows the survey participant's business type. The majority of survey participants identified themselves as lot feeders and graziers. The survey was not distributed to livestock transporters in the main survey round due to the survey not being approved by the Australian Livestock Transporters Association (ALTA) and, hence, the views of livestock transporters are poorly represented. Two livestock transport companies were included in the pilot survey and their results are included in these results.

Figure 7 identifies the location of the survey participants operation. This shows the majority of survey participants were located in south-east Queensland, northern/central Queensland and northern NSW.

Figure 8 shows the areas serviced by the survey participants. The areas serviced relates to the location of the operation. The south-east Queensland, northern/central Queensland and northern NSW areas are serviced the most by the survey participants. A number of survey participants service more than one area and this is reflected in the results.

5.4.1 Current livestock transport practices

Figure **9** outlines the best management practices implemented in the survey participant's operation. The survey allowed the participant to rate each best management practice in terms of how often it is implemented in their operation. Following 'Fit to Load' procedures was indicated by 86% of

responses as always implemented. The requirement for effluent containment on livestock transport vehicles was indicated by 52% of responses as never implemented.

Figure 10 identifies the livestock trailer washdown practices of survey participants. 56% of responses answered that they always provide washdown facilities for livestock transport vehicles at their operation. 37% of responses never require livestock transport vehicles to be clean prior to entering or exiting the premises. 57% of responses never accept effluent from effluent holding tanks into a dump facility.

Figure 11 shows the frequency of livestock trailer washdown by survey participants. The majority of survey participants are not directly involved in livestock transport (e.g. contract a livestock transporter company) and do not washdown vehicles. 76% of participants answered 'not applicable' to this question. Of the survey participants that do transport livestock, the washdown frequency is variable. Figure 12 identified the drivers for livestock vehicle washdown. Vehicle washdown generally occurs on a regular washing schedule. However, it also depends on when the driver has time available to do the job and how dirty the vehicle is.

Figure 13 identifies the current effluent spillage management practices implemented as part of the operation. Curfew of animals prior to transport and regular cleaning of livestock transport vehicles were identified as the most popular management practices. 'Other' management practices included providing a washdown facility, only using reputable livestock transporters and using self-cleaning floors.

Figure 14 outlines the availability of livestock transport vehicle washdown facility at the participant's operation. 30% of responses identified that a free vehicle washdown facility is available at their operation and use is encouraged. 26% of responses recognised that a washdown facility was not available at their operation.

Figure 15 identifies the capacity for effluent contained on livestock transport vehicles to be accepted at the participant's operation. 45% of responses indicated that no problems were envisaged with installing an effluent dumping facility at their operation. 21% of responses suggest effluent could not be accepted at their operation.

5.4.2 Experiences with effluent spillage

Figure 16 shows the percentage of respondents that have received a complaint from the community in the last 12 months. The majority (over 70%) of participants did not receive a complaint but all of the complaints from the community have been in regard to effluent spillage.

Figure 17 shows the percentage of complaints received in the last 12 months from a regulatory agency. A proportion of these complaints were the result of community complaints.

Figure 18 identifies the potential community issues associated with effluent spillage. Damage to the industry image was recognised as a 'very important' or 'important' issue by 82% of respondents. 58% of responses indicated that the odour impacts associated with effluent spillage was a 'very important' or 'important' issue. The overall significance of community issues was rated a 'very important' or 'important' issue by 50% of respondents. A number of comments indicated that effluent spillage may be more of a perceived risk than an actual problem and that more awareness was required on the benefits of the beef industry for communities. The risk to public health was perceived to be the least significant community issue.

Figure 19 demonstrates the most likely locations of concern in terms of effluent spillage. All of the identified areas were given a rating of 'very important' or 'important' issue by over 50% of respondents. 73% of responses indicated that the overall significance of the issue was 'very important' or 'important'.

5.4.3 Curfew practices

Curfew of animals was undertaken by 51% of respondents. Of the respondents that do curfew animals, 43% specified they do not withhold animals from water. 20% indicate they withhold animals from water for 6-12 hours prior to transport. Figure 20 shows the percentage breakdown of water curfew management practices. Figure 21 shows the breakdown of feed curfew management practices. 22% of responses indicated that they do not withhold animals from feed prior to transport. Similarly, 22% of responses specified that they withhold animals from feed for 0-2 hours.

Figure 22 shows the reasons for curfewing animals prior to transport. The most popular reasons for curfewing were to reduce animal stress during transport as they are comfortable before loading, and that the animals travel better. The 'other' reasons for curfew included that it was not implemented on purpose but the animals were 'curfewed' during the processing time prior to transport. For example, the last feed may be between 10-12 pm and the animals are loaded between 2-3 pm the next day.

Figure 23 shows the reasons for not curfewing animals. The most popular reasons were for Meat Standards Australia (MSA) compliance, that curfew affects the animal stress level and that curfew affects the livestock liveweight. The reasons identified as 'other' included that dark cutting meat is associated with curfew of animals and that abattoirs heavily discount this meat. Animal welfare (RSPCA) of animals was identified as a concern and not curfewing cattle prior to entry into feedlots was recommended so that feeding patterns would not be disrupted. 71% of respondents identified that they do not alter the animal's diet, or require diet to be altered, prior to transport. Those that do change animal diet indicated that they feed out hay and electrolytes.

Figure 24 illustrates the perceived change in effluent management practices over the past 10 years. Of those responses that indicated that there has been a change in effluent management practices, the change was described as positive or negative. 89% of those responses indicating a change has occurred recognised that livestock transport vehicle design change has been a 'positive' or 'slightly positive' change. 72% of those responses indicating a change has occurred recognised that the provision of washdown facilities has been a 'positive' or 'slightly positive' change.

5.4.4 Potential solutions to effluent spillage

Figure 25 shows the potential solutions that may minimise effluent spillage from livestock transport vehicles. 82% of responses indicated that more readily available washdown facilities were a 'very important solution' or 'important solution'. 77% of responses identified that effluent dumps to empty effluent holding tanks from transport vehicles was a 'very important solution' or 'important solution'. 51% of responses indicated that selective containment in urban/built up areas (e.g. closing drop pipes) was a 'very important solution'. Diet modification was classified as 'not a solution' for 29% of respondents. Selective containment of effluent was suggested by lot feeders as a preferred solution. However, one of the livestock transporters indicated that 'animal curfew is essential' especially for feedlot cattle. One respondent identified a 'soft floor exchange system' as a possible solution. This system incorporates 50-80 mm of woodchip in the vehicle, the woodchip is vacuumed out at the saleyard and replaced with clean woodchip. This is similar to the European approach.

Figure 26 shows the sector that should be responsible for solving effluent spillage problems from livestock trailers. 61% of responses indicated that the livestock transporters are 'most responsible'. This conclusion would have been very different if there were a higher proportion of livestock transporters involved in the main survey.

The comments received from this question suggest that an industry-wide approach is needed and it is not one sector's responsibility. Figure 27 identifies further the willingness of survey participants to be involved in a voluntary integrated system to minimise effluent spillage from livestock transport vehicles.

This data reflects an important conclusion that can be drawn from all of the consultation during this study. In simple terms, livestock transporters believe that the main solution to the effluent issue is curfewing and this view is echoed in the ALTA letter (see Appendix B). However, graziers, lot feeders and abattoirs have serious concerns about the effect of curfewing on meat quality and they believe that the solution to the effluent issue is some form of effluent containment and this is the responsibility of the livestock transporters.

Figure 28 recognises the impacts on operations due to mandatory effluent spillage minimisation. 47% of responses indicated that installation of effluent dumps to empty effluent holding tanks from livestock transport vehicles would have a 'positive' or 'slight positive' impact on their operation. 28% of responses indicated that the cost of installing effluent holding tanks on vehicles would be a 'negative' impact on the operation. Meat quality impact and liveweight loss due to curfew would have a 'negative' impact on 29% and 26% respectively of operations. Other concerns bought up in the comments section included increased cost to livestock transporters to modify vehicles would be passed onto the producer, and that livestock transporters should be rewarded for updating vehicles with effluent containment infrastructure.

The New Zealand code including effluent containment and disposal facilities was outlined in the survey and participants were asked to comment on whether a similar system in Australia would be a suitable solution to effluent containment. Mixed responses were received for this system. A number of respondents acknowledged this would be an 'excellent' idea and the general industry attitude towards effluent containment is much better in New Zealand. More free washdown facilities and free disposal sites would encourage their use in Australia. However, concerns were raised on a few issues:

- Weather conditions are different in Australia and may affect effluent containment
- Effluent disposal would contribute to the nutrient loading of a facility's wastewater and increase cost of wastewater treatment
- The cost of installation and maintenance of dump stations would be passed on to users
- The system relies on the cooperation of all industry sectors from farm to abattoir
- Trailer modifications may be required and may affect animal welfare during transport

The distances that animals are transported in Australia are much further than those in New Zealand and dump stations may not be available in some regions

Curfewing may have detrimental effects on meat quality and yield

5.4.5 Limb protrusion issues and perceptions

Figure 29 shows whether there is a perception of welfare issues in transporting sheep. 81% perceived a welfare issue with transporting sheep. Figure 30 identifies the welfare issues associated with sheep transport. Staff training of vehicle drivers and animal death during transport was seen as 'very important' issues by 63% and 64% of the respondents.

Figure 31 indicates the locations that are associated with sheep welfare issues. Traffic lights, sharp corners and urban areas are identified as being areas of concern for sheep welfare during transport. Driver behaviour and experience was also commented on as impacting on animal welfare.

Figure 32 shows the responses to whether a perceived significant improvement in animal welfare during transport over the past 10 years. It demonstrates that there has been a perceived improvement in animal welfare during transport in the last 10 years. However, the perceived issues with transporting sheep are quite high (Figure 29).

Figure 32 shows the factors that are perceived to have contributed to improved welfare of sheep during transport. 97% of respondents indicated that improved trailer design on livestock transport vehicles has had a 'positive' or 'slight positive' impact on animal welfare. 10% of respondents indicated that curfewing prior to transport had a 'negative' impact on animal welfare.

Figure 33 identifies the factors that are perceived to affect animal welfare in the future. Over 90% of respondents indicated that staff training of vehicle drivers, trailer design, implementation of 'Fit to Load' criteria and implementation of QA or accreditation criteria will have a 'positive' or 'slight positive' affect on animal welfare in the future.

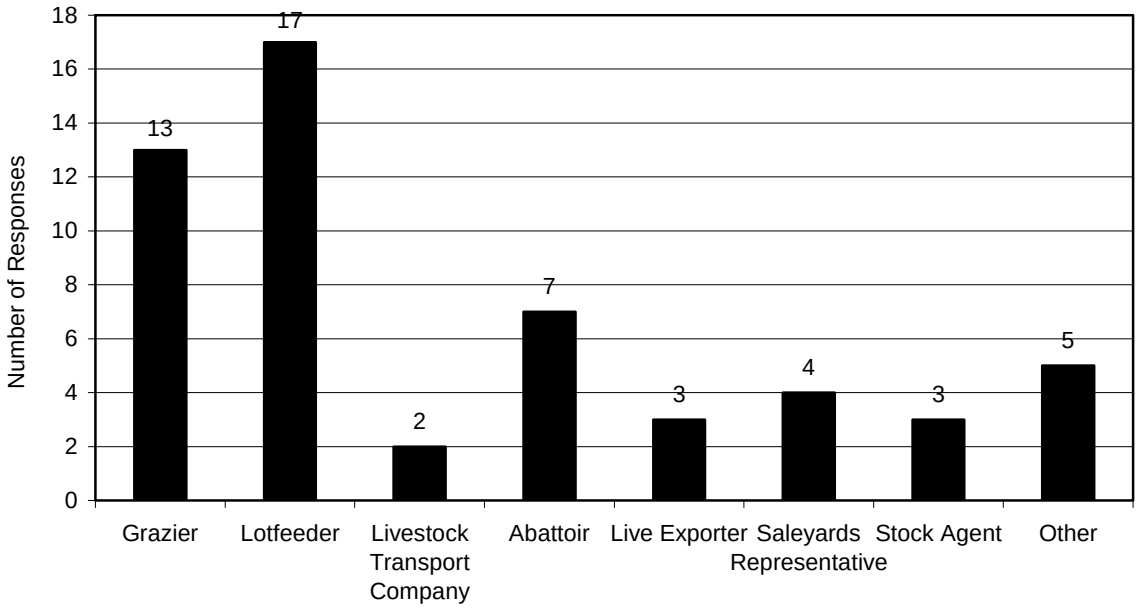

Figure 6 – Survey participant main operation

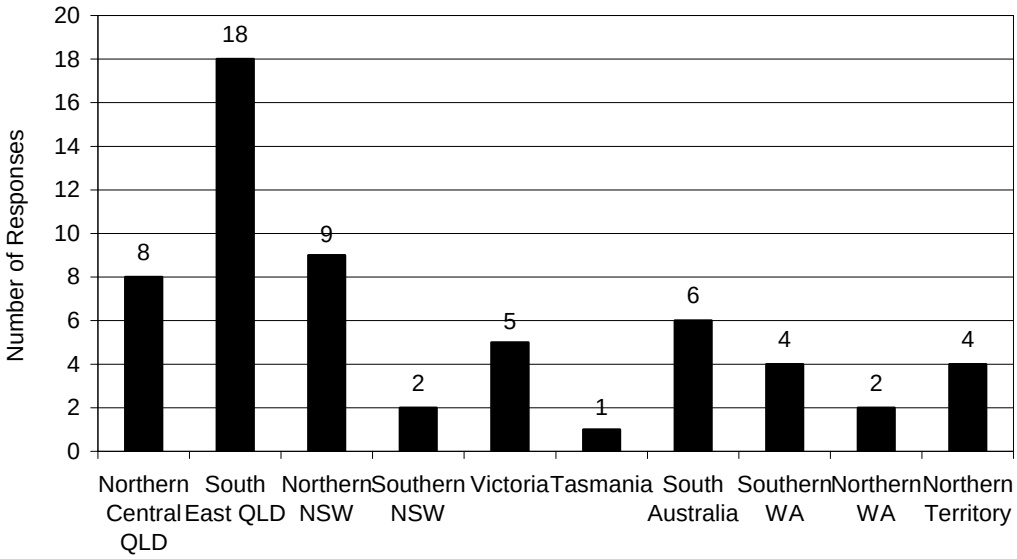

Figure 7 – Survey participant operation location

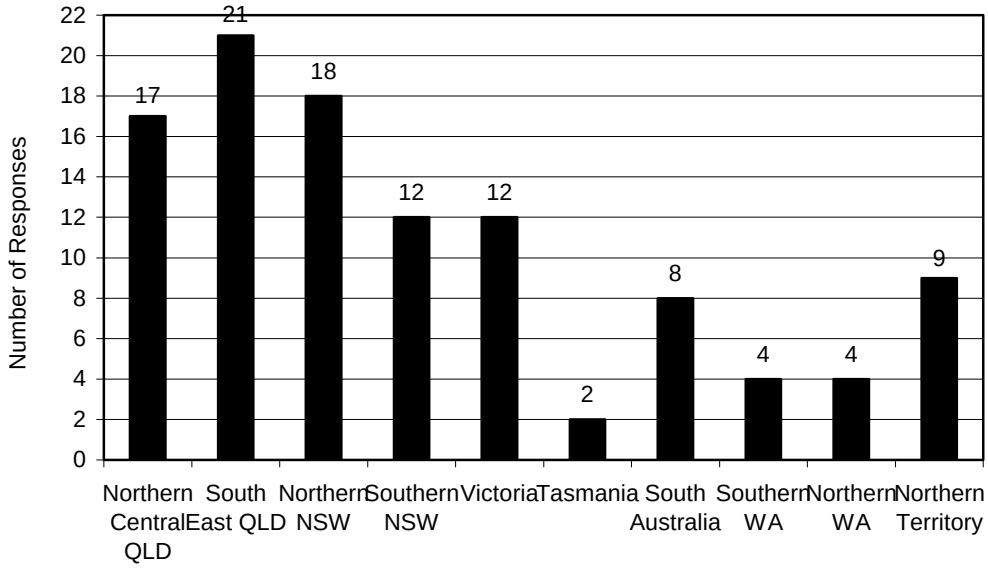

Figure 8 – Survey participant service areas

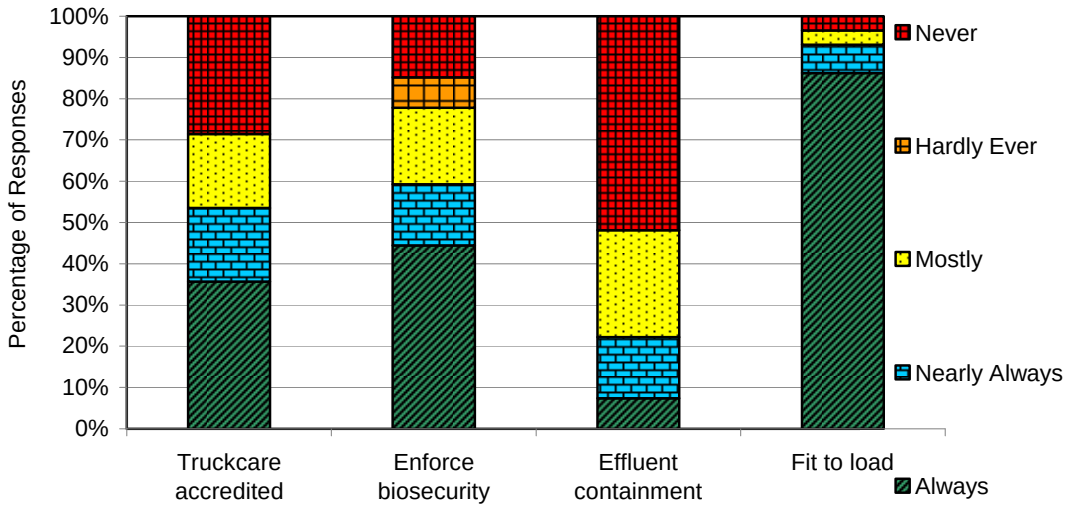

Figure 9 – Livestock transport best management practices implemented at operation

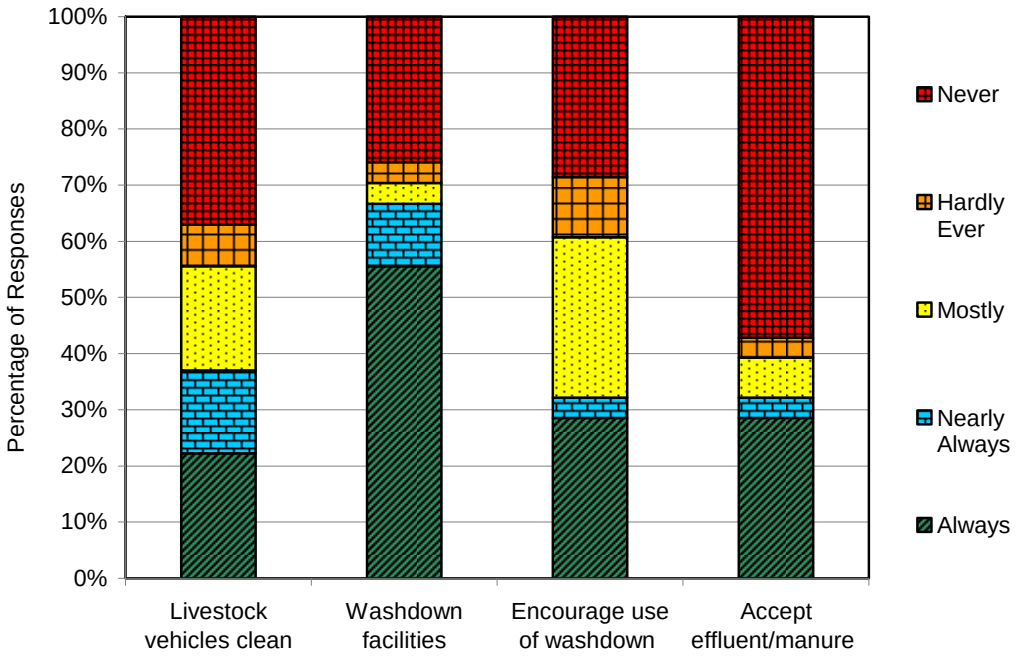

Figure 10 – Livestock trailer washdown practices implemented at operation

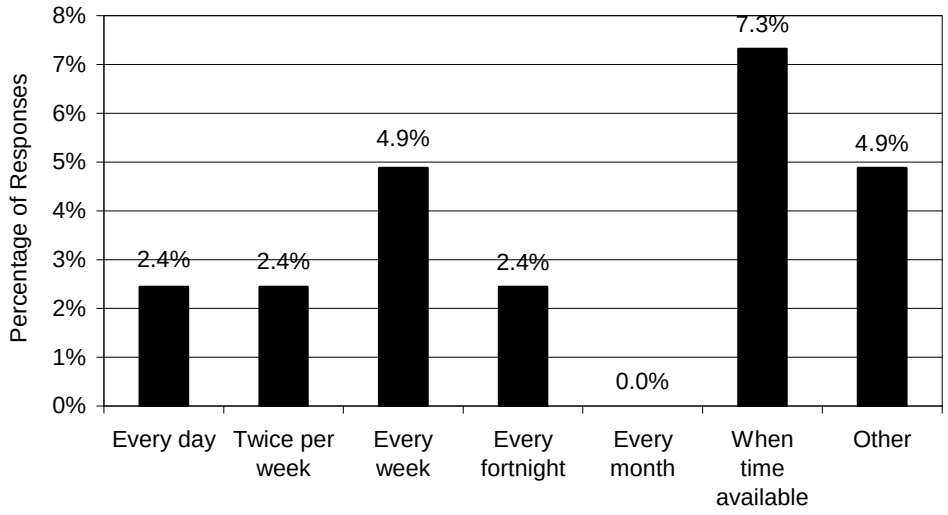

Figure 11 – Livestock trailer washdown frequency

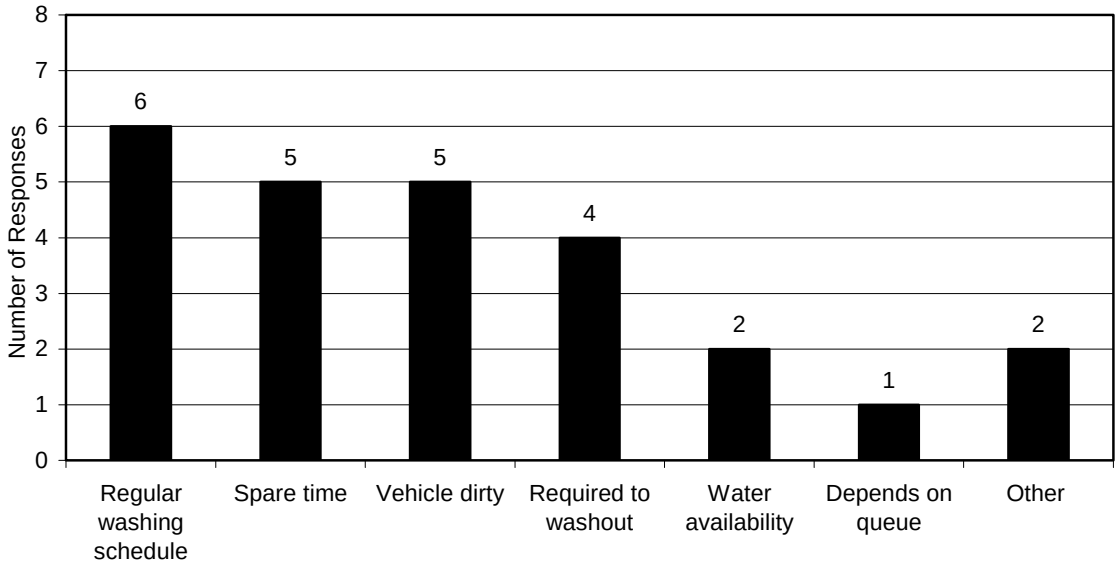

Figure 12 – Decision indicator to washdown livestock trailer

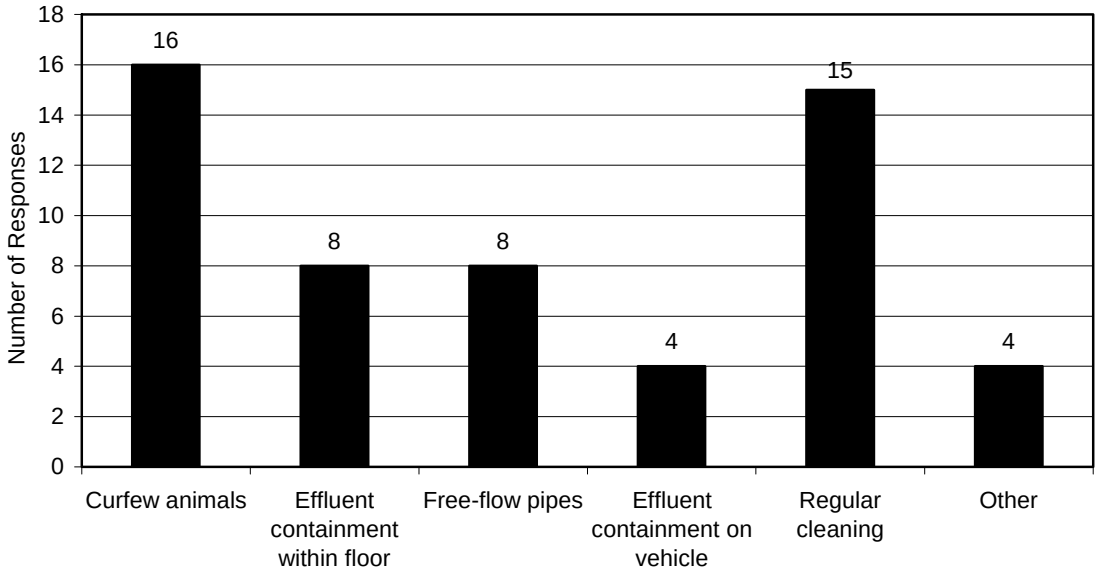

Figure 13 – Current vehicle effluent spillage management practices implemented at operation

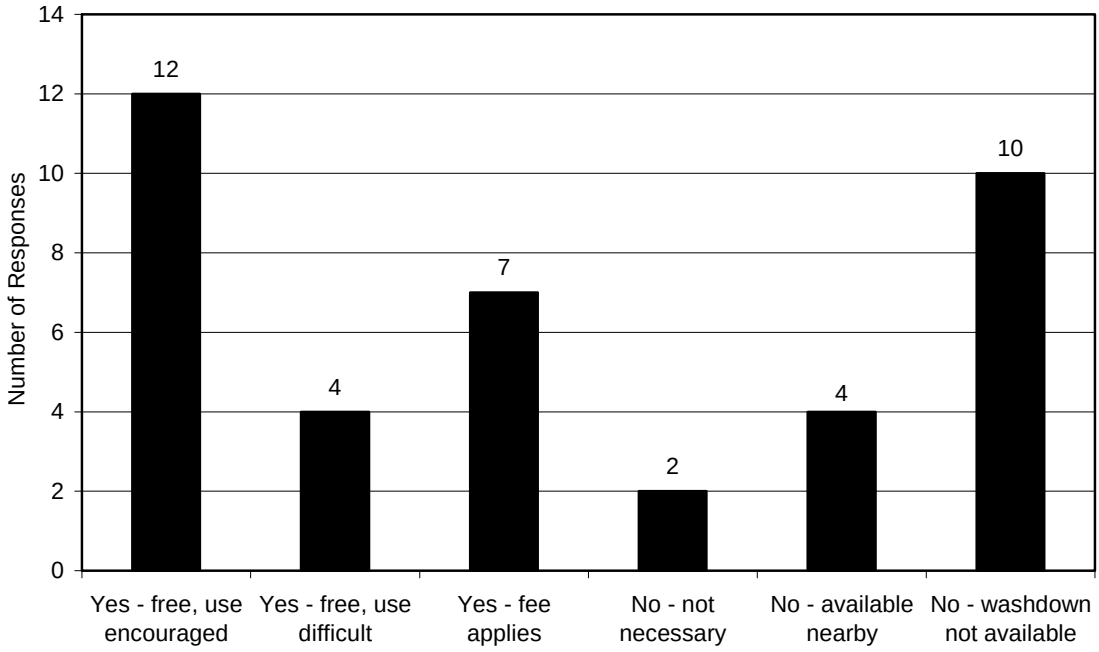

Figure 14 – Livestock vehicle washdown facility at operation

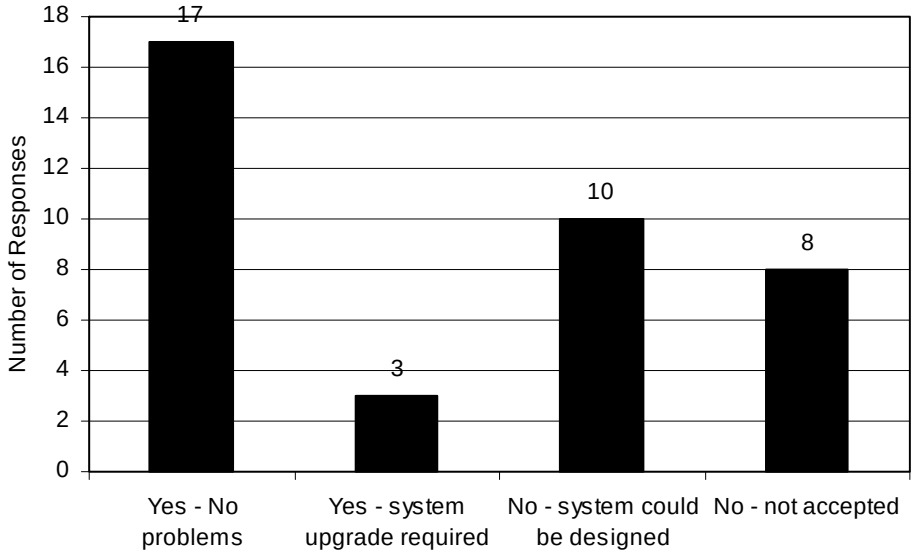

Figure 15 – Potential acceptance of effluent /manure at operation

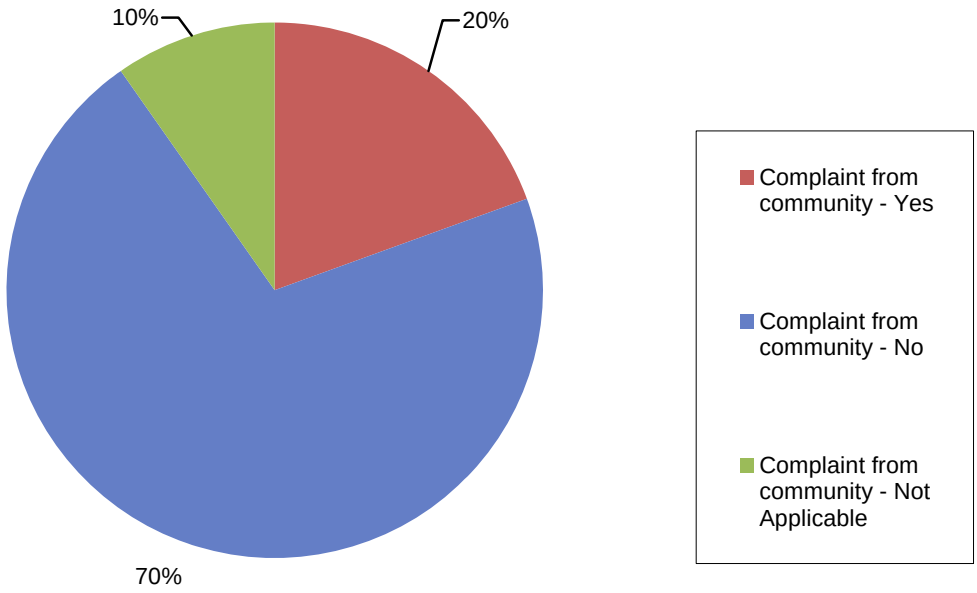

Figure 16 – Complaint received from the community in the last 12 months

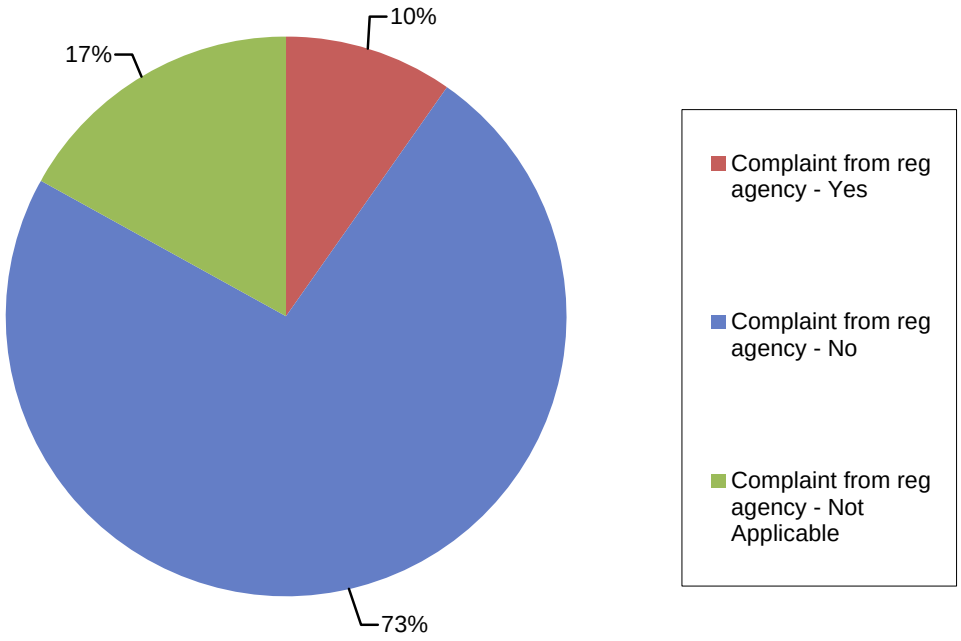

Figure 17 – Complaint received from a regulatory agency in the last 12 months

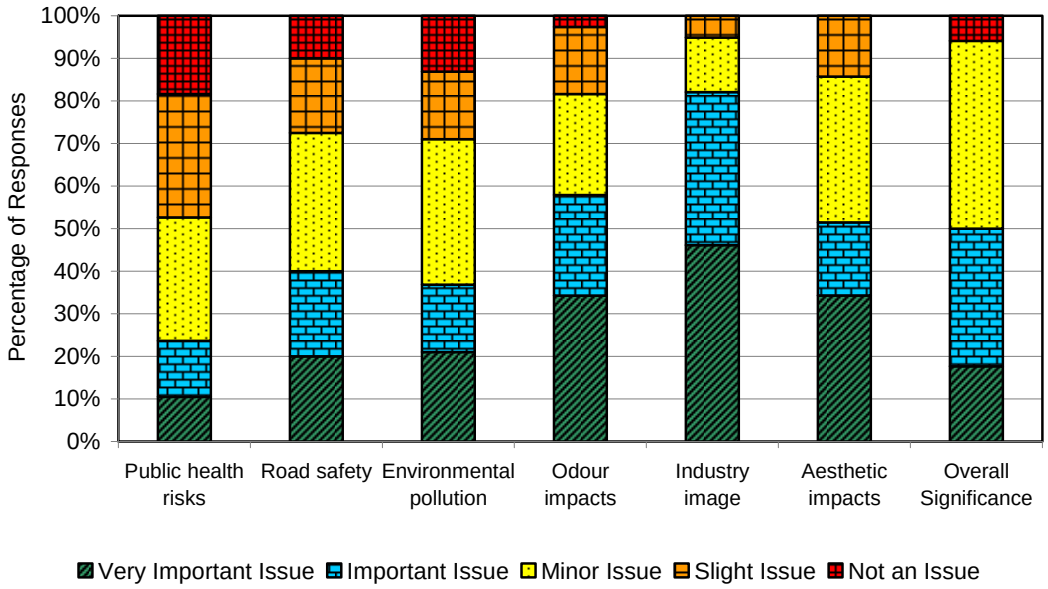

Figure 18 – Potential Community issues associated with effluent spillage

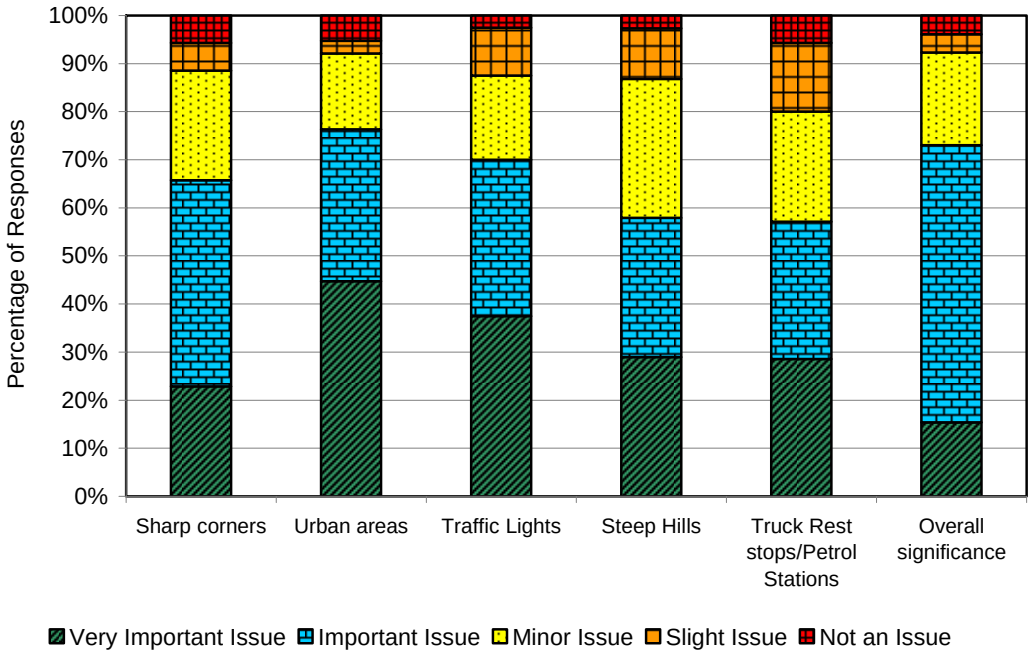

Figure 19 – Location of potential effluent spillage issues

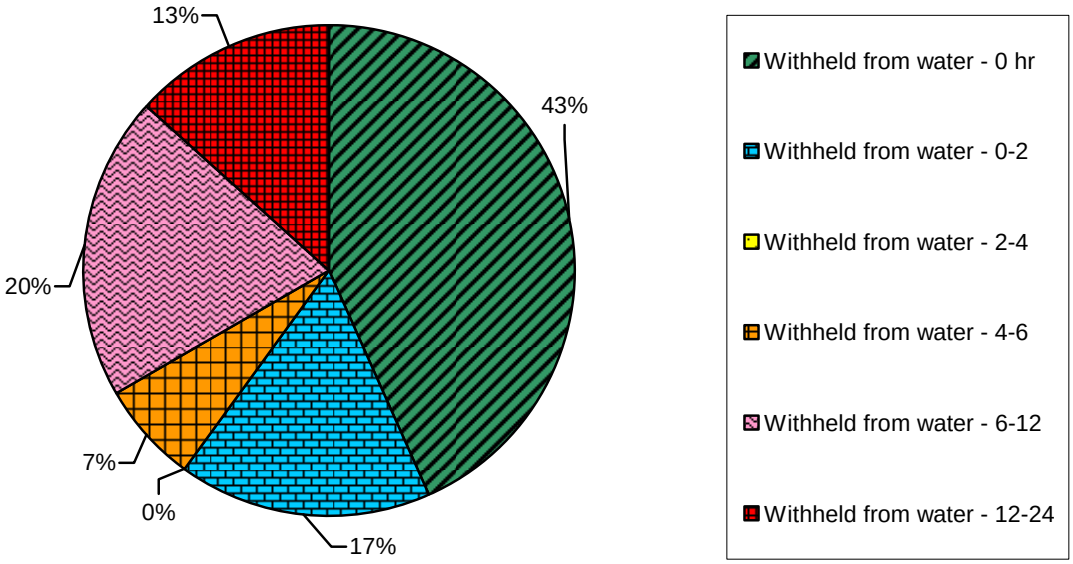

Figure 20 – Hours withheld from water

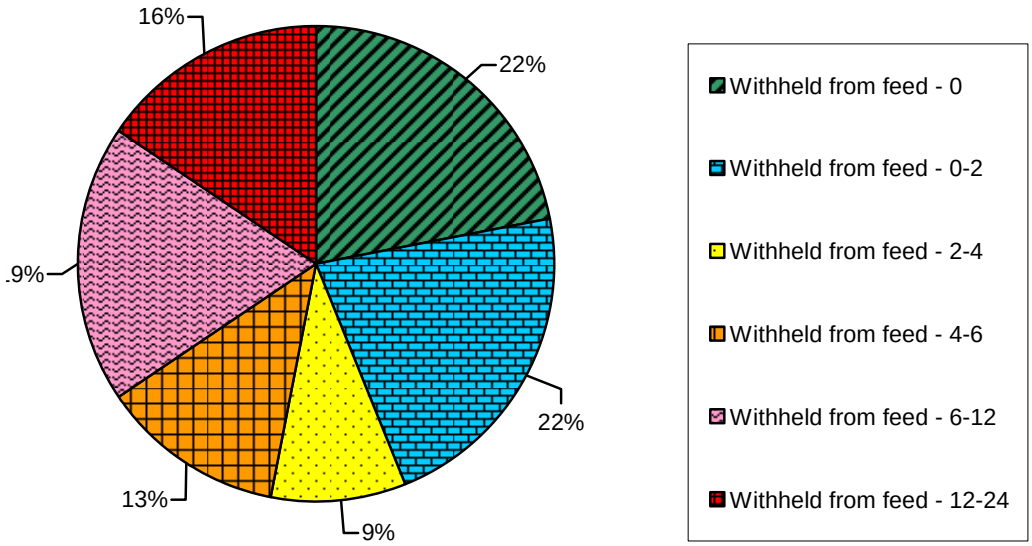

Figure 21 – Hours withheld from feed

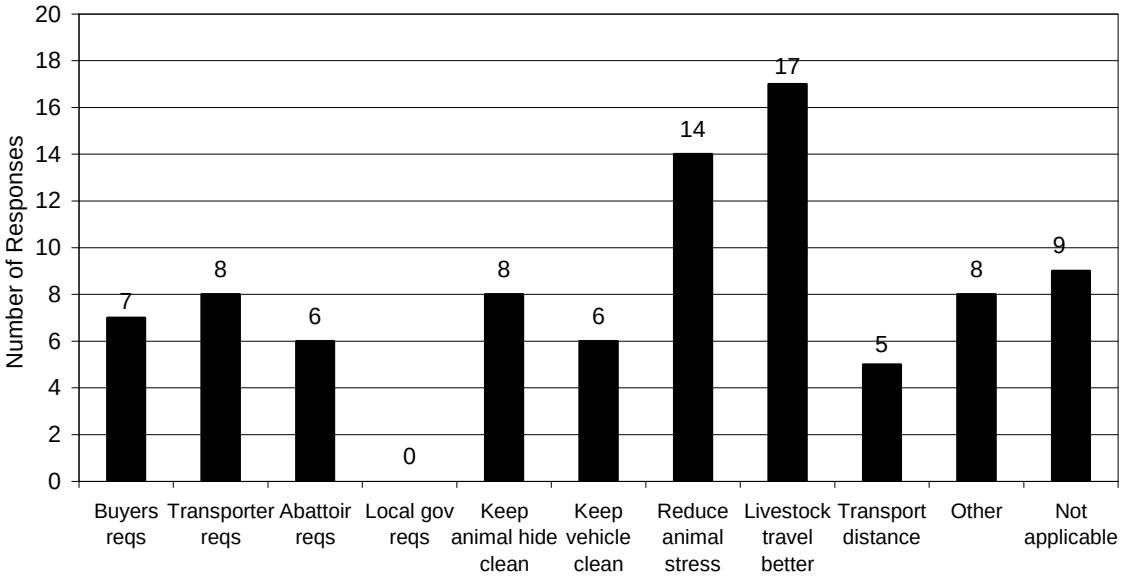

Figure 22 – Reasons for curfew of animals prior to transport

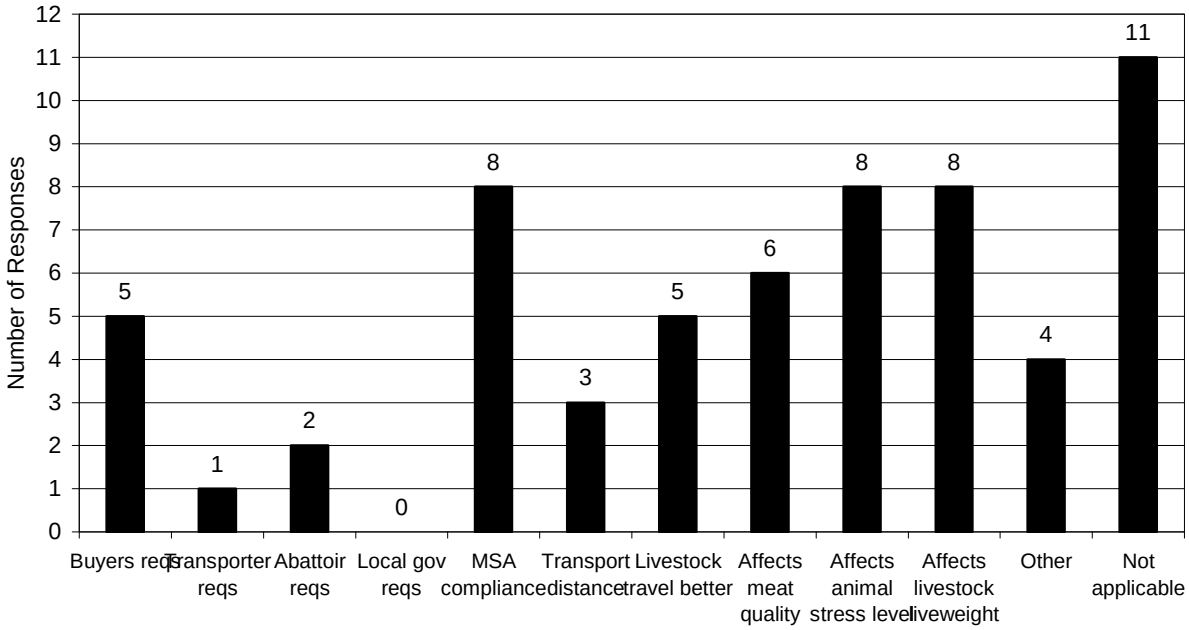

Figure 23 – Reasons for not curfewing animals prior to transport

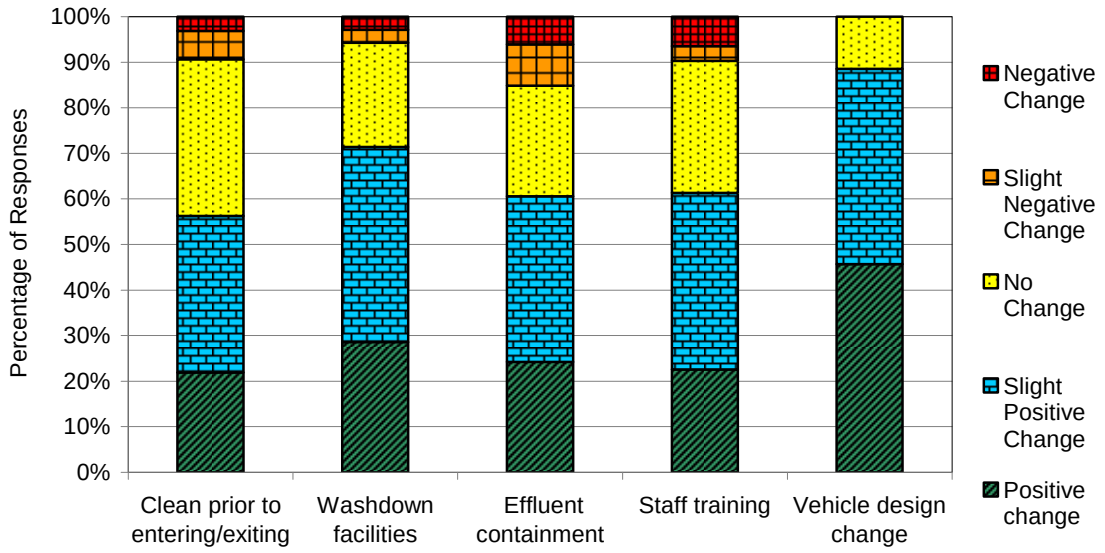

Figure 24 – Perception of effluent management change over the past 10 years

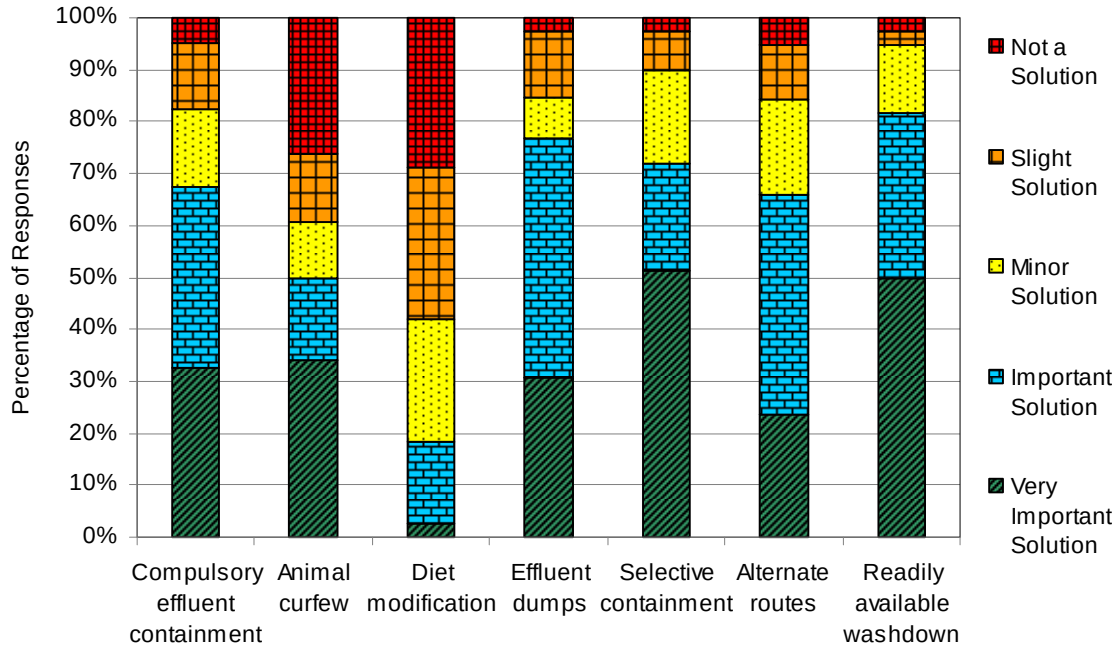

Figure 25 – Potential solutions to minimise effluent spillage

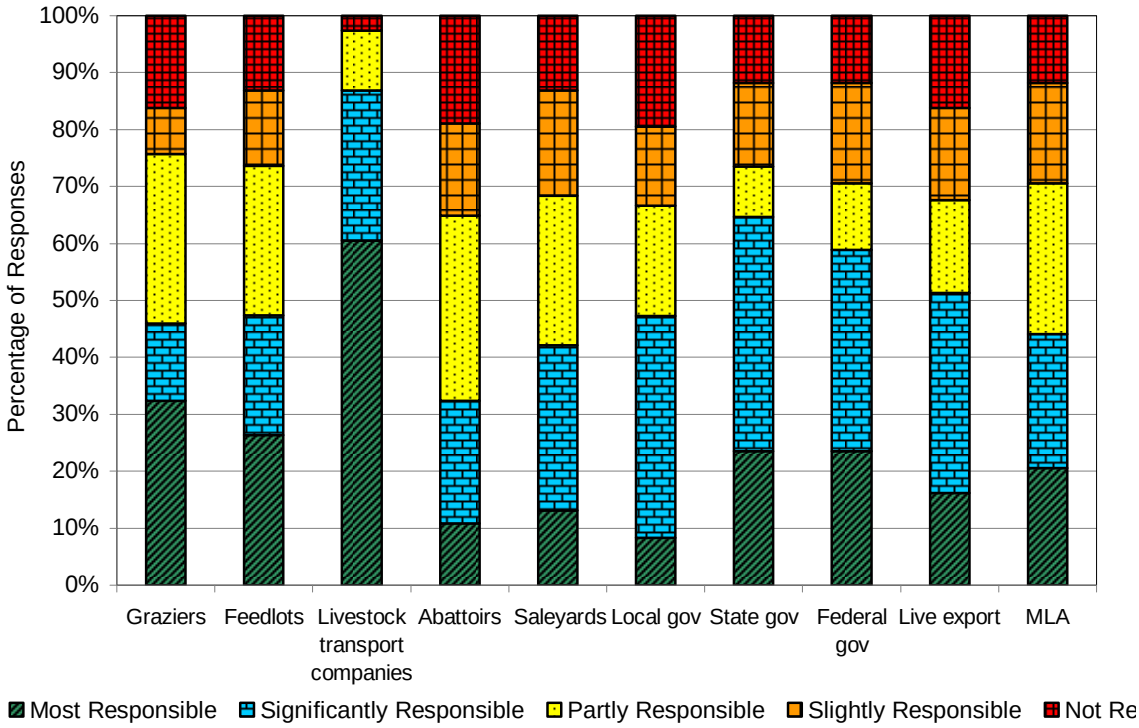

Figure 26 – Stakeholder responsible for solving effluent spillage problem

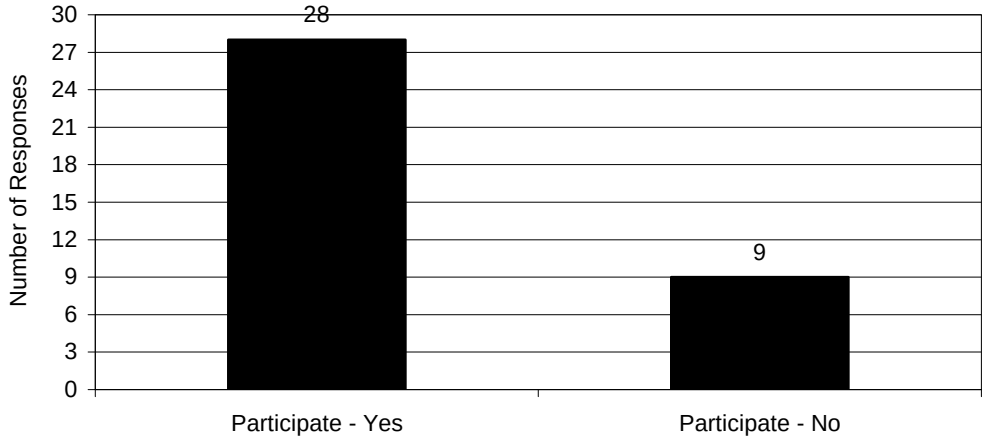

Figure 27 – Willingness to participate in a voluntary integrated system to minimise effluent spillage

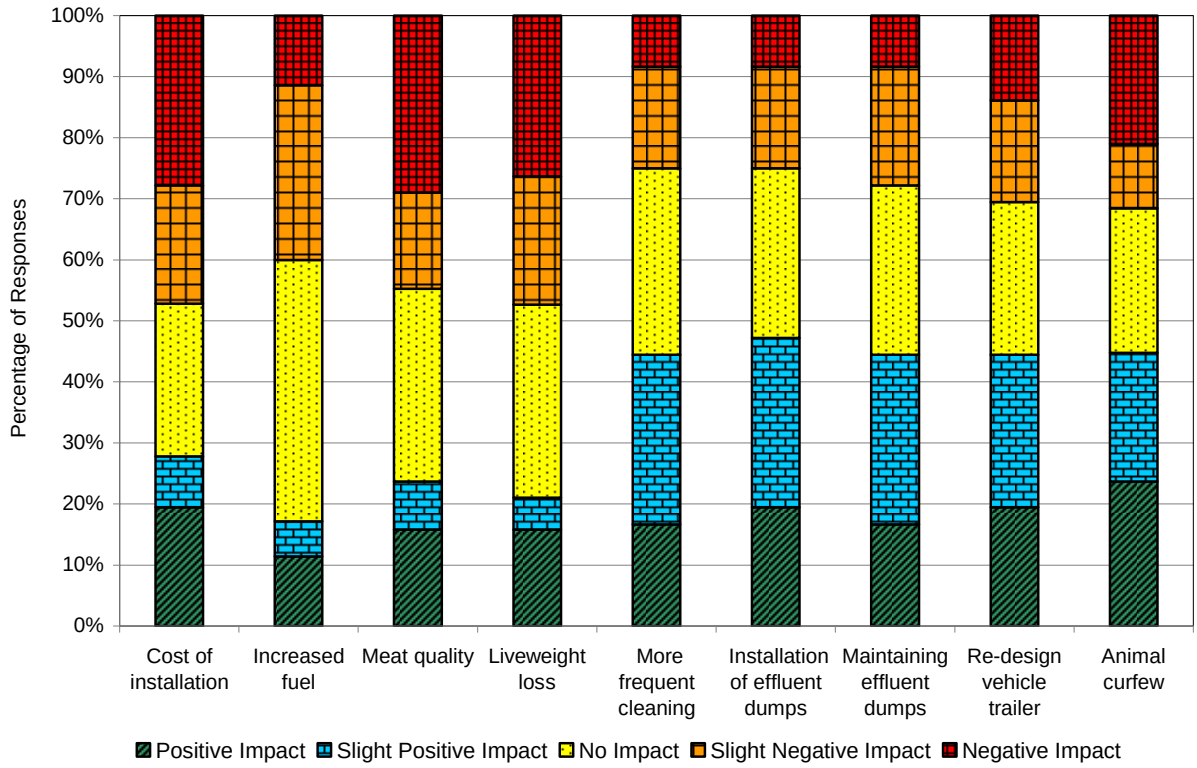

Figure 28 – Impact to operation due to mandatory effluent spillage minimisation

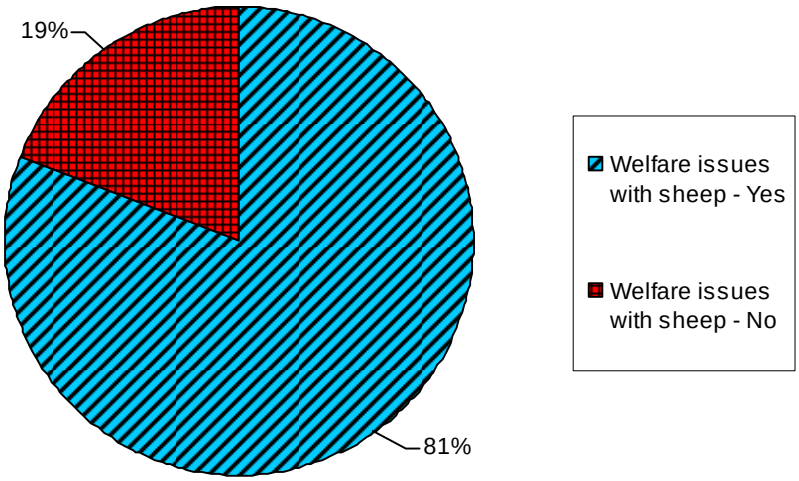

Figure 29 – Perceived animal welfare issues with transporting sheep

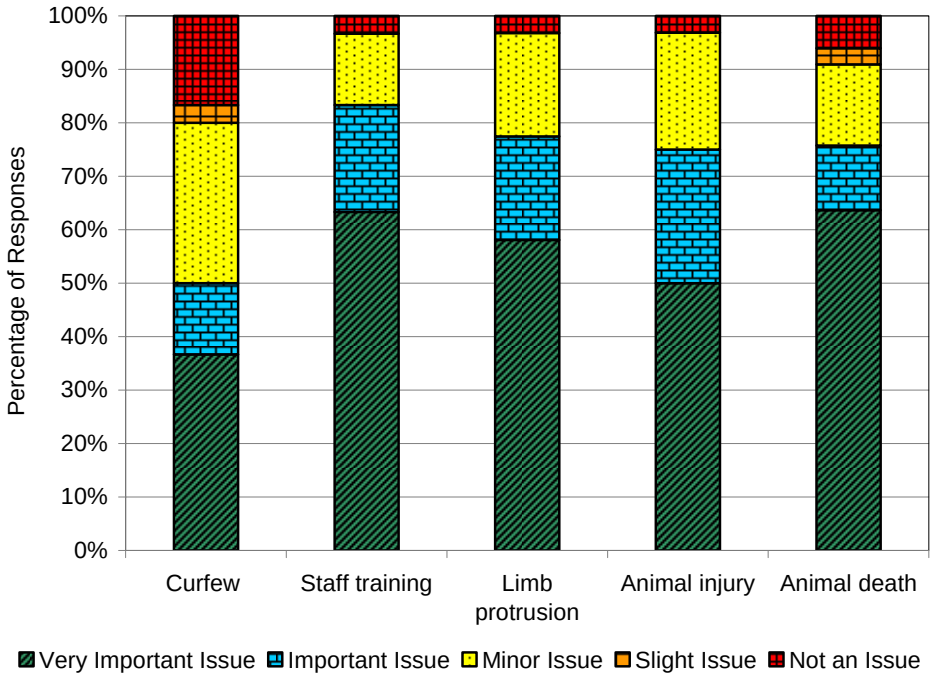

Figure 30 – Important welfare issues with transporting sheep

Figure 31 – Location of potential animal welfare issues

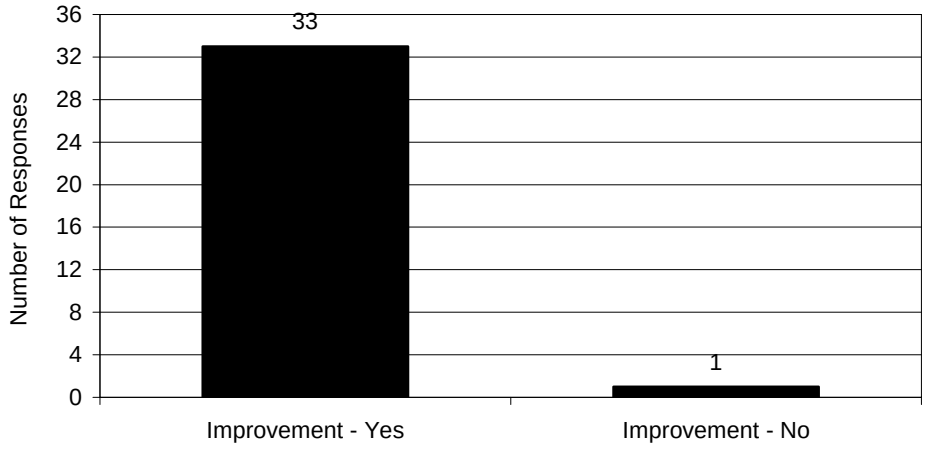

Figure 32 – Perceived significant improvement in animal welfare during livestock transport over past 10 years

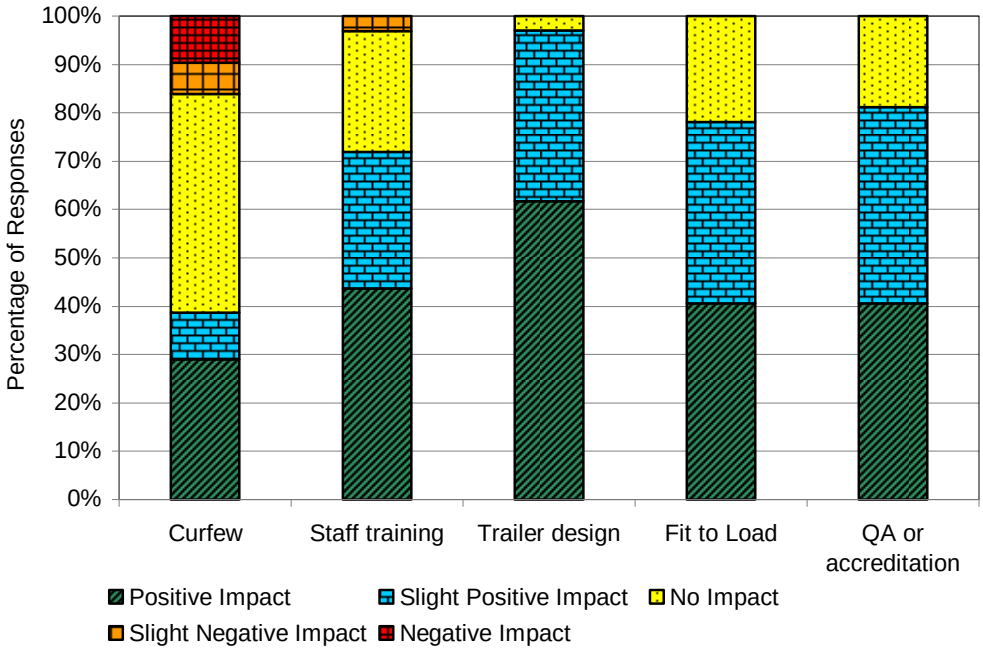

Figure 33 – Perceived factors that have impacted on animal welfare change

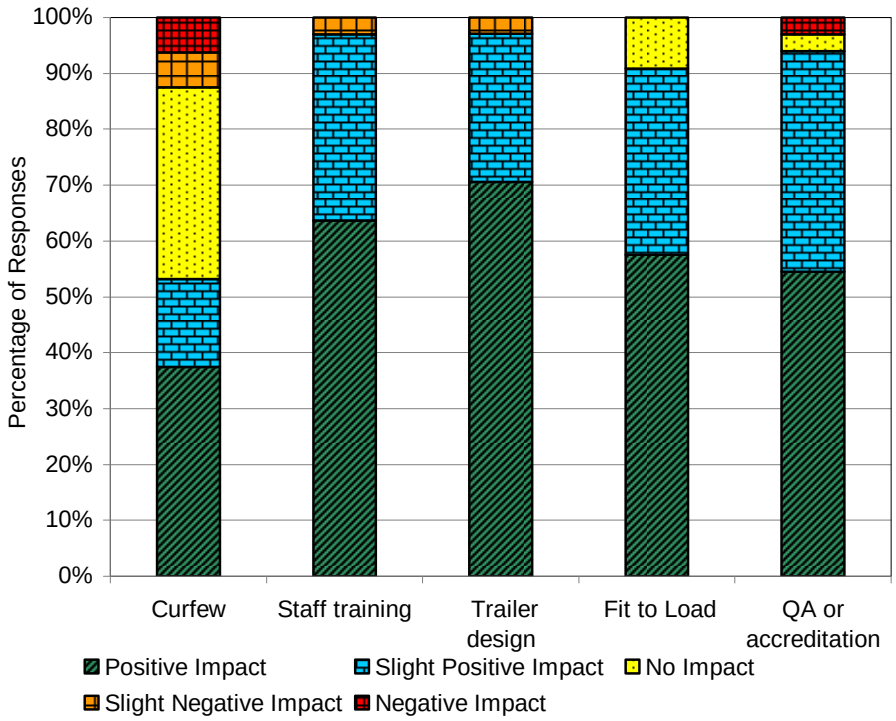

Figure 34 – Perceived factors that will have impact on animal welfare in the future

5.5 Options for reducing effluent spillage

Possible effluent management practices were identified during the project. These options are detailed below. The results of the stakeholder consultation and effluent management practices identified are limited by little participation by livestock transporters. Livestock transporters are a key part of the beef supply chain and the results may have identified additional issues and practices if they had been involved.

An outcome of the consultation process was the recognition that effluent spillage was not an issue across most of Australia. It only becomes an issue where livestock vehicles pass through urban areas and, even then, issues only arise in particular “hot spots”. This would suggest that mandatory, industry-wide changes are not required but that situation-specific solutions should be examined.

5.5.1 Curfew of animals prior to transport

Curfew was a popular response in the formal survey as an effluent spillage management practice. However, in the informal conversations, especially with lot feeders and some abattoirs, curfew is not perceived as a suitable effluent spillage minimisation technique due to concerns about meat quality.

Work from New Zealand has shown that curfewing for 4 hours prior to transport can reduce manure load during transport by at least 50%. Other experiments comparing 24 hour curfewing versus feeding with hay (24 and 48 hours) before transport or coming direct from pasture can reduce manure production during a 2-hour trip by 3 to 4.5 times. This New Zealand work also concluded that cattle fed on pasture up to the time of transport produced more liquid manure and this was attributed to higher stress levels in the animals during transport. Other studies with curfewing have shown that it can have a pronounced effect on manure consistency, with long curfew times (48 hours) producing a wetter manure, as gut content decreases, but moisture in the gut remains high.

Studies have shown that curfewing will have little impact on the biosecurity risk from the spread of weed seeds, given the extended rumen retention periods (> 48 hours). Some studies have shown that curfewing has the effect of increasing the level of some bacteria such as *E. Coli* in the gut. It is not known whether this could have a similar effect on parasites and diseases.

From the survey results, curfew practices were varied between individual industry operators, where 51% of survey respondents indicated that they curfew animals from either feed or water prior to transport. Of these respondents that do curfew animals, 43% specified they do not withhold animals from water. 20% indicate they withhold animals from water for 6-12 hours prior to transport. 22% of responses indicated that they do not withhold animals from feed prior to transport. Similarly, 22% of responses specified that they withhold animals from feed for 0-2 hours.

The most popular reasons for curfewing were to reduce animal stress during transport as they are comfortable before loading and that the animals travel better. Other reasons for curfew included that it was not implemented on purpose but the animals were ‘curfewed’ during the processing time prior to transport.

The most popular reasons for not curfewing were for Meat Standards Australia (MSA) compliance, buyer (supermarket chains) requirements, that curfew affects the animal stress level, and that curfew affects the livestock liveweight and therefore meat quality. It was also indicated that dark cutting meat is associated with curfew of animals and abattoirs heavily discount this meat.

The few surveys and conversations with livestock transporters indicated that curfew is seen as a key technique to minimise effluent production during transport. They indicated that lot feeders and graziers should be more 'responsible' for their effluent production and curfew prior to transportation. However, perceptions that curfewing increases the probability of dark cutters is a deterrent for producers to curfew animals prior to transport. ALTA believes that "the basics of the problem relate to the fact that producers and vendors of livestock are not preparing their stock properly before they are transported" (see Appendix B).

5.5.2 Trailer design

Trailer manufacturers have been proactive in progressing effluent containment on livestock transport trailers. They are receptive to the client's requirements and are happy to install options to minimise effluent spillage. A number of options are being fitted to new and used trailers as standard features or additional options. Trailer design change was acknowledged in the survey as a positive effluent management change during the past 10 years. Such features include:

- Trailer manufacturers are getting more and more inquiries for effluent holding tanks on trailers. Tanks range from 100-200 L depending on the customer requirements and room available to install them on the trailer. Manufacturers indicated automated tank openings can be fitted to allow easy access for drivers to dump effluent at suitable facilities. ALTA has indicated that compulsory effluent holding tanks on livestock trailers would not be a suitable solution for this sector. The livestock transporters feel this is a 'significant compliance cost to industry in terms of purchase, fitting and maintenance costs.' The extra weight of the effluent holding tanks would decrease the number of cattle able to be carried and therefore decrease the productivity of the freight (see Appendix B).
- An external drop pipe that can be manually closed to stop effluent flowing during travel through urban areas. These are generally fitted as standard feature, and manual opening of the flap is required. They allow the slow flow of effluent onto road as it is produced but prevent spillage in sensitive urban areas
- Trailer floors have been designed to slope towards the rear to promote effluent flow. Trailers also have drains down the side of the trailer to allow free flow of effluent
- Flexible rubber is used on the back gate of the trailer to minimise spillage through the gaps. This minimises effluent loss in a large surge when going around a corner or up an incline.

It appears that effluent containment is a feature of almost all new cattle trailers but that effluent holding tanks are only a customer option.

5.5.3 Provision of washdown facilities and effluent dumps

Irrespective of whether effluent holding tanks are used, livestock trailers need to be washed down and this preferably should be done at a location whether the effluent is disposed of in a controlled manner. The industry would benefit from a larger number of truck washdown facilities that can handle effluent loads.

Consideration of the following issues needs to be given to these facilities:

- Water use and availability
- Power use and availability
- Biosecurity
- EPA Licensing requirements
- Local government approvals
- Workplace health and safety requirements
- Community amenity impacts - noise, odour light, dust, rubbish, vermin and visual appearance
- Infrastructure capital and operating costs
- Increased effluent in waste stream and potential requirement to upgrade system
- Increased effluent reuse areas
- Ongoing maintenance and machinery requirements for cleaning
- Location at specific transport nodes

56% of survey respondents indicated that a washdown facility is available for livestock transport vehicles at their operation. Many councils have washdown facilities as part of the saleyards operation. Some major abattoirs located in urban areas have EPA requirements to operate washdown facilities and to ensure its use by livestock transporters. Washdown facilities were not provided at some operations due to water availability and biosecurity risk. Cost and availability of water is an increasing concern for producers. Increasing effluent flow into the waste stream is also a concern for some washdown facility operators.

Of the survey respondents that indicated livestock transport vehicle washdown was applicable to their operation, half identified that washdown of vehicles was undertaken at least fortnightly. Washdown is also dependent on when time is available, how dirty the trailer is, and the cost involved in washdown.

5.5.4 Floor covering and bedding

European Union regulations require all vehicles and trailers need to have a flooring surface that is anti-slip and minimise leakage of urine and faeces from the vehicle. Anti-slip provision can be chequer-plate flooring, a covering of sand or other material, or fixed or removable matting. Minimising leakage of urine and faeces does not mean that the floor has to be ‘watertight’. Floors should be kept as dry as possible and it is preferable for excess liquid to drain into a sump or holding tank. Bedding is also required in all transport vehicles for comfort and adequate absorption of urine and faeces when transporting young animals. Appropriate litter is recommended over bare flooring if

bedding is not used for older animals. For long distance transport (over 8 hours), bedding is a requirement for all animals which must absorb urine and faeces adequately.

In the USA the Animal Welfare Act 2007 requires transporters to provide suitable transport trailers, a clean environment and appropriate litter during transport. Enclosures used to transport animals are to have solid bottoms to prevent leakage during transport, and to allow for thorough cleaning and sanitisation. The enclosure should contain clean litter of a suitable absorbent material that is non-toxic to the animal. There should be a suitable amount of the litter to absorb and cover excreta. The 'Cattle and Swine Trucking Guide for Exporters' in the USA recommends a bedding material to absorb animal waste and provide better footing, as well as to keep animals warm in winter and cool in the summer. Sawdust, wood shavings, straw, and sand are recommended as suitable bedding materials. Sawdust and wood shavings are recommended to be spread about 5 cm deep, straw 8-10 cm deep, and sand at least 3 cm deep on the truck floor. The guideline outlines that authorities may impose fines if the effluent spills onto the road.

In Canada the Health of Animals Regulations state that there must be provision for adequate drainage and absorption of urine within the vehicle. Sand or safe footholds in addition to adequate bedding, is required to ensure animals are able to stand during transport. Canada also has a 'Recommended code of practice for the care and handling of farm animals – transportation' that outlines the provision for the drainage or absorption of urine during transport. Suitable bedding such as straw, wood shavings or matting should be added to the vehicle to assist in absorbing urine and faeces. This bedding also provides better footing for the animals and provides protection from hard flooring. Fresh bedding is required for each new load for all livestock transport.

Under current Australian conditions, the use of floor coverings and litter is not seen as a viable or necessary solution.

5.5.5 Integrated solution

The majority of respondents to the survey indicated they would be willing to participate in a voluntary integrated system to minimise effluent spillage. There was a general indication that all sectors should be involved in providing effluent minimisation solutions. Councils generally indicated they would be willing to participate in the voluntary system but don't think it is their responsibility to solve the problem. Councils would generally not be able to finance the cost of installing and maintaining effluent dumps or washdown facilities, but see the community benefits of this infrastructure.

In New Zealand, the National Stock Effluent Working Group (NSEWG) was established with the aim of minimising the amount of stock effluent spilled from stock trucks onto roads. The NSEWG developed a code of practice with all stakeholders involved and a voluntary system was introduced, thus avoiding the need for regulatory intervention. The code was developed with a thorough identification of existing practices and technologies used to manage in-travel effluent generation in livestock transport vehicles and their effectiveness in preventing or minimising effluent spillage.

The NZ code has a number of basic principles. In their system, the most important feature is that stock are prepared for transport by standing off pasture / crop, but with access to water. The amount of time stock should be stood off feed prior to transport is usually 4 - 8 hours. Livestock trucks are equipped with effluent holding tanks (400 L) to contain effluent during travel and the holding tanks have valves that can be opened when the stock truck is parked over a dump site grate. Effluent dump stations are available at a number of points along major stock routes and away from urban areas. The location of these dump stations was determined by GIS modelling, with disposal sites are

also available at points of livestock delivery (e.g. saleyards). The effluent disposal sites are operated by the local council and are free. While many of these features are not applicable in Australia, a key to the success of this system was a co-ordinated approach to control the problem by good communication between all those directly and indirectly involved with the handling and transportation of stock, and the management and disposal of effluent.

It is evident that there is no one solution to minimisation of effluent spillage during livestock transport. A number of techniques may need to be implemented across a number of sectors in the beef supply chain for effluent spillage to be managed. There will not be a one-size-fits-all solution that will solve the issues identified as there are subtle differences in each region's issues. Targeted solutions may need to be applied in each region to address the particular issues relevant to the region.

5.6 Limb protrusion during transport

Limb protrusion is an issue that only relates to sheep. This section provides a summary of face-to-face consultation carried out in Western Australia. A general observation regarding stakeholder opinion is that limb protrusion is more of a *perceived* welfare issue than an actual concern for livestock health and well-being. Clearly, sheep that die or break limbs during transport would be a concern to the industry but this was not mentioned by the stakeholders. However, it was agreed that, none the less, the issue needs to be addressed by the industry. It was also clear that transport is a major point of contact between urban Australians and the sheep industry and is part of the public 'face' of the live-export industry. From the workshop and stakeholder consultation, the following issues have been identified and are grouped under the appropriate headings.

5.6.1 Geographical context

Concern over limb protrusion is focussed on the transport of sheep to the Fremantle wharf from live-export bulking depots, typically some 30 km from the wharf. The issue is less often identified as a concern in other locations.

There are several reasons which localise the issue to the live-export ship loading operation. Ships of up to 70,000 sheep are loaded in a relatively short amount of time (around 12-14 hours). This requires a large number of trucks to transport sheep from company bulking depots where sheep are collected prior to transport to the wharf. This work is contracted to a number of small owner operators and some companies. However, the operation is very financially competitive and operators aim to maximise the number of trips per truck for each ship loading (typically 4-5). The competitive nature and relatively low return may partially explain the usage of older model livestock trailers (discussed in Section 4.8.4), as they are used infrequently throughout the year apart from the intense activity that occurs when a ship is being loaded. Consequently there is a low return on investment for the trailers used and drivers may not work full time as livestock transporters. The following issues were raised by stakeholders as contributing to the problem of limb protrusion in this context:

- There is high exposure of sheep to the public as they must be transported right through Fremantle main thoroughfares
- Frequent stops / starts during this journey is unsettling for sheep and may contribute to the number of limb protrusions
- There is pressure on the transporters to maximise the number of return trips during each ship loading which may contribute to the following problems
  - pressure to load sheep rapidly may lead to inappropriate penning densities
  - pressure to complete the return trip rapidly reduces the likelihood of operators stopping to check animals en-route
- Use of old-style trailers with rail spacing of greater than 150 mm

Considering the localised impact and factors contributing to the issue, it is expected that a localised solution is required that meets the needs of all stakeholders.

5.6.2 Trailer design

Trailer design is major contributor to the problem of limb protrusion. Several stakeholders noted that the problem is particularly related to older trailers manufactured by SFM Engineering Pty Ltd. These trailers were designed for maximum airflow and have wide rail spacing (in excess of 200 mm in some cases). The wide rail spacing allows sheep to extend their limbs through the rail and retract the limb without entanglement, which reportedly leads to fewer limb breakages. However, it is recognised that, in some cases, sheep may have multiple limbs (and head) through rails which can lead to compromised welfare conditions.

Stakeholders from the trucking industry commented that the old design trailers were slowly being replaced and that the problem was far less apparent than it was 4-5 years ago. One stakeholder commented that '90% of the problem could be solved by phasing out the use of the old SFM Engineering trailers'.

According to SFM Engineering, newer trailers have reduced rail gaps (to approximately 120 mm) in response to this issue, however, considering the turnover of trailers is 15-40 years, there are many of the older design still in use.

Several stakeholders mentioned that the older trailers (owned by companies or private operators) are preferentially used for the live-export transport route from the bulking depot to the wharf. One stakeholder noted that many 'sub-standard' trailers are still for this work and some live-export companies own older design trailers for their own use. This must be understood in the context of the live-export operation and will be discussed in the following section.

One stakeholder commented that livestock trailers had been modified to reduce the incidence of limbs protruding through rails by adding a rubber flap on the inside of the rail. This blocks limbs while still allowing access to the operator.

Design options to reduce this problem were identified by several stakeholders. However, it was noted that this would be costly and could not be mandated rapidly without consultation with truck operators.

It was also identified that rail height on the open top deck of 4 deck sheep trailers was insufficient, and this has led to sheep jumping from the top deck on more than one occasion. This is an additional welfare problem that needs to be addressed by the industry with respect to trailer design.

5.6.3 Livestock handling

Correct livestock handling, loading and transport practices have been formalised in codes of practice for sheep transport, such as the Code of practice for the transportation of sheep in Western Australia. However, some of these recommendations (partitioning of pens, livestock densities and inspections of livestock 30 – 60 min after journey commencement) are not always being followed in practice. Within the sector training is often carried out 'on the job' and there are no clear guidelines that prioritise animal welfare considerations.

The following livestock handling issues may contribute to poor animal welfare outcomes:

- Incorrect penning of sheep (anecdotal reports suggest that sheep are not always penned and are left to move throughout the whole deck)
- Incorrect pen density (this is related to the issue of penning and the pressure to transport the maximum number of sheep per load)
- Sheep are not always checked en-route to reduce the number of animals with limbs protruding through side rails

It was noted that many operators who are carrying out the work are not members of an accreditation system such as TruckCare and may not receive information and training through this route.

5.6.4 Summary of limb protrusion consultation

Several preliminary conclusions can be drawn from the Western Australian consultation process, namely:

- Limb protrusion is related to trailer design and livestock handling
- There are localised issues related to the transport of sheep from bulking depots to the Fremantle wharf that are not present in other areas
- The incidence of limb protrusions has reportedly decreased in recent years but there is still a need to solve the problem

In conjunction with the survey results and further consultation, it is anticipated that solutions can be proposed that address the needs of the industry based in Fremantle, which may act as a case study for other areas where the same problem is identified.

ALTA view (see Append B) is that "*limb protrusion – particularly for sheep – is not in and of itself an issue of concern, provided that 2 key factors are satisfied:*

1. *The stock trailer in question is in good condition has been designed to carry the species being transported; and*
2. *Recommended penning densities for classes and species of stock (in line with the State-based codes of practice and the guidelines for the new draft national stock transport legislation) are being adhered to."*

5.7 Options for managing limb protrusion

Limb protrusion was only identified as an issue in Western Australia. However, solutions could be applied in other regions if the need arises. The consultation process identified these main issues:

- There are localised issues related to the transport of sheep from live-export bulking depots to the Fremantle wharf that are not present in other areas
- The incidence of limb protrusions has reportedly decreased in recent years. However, there is still a need to solve the problem
- Limb protrusion is an important issue because it represents the 'public face' of the live export industry
- Limb protrusion is related to trailer design and livestock handling

5.7.1 General awareness of the issue within the industry

Within the industry there is a need to raise awareness of the importance of this issue to the wider live-export industry. It is imperative that the personnel responsible for loading and transporting sheep to the port understand they are the 'public face' of the live export industry. This will be fundamental to the uptake of improved practices. The live-export companies have an important role in raising the profile of this issue among their staff and contract transporters. A stakeholder workshop is suggested as a means to improve awareness of this issue and to discuss implementation of solutions.

5.7.2 Trailer design

Trailer design, particularly with respect to older style SFM Engineering trailers, is a major factor contributing to limb protrusion issues in Western Australia. These trailers have rail spacing of up to 200 mm which lead to greater numbers of limb protrusions. Improving the design of trailers used to transport sheep from live export bulking depots to the port could significantly reduce the problem of limb protrusion.

This would require live export companies to stipulate compliance with minimum rail spacing regulations (maximum gap size of 150 mm, preferably 120 mm) for the transport of their sheep from bulking depots to the port.

The use of new design trailers would significantly reduce this problem. Alternatively, old style trailers could be modified to reduce the rail spacing. This could be done by re-fitting rails with the recommended spacing, or through simple means such as adding a rubber strip to the inside of the rail, reducing the gap size. This may offer a cost-effective solution to the limb protrusion issue. It is important that modifications do not significantly cover the side walls of the trailer, as this may compromise air flow and create animal welfare concerns.

5.7.3 Livestock handling

Codes of practice relating to animal welfare during transport are already in place in Western Australia for the transport of sheep (see Section 4.5.3). However, the stakeholder consultation recognised that livestock handling, loading and transport practices may not meet these standards. 'On the job' training may not be adequate for staff involved in this sector and more formal training related to loading, pen density and regular checking during the trip may be required. Many of the

operators are not members of an accreditation system such as TruckCare and may not receive information and training through this route.

Improvements in livestock handling could be made through dissemination of simple guidelines or fact sheets that explain the correct handling and loading of sheep to all personnel involved. Regular assessment of the performance of livestock transporters via an auditing process may also improve livestock handling and transport.

5.7.4 Implementation issues

Implementation of the above solutions will require the co-operation of the live-export companies and the livestock transporters who are employed by them to transport sheep from bulking depots to the port. It is possible that a relatively small number of transporters are working in this field. Raising awareness of the problem is fundamental to the success of implementing change. Because many members of the transport and live-export industry do not believe there is an actual welfare issue, it is important that the message 'transport is the public face of the live export industry' is conveyed. Hence, the issue is not an actual welfare concern, but a public perception issue that affects the industry as a whole.

It was cited at the Western Australia consultation workshop that transport of sheep to the port is highly competitive and price driven. Hence, it is likely that cost will be a primary obstacle to implementation of improvements to trailer design and animal handling. Improvement to trailer design could be made via establishment of standards that are imposed by the live export companies. In this case, the cost of altering non-complying trailers would be met by the livestock transport company, with a possible increase in transport costs to be met by the live export company. These standards should be developed at the industry level to ensure consistency.

Development of simple guidelines in fact sheet form, for dissemination to livestock handlers and truck drivers is one form of training and raising awareness. If required, a guideline for training of livestock handlers and truck drivers could be developed that is specific to transport from the bulking depot to the port. As the requirements for handling are fairly simple (correct penning density, ensuring pen gates are closed, etc) it may be valuable to institute a auditing or monitoring program to ensure these requirements are being met.

As part of the general awareness, an industry hosted workshop could be held that would provide a forum for discussion of the issue and some training with respect to the importance of the issue to the industry. This will require the strong support of the companies involved in the live export trade.

6 Success in achieving objectives

1. Summarise current knowledge and opinion from stakeholders regarding livestock effluent spillage

To further understand the issues of effluent spillage and limb protrusion during livestock transport, a consultation and survey process was conducted with all key stakeholders. The key stakeholders were identified partly via a mapping process to identify the major beef cattle and sheep road transport routes in Australia using spatial and statistical data on cattle and sheep production areas, cattle feedlot locations, saleyards locations, abattoirs locations and live-export facilities.

Initial informal consultation was undertaken with a number of stakeholder groups (graziers, lot feeders, livestock transporters, abattoirs, researchers, trailer manufacturers and live exporters) to get a general indication of what the main issues were for the development of a more formal survey.

Local government councils were contacted on the basis of whether they had saleyards, abattoirs or live-export ports in their area. The selected councils were questioned on whether effluent spillage was an issue in the area and if they had received any complaints from the public regarding effluent spillage. The councils were all asked if they would be willing to take part in the survey regardless if effluent spillage or animal welfare was considered an issue or not.

Discussions were conducted with Queensland Rail (QR) and revealed that they have never received a complaint about effluent spillage. Most rail transport occurs in rural areas and any effluent spillage occurs on land owned by QR.

A stakeholder survey form was developed and circulated to gauge the extent of the issues and seek reactions and potential solutions. Background information and pictures complemented the survey to outline the potential issues to participants and stimulate thoughts on the topics. After an initial pilot with the survey form, it was distributed to stakeholder representative organisations for circulation to their membership lists. A separate survey was produced for local government to identify specific issues and solutions appropriate for councils.

The results of the stakeholder consultation and effluent management practices identified are limited by a lack of participation by livestock transporters. Livestock transporters are a key part of the beef supply chain and the results may have identified additional issues and practices if they had been involved. It is recommended that a whole-of-industry approach to the issue be addressed and it must involve the livestock transporters.

2. Consider livestock limb protrusion from livestock transport vehicles (road and rail)

Concern over limb protrusion is focussed on the transport of sheep to the Fremantle wharf from live-export bulking depots, typically some 30 km from the wharf. The issue is less often identified as a concern in other contexts.

Major stakeholders concerned with limb protrusion were consulted in a facilitated workshop and face-to-face meetings held in Western Australia. Face-to-face consultation was seen as a preferred option to discuss limb protrusion because of the regional focus to this issue. The workshop was also

a useful forum to discuss effluent spillage from trucks, as many stakeholders had an interest in both topics.

There are several reasons which localise the issue to the live-export ship loading operation. Ships of up to 100,000 sheep are loaded in a relatively short amount of time (around 12-14 hours). This requires a large number of trucks to transport sheep from company bulking depots where sheep are collected prior to transport to the wharf. The following issues were raised by stakeholders as contributing to the problem of limb protrusion:

- There is high exposure of sheep to the public as they must be transported right through Fremantle main thoroughfares
- Frequent stops / starts during this journey is unsettling for sheep and may contribute to the number of limb protrusions
- There is pressure on the transporters to maximise the number of return trips during each ship loading which may contribute to the following problems
    - pressure to load sheep rapidly may lead to inappropriate penning densities.
    - pressure to complete the return trip rapidly reduces the likelihood of operators stopping to check animals' en-route.
- Use of old style trailers with rail spacing of greater than 150 mm

Discussions were conducted with Queensland Rail (QR) and revealed the QR trailers are designed to minimise limb protrusion and allow for air flow. Sheep are not carried by rail in Australia and limb protrusion for rail was considered a negligible issue.

3. Provide a recommended way forward on these issues

From the consultation and survey process, effluent spillage has not been identified as a broad scale issue in all regions with the beef supply chain sectors in Australia. However, where it has been identified a localised issue, it can be highly emotive and has received both media and government attention.

Industry stakeholder consultation has identified the following potential techniques that could be used to minimise effluent spillage from livestock transport vehicles:

- Curfew of livestock prior to transport
- Selective effluent containment through urban areas using drop pipes
- Compulsory effluent holding tanks
- Provision of more readily available washdown facilities
- Provision of effluent dumps where effluent from effluent holding tanks can be disposed
- Alternate routes around towns for heavy vehicles

The project has revealed that curfewing is a contentious issue within the industry. Curfew practices varied between lot feeders and graziers. From the survey results, reasons for curfewing range from reducing animal stress, the belief that livestock travel better and buyer/transporter requirements. Reasons for not curfewing include MSA compliance, buyer requirements, and effects on the animal

liveweight and stress levels. Among the survey respondents a trend was apparent, where livestock transporters suggest lot feeders and graziers should be responsible for the effluent production of their cattle during transport, and should therefore curfew prior to transportation. Alternately, the lot feeders and graziers suggest effluent containment on trucks is a better solution as it does not affect the meat quality of their animals.

It is apparent that strong perceptions have been formed in the industry and more education and research on this topic is required at a grass-roots level to increase the knowledge on this potential technique to minimise effluent spillage.

There has also been little scientific work conducted that attempts to correlate the amount of manure production to the level of fear or stress before or during transport. Research and evidence in this area would help reinforce the other positive benefits in relation to improved meat quality and a lower incidence of dark cutting meat by minimising stress. Little research has been undertaken on the quantity and timing of effluent production on Australian livestock vehicles and the rate of effluent release from those vehicles. There is also little data on the fuel and additional operating costs associated with containing effluent.

The consultation and survey process has revealed that older trucks are more of an issue with effluent spillage. Retro fitting old trailers to retain more effluent was recommended in the survey and from visits to trailer manufacturers. This would include the selective containment of effluent on trailers and reducing splash out the side and through the back gate by install rubber matting.

Effluent holding tanks have been identified as a possible part of a solution to reducing effluent spillage. There would be increased operating costs for livestock transporters in terms of additional labour time required to clean out effluent holding tanks. Increased operating costs for livestock transporters will occur in terms of additional labour time required to stop and empty the effluent from the tank into a disposal facility. Ongoing maintenance of the effluent holding tanks will be a cost incurred by livestock transporters.

The addition of effluent holding tanks is an additional cost to a new or old retro-fitted livestock trailer. This cost is relative to the volume of the tank, the number that are installed, installation costs, and whether it has a manual or automated opening system. For a B-Double, the estimated cost of effluent holding tanks on a new trailer would be about $3,200 on top of an estimated cost of $210,000 to $260,000 for a new B-Double trailer configuration. This represents an extra 1.5% capital cost for effluent holding tanks.

Significant capital costs are associated with the design and construction of effluent disposal sites to dump effluent from these tanks. This cost is relative to the water availability, proximity to major roads and towns, labour costs, site specific design parameters including legislative requirements for effluent disposal, and construction materials used for the disposal site.

The direct capital and operational costs borne by livestock transporters due to effluent holding tank installation could be significant in terms of increased labour costs to clean and maintain tanks. These costs will be passed onto the livestock producers potentially increasing livestock transport freight costs.

Limited information is available on the extra cost of structures for effluent containment and the additional fuel used due to the increased tare weight of trailers with effluent holding tanks or

increased gross weight due to contained effluent. The additional fuel cost for effluent containment was modelled using a generic road transport model based on a design journey. This exercise showed a small difference in fuel usage with effluent containment. It is recommended that empirical data be obtained from actual livestock transport vehicles with and without effluent containment to gain a better understanding of the cost of effluent containment on trucks. No informative discussion about the effect of effluent containment and effluent holding tanks can be undertaken without this information. This information needs to be collected to further progress the discussion on effluent holding tanks.

During the project, it was observed that the issue of effluent spillage was being addressed by several groups across the country including ALTA and state road authorities. It is recommended that the relevant stakeholders, including the regulators and industry groups, progress the issue with a coordinated approach. It is recommended that a task-force of industry participants be formed to address the issue at a national and local level. This taskforce could coordinate the locally affected stakeholders to address the issue at each local level, with the industry taskforce addressing common issues and solution at a national level.

It is not likely that one solution will be found to address all issues related to effluent spillage from livestock transport. There is positive indication from survey results that an industry-wide voluntary effluent management system would be accepted.

The issues related to limb protrusion can be addressed at an industry level, and there are several recommendations.

- Live export industry host a workshop with all participants involved in handling and transport of sheep to raise awareness of the issue. This workshop can be used to present the findings of this report and to discuss the implications of the actions proposed. It is likely that other solutions will be proposed which may be equally valid and useful for solving the problem.
- A set of minimum standards need to be developed for livestock trailers used in the transport of sheep to the port. These standards should specify a maximum rail spacing of 120 – 150 mm.
- A simple fact sheet guide to loading and handling of sheep should be developed for dissemination among drivers and personnel within the industry.
- An audit process should be considered to improve handling and loading of livestock.

7 Impact on meat and livestock industry – now and in five years time

Transport of livestock via public road networks and by rail (Queensland only) is an indispensable and crucial component of the live-export and red-meat supply chains to move animals between farms, feedlots, saleyards, live-export ports and abattoirs.

Public concerns have been raised over several issues related to livestock transport, particularly in relation to effluent spillage and limb protrusion. These issues are particularly apparent where livestock travel through urban centres en-route to live-export ports, abattoirs and saleyards. These facilities are usually located in urban centres and have been encroached by residential land uses. Impacts typically occur where the conflicting land uses adjoin.

Most transport vehicles are now designed to retain the excretions of the livestock on the floor of the vehicle with gradual release of the effluent to the road during travel. While not mandatory, effluent holding tanks are being installed on some new commercial livestock vehicles. However, they are not common on older trailers and small owner-operator livestock transport vehicles. Effluent discharges have resulted in community complaints, though there is little consensus on who is responsible and who needs to address the issue. This has resulted in localised solutions being implemented without a coordinated approach to the problem.

The issue sheep limb protrusion during livestock transport is of particular concern for the Western Australian live-export industry and has been raised by animal rights and liberation groups on numerous occasions. The issue largely relates to the use of old style stock trailers that were designed with wide rail spacing to improve air flow and minimise the risk of limb fracture if limb protrusion occurs. While welfare codes have been developed for livestock transport in Australia, there is not sufficient detail in these codes with respect to trailer design to address this issue.

These issues will continue to impact on the red-meat industry unless they are addressed by all the relevant stakeholders. The most effective methods for addressing will be developed at an industry level. The alternate is to do nothing and governments will develop legislation to address the issues. This would undoubtedly lead to a less effective solution and would likely increase the cost burden for livestock producers.

8 Conclusions and recommendations

8.1 Effluent spillage

From the consultation and survey process, effluent spillage has not been identified as a broad scale issue in all regions with the beef and sheep supply chain sectors in Australia. However, where it has been identified an issue, it can be highly emotive and has received both media and government attention.

Road livestock transport represents the closest proximity of animals and animal waste to most urban Australians and therefore, the complaints about effluent spillage from livestock transport have been generally confined to urban areas. There are minimal documented complaints regarding effluent spillage in rural areas. It is for this reason that local government and the represented community have identified effluent spillage as more of an issue than industry itself. However, the livestock

industry feels that effluent spillage may have a negative impact on the environmental management and public safety credentials of the industry. The rail transportation (Queensland only) does not cause any issues with effluent spillage, as the general public are further removed from rail transport compared to road transport of livestock. The potential reduction or cessation of rail transport (if it occurs) of cattle will likely increase complaints about effluent spillage at already existing 'hot spots' in southern Queensland due to increased truck movements.

Wide consultation was conducted with local councils around Australia to identify where effluent spillage is an issue. This consultation has identified the following issues:

- Effluent spillage is a localised problem in some council areas
- Local government generally do not see it as their responsibility to address or find solutions to effluent spillage. They expect livestock transport companies to deal with the issues
- Councils generally agree that positive change has been perceived in the past 10 years in terms of effluent management practices
- Councils understand the positive impact effluent dumps and washdown facilities have, but negative impact in regards to cost to install and maintain them
- Councils with effluent spillage problems don't have any legislation to enforce with regards to effluent spillage and refer the matter to the transport authorities to regulate
- Effluent containment on livestock transport vehicles seen as an important solution
- Effluent spillage problems in affected council areas needs targeted solutions relevant for the specific issues

Industry stakeholder consultation has identified the following potential techniques that could be used to minimise effluent spillage from livestock transport vehicles:

- Curfew of livestock prior to transport
- Selective effluent containment through urban areas using drop pipes
- Compulsory effluent holding tanks
- Provision of more readily available washdown facilities
- Provision of effluent dumps where effluent from effluent holding tanks can be disposed
- Alternate routes around towns for heavy vehicles

The project has revealed that curfewing is a contentious issue within the industry. Curfew practices varied between lot feeders and graziers. From the survey results, reasons for curfewing range from reducing animal stress, the livestock travel better and buyer/transporter requirements. Reasons for not curfewing include MSA compliance, buyer requirements, affects the animal liveweight and stress level. The majority of producers withhold water for 2-4 hrs prior to transport. A mixed response for time withheld from feed was received, with over half the respondents indicating they curfew feed 0-4 hours prior to transport. Among the survey respondents a trend was apparent, where livestock transporters suggest lot feeders and graziers should be responsible for the effluent production of their cattle during transport, and should therefore curfew prior to transportation. Alternately, the lot feeders and graziers suggest effluent containment on trucks is a better solution as it does not affect the meat quality of their animals.

From a literature search there appears to be a lack of scientific data to support the anecdotal views that pre-transport curfews facilitate improvements in the capacity of cattle and sheep to cope with transport. Any time of curfew will increase liveweight loss due to the excretion of urine and faeces, as well as respiration; however, this does not necessarily correspond to a carcass weight loss. Most of the evidence suggests that curfewing up to 24 hours will not affect carcass weight. However, the diet of the animal (i.e. lot feeding of a concentrated diet) may have some effect on liveweight and the incidence of dark cutting, and this needs further investigation.

The moisture content of the gut increases when animals are fasted for long periods and produces watery manure. However, the effect of shorter curfews (less than 24 hours) compared to feeding fresh pasture up to the point of transport is likely to reduce manure moisture content during transport.

The New Zealand code for reducing effluent spillage recommend curfewing animals from feed for between 4 and 8 hours prior to transport and report that this will have minimal effect on carcass weight and is the most effective method of minimising effluent spillage. Their studies have shown that manure production rates can be reduced by half during transit if cattle are curfewed for 4 hours before transport. Further work in New Zealand predicts manure production rates of less than a third for 24-hour curfewed cattle compared to full cattle over a 2-hr trip.

It is apparent that strong perceptions have been formed in the industry and more education and research on this topic is required at a grass-roots level to increase the knowledge on this potential technique to minimise effluent spillage.

There is also little scientific work been conducted that attempts to correlate the amount of manure production to the level of fear or stress before or during transport. Research and evidence in this area would help reinforce the other positive benefits in relation to improved meat quality and a lower incidence of dark cutting meat by minimising stress.

The biosecurity risks of effluent spillage were researched. It was identified that the main biosecurity issues that relate to livestock transport were weed seed transfer, animal disease transfer within the livestock population and disease transfer from livestock to humans. The main biosecurity risk with livestock transport was the spread of weeds, particularly from animals that have originated from extensive grazing. During livestock transport, weed seeds are primarily transported in the rumen, but can also be attached to hooves, hide, skin and wool. There is little available research data on the effects of curfewing animals on weed seed survival, however since average retention times for cattle and sheep are greater than two days, curfewing periods of less than this time period are unlikely to greatly reduce the risk of weed seed dispersion via excretion.

Approaches to the issue of livestock effluent spillage from livestock transport in an overseas context have been explored. In North America and Europe it appears that effluent is contained by both having trailers sealed to minimise spillage, as well as the use of bedding in the trailers to absorb the moisture. The use of sand, sawdust or other bedding material in Australia will add a significant cost to transportation of livestock in terms of buying material and the down-time in adding and removing the material. There are also likely to be difficulties in accessing suitable bedding in some areas, as well as the treatment (e.g. composting) of the material once it is removed.

Changes in design from old to new trailers was investigated in terms of effluent spillage. A challenge in livestock trailer design is finding a balance between trailers that are well ventilated yet closed enough to contain effluent. Trailers need adequate air flow through the trailer to reduce heat stress and provide easy access for drivers to inspect the livestock during the journey.

Cattle trailers have changed in design to incorporate solid panels to the floor, with a gap located about 300 mm from the bottom to allow the operator to see in and to provide ventilation. Effluent is directed to the back of the trailer and is allowed to flow out through drains on each deck. The slope of the floor helps direct effluent to the back drains but the effectiveness of these drains could be reduced if frequent cleaning does not remove debris and manure completely.

On some trailer designs, this drainage system has been improved to allow for temporary containment of effluent. This has been done by adapting the drainage shaft from the bottom deck to incorporate a valve or door that allows the operator to cut off the flow of effluent from the trailer to temporarily contain effluent on the floor of the trailer.

The temporary containment of effluent is effective but not without its problems. With the more basic designs, this requires the driver to stop prior to entering towns to manually close the shut off door at the end of the shaft. The effluent can be contained on the deck for a short period, however once the effluent reaches the depth of the gates or when the truck travels on slopes, effluent can escape out the back or front of the trailer. In order to help prevent effluent spillage through gates, some trailers have been designed with gate covers or flaps to contain effluent as much as possible.

Some newer trailers have been fitted with effluent holding tanks for more long-term effluent storage. These tanks are able to store effluent and allow for more controlled effluent release. These can remain open to allow free flow of effluent in non-urban areas and are closed when travelling in urban areas.

The consultation and survey process has revealed that older trucks are more of an issue with effluent spillage. Retro fitting old trailers to retain more effluent was recommended in the survey and from visits to trailer manufacturers. This would include the selective containment of effluent on trailers and reducing splash out the side and through the back gate by install rubber matting.

Effluent holding tanks have been identified as part of a solution to reducing effluent spillage. The research undertaken in this project identified that the weight of an effluent holding tank (empty) is estimated at 50-100 kg. The additional weight that this structure adds to the vehicle is considered negligible compared to the weight of the vehicle. Effluent is not considered as additional weight to the vehicle, as the effluent is only transferred from the animal to the vehicle floor. The approximate cost to manufacture, sandblast, paint and install an effluent tank is $3,500 per tank. This includes an automated air ram opening system. This is a significant capital cost.

There will also be increased operating costs for livestock transporters in terms of additional labour time required to clean out effluent holding tanks and stop and empty the effluent from the tank into a disposal facility. The ongoing maintenance of the effluent holding tanks will be incurred by livestock transporters. These costs will be passed onto the livestock producers potentially increasing livestock transport freight costs.

Significant capital costs are associated with the design and construction of effluent disposal sites to dump effluent from these tanks. This cost is relative to the water availability, proximity to major roads and towns, labour costs, site-specific design parameters including legislative requirements for effluent disposal, and construction materials used for the disposal site. Work from New Zealand (Thull 1999) suggests that the cost of constructing and operating an effluent dump site (assuming a 25 year life) is in the order of $6,700 and $11,600 (NZ).

Estimates have been made on the likely increase in fuel consumption for trailers fitted with effluent containment tanks for a journey while the trailer is loaded and unloaded. It is predicted that fuel usage would increase by 3% and 1% for a journey on relatively flat terrain while the trailers are loaded and empty respectively. However, further work is likely to be required in this area due to the large variations in estimates of fuel usage of loaded and unloaded trucks from predictive models and industry data. It is likely that trucks would need to be equipped with monitoring equipment (fuel flow, inclinometers, dataloggers) and detailed records of journeys and effluent collected/dumped in order to obtain real data for Australian situations before an informed discussion about the effect of effluent containment and holding tanks can be undertaken.

Washdown facilities operating at various locations throughout Australia have been identified. The washdown facilities are predominately located in the eastern states and are usually located nearby saleyards or abattoirs. These washdown facilities allow drivers to wash effluent and manure out of the cattle trailers and also clean the truck underbody free of any weed seeds. Many sites use a coin or magnetic tag system to operate the washdown. Each individual operation varies in size, capacity, throughput, and water usage.

Truck washes are potential sites for dumping effluent and minimising spillage from livestock transports. Facilities that are located closer to main roads are more likely to be used due to easier access. The actual site selection for new facilities may greatly increase the cost of construction. All weather access is essential. However, if a facility is located too far off the formed or sealed road then earthworks and access roads will also increase construction costs.

Appropriate provision for control of dust and atmospheric contaminants are incorporated into the design of new facilities to ensure that users on-site are not adversely affected by dust. Noise may be generated by high pressure air and water equipment, and by vehicles and machinery during the facility operation. Public amenity is an important consideration for any washdown facility. Noise, light, dust, rubbish, vermin and visual appearance can reduce the public amenity and can affect residents nearby to the facility. Washdown facilities are usually available for operation 24 hours per day. The lighting installed should not create a nuisance. Dust nuisance can be a problem due to the network of unsealed roads around some facilities near saleyards.

A number of hot-spots for effluent spillage have been identified around Australia. These include: Ballarat VIC, Inglewood QLD, Toowoomba QLD, Warwick QLD, Gympie QLD, Brisbane QLD, Nowra NSW, Esperance WA, Wagga Wagga NSW, Townsville QLD, and Glen Innes NSW. These issues have varied between only minor comments (it occurs but there have been no complaints) to being identified as a major problem (all livestock trucks need to be diverted around town). In some cases the issue has already been resolved (e.g. Inglewood where the truck stop has been relocated out of town). This is unlikely to represent the full extent of effluent spillage issues in Australia, however, it is likely to represent a large percentage of the likely ‘hot spots’ of most contention.

During the project it was observed that the issue of effluent spillage is being progressed by several groups across the country. It is recommended that the relevant stakeholders, including the regulators and industry groups progress the issue with a coordinated approach. It is recommended that a task-force of industry participants be formed to address the issue at a national and local level. This taskforce could coordinate the locally effected stakeholders to address the issue at each local level, with the industry taskforce addressing common issues and solution at a national level.

Some solutions may be as simple as a driver education program to ensure that drains on trailers are not blocked (dry manure, sticks and leaves). This would avoid the potential for large volumes of effluent to be contained in the trailer that can potentially be released while the truck is passing through an urban area. Any driver education could be conducted via the already developed TruckCare program.

Other solutions may require a more complex and integrated approach, such as the selective containment of effluent through urban areas and dumping of the contained effluent at a specifically designed effluent dump site on the outside of the effected urban zone. If effluent dumps are not provided there will likely be issues with effluent being released on the road in a concentrated area once trucks have passed through the urban zone. This may have road safety issues if it is just dumped as the truck is moving via an automated flap. There may also be issues at rest stops on the side of roads by releasing this effluent all at once.

It is not likely that one solution will be found to address all issues related to effluent spillage from livestock transport. There is positive indication from survey results that an industry-wide voluntary effluent management system would be accepted.

The results of the stakeholder consultation and effluent management practices identified are limited by a lack of participation by livestock transporters. Livestock transporters are a key part of the beef supply chain and the results may have identified additional issues and practices if they had been involved. It is recommended that a whole of industry approach to the issue be addressed and it must involve the livestock transporters.

A number of research, development and/or extensions projects could be undertaken to advance a collaborative approach to effluent spillage across the industry, such as:

- The effect of curfew (feed) and feeding regime on manure production rates.
- The effect of curfew (feed and water) on meat quality with specific attention on both pasture fed and grain fed.
- Detailed study on the increased capital and operating (particularly fuel usage) costs of containing effluent on trucks.
- Feasibility study on construction of potential effluent dump stations (if not already available at saleyards/abattoirs) at identified hot-spots around Australia.
- Additional driver training to avoid unnecessary spillage of effluent through urban areas through blocked drains.

8.2 Limb protrusion

Limb protrusion is only an issue in Western Australia and primarily relates to two main factors with transport between the live export bulking depots and the port, namely:

1. Use of old style trailers with wide rail spacing
2. Inappropriate handling and loading density of sheep

These issues can be addressed at an industry level, and there are several recommendations.

- Live export industry host a workshop with all participants involved in handling and transport of sheep to raise awareness of the issue. This workshop can be used to present the findings of this report and to discuss the implications of the actions proposed. It is likely that other solutions will be proposed which may be equally valid and useful for solving the problem.
- A set of minimum standards need to be developed for livestock trailers used in the transport of sheep to the port. These standards should specify a maximum rail spacing of 120 – 150 mm.
- A simple fact sheet guide to loading and handling of sheep should be developed for dissemination among drivers and personnel within the industry.
- An audit process should be considered to improve handling and loading of livestock.

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Appendix A – Industry and local government surveys

Livestock transport – effluent spillage and limb protrusion

stakeholder survey

Background
Livestock transport is a vital part of animal production in Australia. It is also one of the greatest areas of contact between livestock and the general public. Issues related to livestock transport (effluent spillage and limb protrusion) have been raised in recent years and have the potential to damage the industry's image if not addressed.

Meat and Livestock Australia (MLA) and LiveCorp have established a project (MLA B.LIV.0126) focussed on effluent spillage and limb protrusion with the intent of gathering opinions and information among industry stakeholders regarding these issues. To do this, FSA Consulting have been contracted to survey a wide cross-section of industry stakeholders, with three basic aims to the survey:

1. To summarise current knowledge and opinion from stakeholders regarding stock effluent spillage.
2. To consider livestock limb protrusion from livestock transport vehicles; and
3. To provide a recommended way forward on these issues.

MLA, LiveCorp and FSA Consulting have no pre-determined position on these issues, other than ensuring livestock welfare is maximised and public concerns are minimised. The survey has been designed to provide a format for input from all stakeholders involved in the road transport of livestock. This information will assist in providing MLA and LiveCorp with the necessary information to be able to assess if, and how, the issues can be investigated and further addressed.

For further information on the project, please contact MLA (Des Rinehart on (07) 5464 2277 or Simon Winter on (02) 6281 5257). FSA Consulting can be contacted at (07) 4632 8230.

We invite you to provide input into this project by completing this survey by the 21st September 2008. To help do this, the following pages provide some further background to the issues involved.

The issues

Livestock transport vehicles traverse Australia carrying stock between farms, feedlots, saleyards, ports and abattoirs, using both road and rail networks. They are an indispensable and crucial component of the live-export and red-meat supply chains. Virtually every stage of the supply chain requires the transport of large numbers of livestock across significant distances in a humane and efficient manner. However, transport of livestock on public roads or along rail networks can lead to:

- Aesthetic and road safety issues, such as stock effluent deposition on public roads and vehicles sharing those roads;
- Potential exposure of the community to health risks from effluent ;
- Potential contamination of the environment with animal manure and effluent;
- Perceived and actual impacts on animal welfare from the protrusion and possible entrapment of livestock limbs through the sides of stock trailers.

These issues are particularly apparent when livestock are transported through urban communities adjacent to animal assembly areas and abattoirs.

Effluent spillage

Most livestock transport vehicles are now designed to contain the excretions of the livestock during travel within the floor of the vehicle with gradual release of the effluent to the road during travel. Effluent holding tanks are not commonly used in Australia. On occasion, the effluent discharges result in community complaints or disquiet for the reasons stated above. More difficult to assess is the risk to public health. Livestock transport – especially trucks – represents the closest proximity of animals and animal waste to most urban Australians. In the Australian climate this risk is worthy of consideration. Road safety issues are also difficult to quantify.

Cattle trucks create a stink

By LOUISE O'KEEFFE
louise.okeeffe@thechronicle.com.au

TOR Street resident Kevin Connolly believes something needs to be done to alleviate the stench of cattle trucks going through the city.

Mr Connolly said a Range crossing for Toowoomba would be ideal but, as it is still in the works, something else needs to be done.

"I live in Tor Street and the big trucks pass our place and the smell is horrible," Mr Connolly said.

"We even get faeces all over the windscreen.

"It is ridiculous; trucks come through the heart of town.

"A second Range crossing would be good, but no-one knows what's happening there."

Originally from Toowoomba, Mr Connolly and his wife Margaret returned in February after a year in Bendigo.

Mrs Connolly was looking for accommodation and couldn't find anywhere else to rent but the Tor Street residence.

Queensland Transport legislation states that if the crate contains excessive waste, which is spilling freely from the vehicle, enforcement officers can issue a penalty to the driver.

Federal Member for Groom Ian Macfarlane admitted there was an issue with semi-trailers, especially those carrying cattle travelling through Toowoomba.

"The second Toowoomba Range crossing will alleviate this problem by reducing the need for motorists to travel into the centre of the city," Mr Macfarlane said.

"Work is about to get under way on the pilot tunnel and that's a huge step forward for the project and another step closer to construction of the bypass."

"We even get faeces all over the windscreen. It is ridiculous; trucks come through the heart of town."
— Kevin Connolly

LOCAL NEWS We live here

Resident sick of the stench

Tor Street resident Kevin Connolly is fed up with the smell from cattle trucks on James and Tor streets.

Figure 35 – Effluent Spillage has been identified as a public nuisance in some towns

In Queensland, a working group containing members of the Livestock Transporters Association (QLTA), the feedlot sector and main roads have met on several occasions in an attempt to address this issue. Possible solutions discussed in this forum included:

- Re-routing livestock transport to avoid towns and other sensitive receptors
- Containment of effluent on livestock vehicles.

The discussions have not developed a clear approach to address the problem and the above solutions were not considered suitable.

Beyond Australia, this issue has been addressed in a proactive way by all stakeholders in New Zealand. This was done by means of a voluntary code of practice (initiated in 1999) and has been adopted through the supply chain to minimise stock effluent spillage from livestock trucks. This model will be discussed later in this survey.

The New Zealand approach serves as an example. However, the vast land size of Australia, the dry climate and the long distances stock are transported make such an approach more difficult to consider or implement. In some cases, overseas solutions may contradict Australian animal welfare requirements.

Considering this, the agreed approach for managing effluent spillage in Australia will have to consider all the implications before a way forward can be established.

The aim of this work is to gather information and to determine the attitude of various stakeholders on this issue and to develop an agreed 'way forward' to address effluent spillage in the Australian context.

Animal welfare – limb protrusion

Another issue identified by MLA and LiveCorp is limb protrusion during livestock transport. This is of particular concern with sheep. The design of some transport vehicles allows the limbs and heads of sheep to protrude through the sidewalls with a risk of entrapment. This can potentially lead to injuries to the sheep and in rare cases loss of life. This issue has been cited as a major animal welfare violation by some activist groups, particularly in the context of Australia's live export industry (see Figure 36).

Figure 36 – Limb protrusion is possible through wide gaps in side panelling in old-style sheep transport trailers

There is some debate about the actual welfare concerns related to limb protrusion and entrapment. However, it is clear that the public perceive that a welfare violation can occur and this must be addressed by the industry. Several factors may contribute to the incidence of limb protrusion from livestock trailers. These include:

- High loading densities
- Inadequate partitioning of livestock (using internal pens) during transport
- Wide rail spacing leading to a greater likelihood of limb protrusion

This survey asks for information and feedback that will help provide an industry-led solution to these issues, your contribution is appreciated.

Stakeholder information

We are interested in where you are located and the sector of the livestock industry that best describes your business/employment. If you are available for a short follow-up phone survey, please indicate in Question 2.

When completing this survey, please feel free to express any views that you might have on the issues.

Completion of the Contact Details below is optional. All responses will be regarded as confidential.

CONTACT DETAILS

Business Name:_____

Contact Person:_____

Street Address:_____

Postal Address:_____

Telephone:_____

Fax:_____

Email:_____

Q1. What is your main activity
Please tick the relevant box(es)

- ❑ Grazier
- ❑ Lot feeder
- ❑ Livestock transport company
- ❑ Abattoir
- ❑ Live exporter
- ❑ Saleyards representative
- ❑ Stock agent
- ❑ Other (please specify)_____

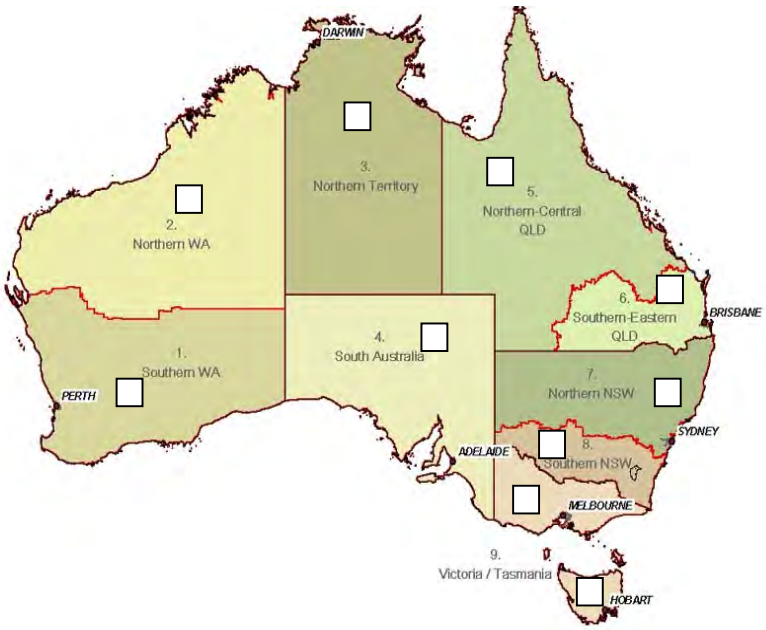
Q2. Are you willing to participate in a follow-up phone conversation regarding effluent spillage and animal welfare during livestock transport?

❑ Yes ❑ No

❑ Other_____

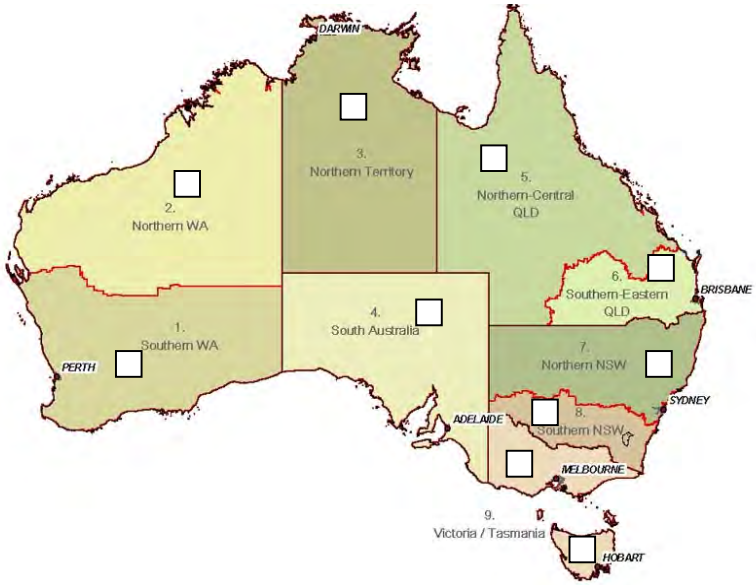
Q3. Where are you located?

Please tick the relevant box on the map below



Q4. Which areas do you service?

Please tick the relevant box(es) on the map below



Current livestock transport practices

In this section, we are trying to gain an understanding of current livestock transport practices, particularly in relation to effluent spillage and limb protrusion.

Q5. What livestock transport Best Management Practices do you implement in your operation?

❑ Not applicable

Please rate each practice

Best Management Practices	Rating (1 Always implement – 5 Never implement)				
Require livestock transport vehicles to be Truckcare accredited	1	2	3	4	5
Enforce biosecurity requirements for livestock transport	1	2	3	4	5
Require effluent containment on livestock transport vehicles	1	2	3	4	5
Follow 'Fit to Load' procedures	1	2	3	4	5

Q6. What practices do you implement for livestock trailer washdown?

❑ Not applicable

Please rate each practice

Vehicle Washdown Practices	Rating (1 Always implement – 5 Never implement)				
Require livestock transport vehicles to be clean prior to entering or exiting the premises	1	2	3	4	5
Provide washdown facilities for livestock transport vehicles	1	2	3	4	5
Encourage use of washdown facilities on-site	1	2	3	4	5
Accept effluent/manure from vehicle containment tanks in a dump facility	1	2	3	4	5

Q7. How often do you wash your livestock trailers?

❑ Every day ❑ Twice per week ❑ Every week
❑ Every fortnight ❑ Every month ❑ When time is available
❑ Not applicable
❑ Other (please specify)_____

Q8. What drives your decision to wash livestock trailers?

Please tick the relevant box(es)

- ❑ Regular washing schedule
- ❑ Spare time available to washout
- ❑ When vehicle is really dirty
- ❑ Required to washout prior to transporting livestock
- ❑ Water availability
- ❑ Depends how long the queue is at the washdown facility
- ❑ Not applicable
- ❑ Other_____

Q9. What current vehicle effluent spillage management practices do you implement as part of your operation?

Please tick the relevant box(es)

- ❑ Curfew animals prior to transporting
- ❑ Effluent containment within vehicle floor
- ❑ Free-flow pipes from vehicle floor to road
- ❑ Effluent containment tank on vehicle
- ❑ Regular vehicle cleaning
- ❑ Other (please specify)_____

Q10. At your main site of operation, do you have livestock vehicle washdown facilities?

- ❑ Yes - free and use is encouraged
- ❑ Yes - free but use is difficult and not encouraged
- ❑ Yes - a fee applies
- ❑ No - a washdown is not considered necessary
- ❑ No - a washdown is available nearby or at a convenient location
- ❑ No - a washdown is not available

Q11. At your main site of operation, could you accept effluent / manure if it was stored in on-board tanks that needed to be dumped at your facility?

- ❑ Yes - no problems envisaged
- ❑ Yes - but a system upgrade would be required
- ❑ No - but a system could be designed to accept manure
- ❑ No - effluent / manure could not be accepted at your facility.

Figure 37 – The sidewalls and floors of many new livestock transport are now designed to allow a reasonable accumulation of effluent in the base of the livestock trailer.

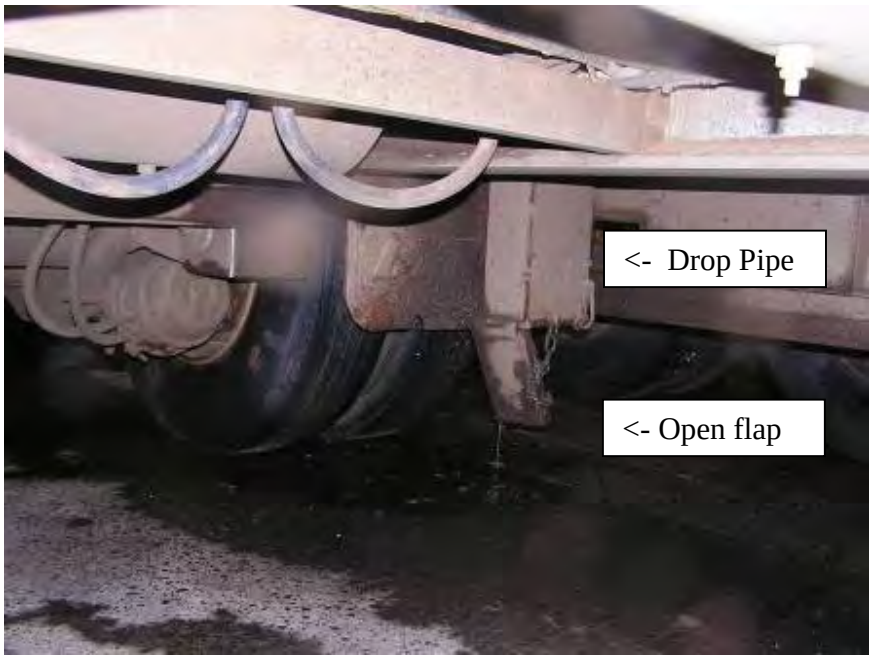


Figure 38 – Some drop pipes from livestock vehicles can be closed thus preventing loss of effluent while travelling through urban areas.

Experiences with effluent spillage from livestock transport

The following questions relate to your experiences with effluent spillage from livestock transport.

Q12. Have you had any complaints due to livestock transport from your operation within the last 12 months?

Complaint from community
❑ Yes ❑ No ❑ Not applicable

Complaint from regulatory agency
❑ Yes ❑ No ❑ Not applicable

If able, please provide details:_____

_____

_____

_____

_____

Q13. What potential community issues do you associate with effluent spillage from livestock transport vehicles?

Please rate each issue

Potential issue	Rating (1 Very important issue – 5 Not an issue)				
Public health risks to community	1	2	3	4	5
Road safety risk to vehicle drivers	1	2	3	4	5
Environmental pollution	1	2	3	4	5
Odour impacts	1	2	3	4	5
Industry image	1	2	3	4	5
Aesthetic impacts	1	2	3	4	5
Overall Significance	1	2	3	4	5

Comments:_____

_____

_____

_____

Q14. Where do you believe that effluent spillage from livestock trailers onto roads is most likely to be an issue?

Please rate each issue

Potential issue	Rating (1 Very important issue – 5 Not an issue)				
Sharp corners	1	2	3	4	5
Urban areas	1	2	3	4	5
Traffic lights	1	2	3	4	5
Steep hills	1	2	3	4	5
Truck rest stops or petrol stations	1	2	3	4	5
Overall Significance	1	2	3	4	5

Specify any particular areas of concern_____

_____

_____

Figure 39 – Is effluent spillage from livestock trucks worst at traffic lights, corners or other sites?

Animal curfew/diet modification prior to transport

Research has shown that curfewing of animals can considerably reduce effluent production during transport. However, the curfewing of animals for extended periods may have implications in relation to animal welfare (for long transport distances) and meat quality. MSA requirements do not recommend curfewing of animals prior to transport. However, some buyers and transport companies do recommend curfewing for various reasons. Your comments on curfewing practices are welcomed.

Q15. If you dispatch animals from your operation, do you curfew the animals from water or feed prior to transport?

Please tick the relevant box (es)

❑ Yes ❑ No ❑ Not applicable

What is your curfew practice?

Curfew practice	Hours withheld					
	0	0-2	2-4	4-6	6-12	12-24
Withheld from water						
Withheld from feed						

Q16. If you do curfew animals prior to transport, why?

Please tick the relevant box(es)

❑ Buyer requirements
❑ Transporter requirements
❑ Abattoir requirements
❑ Local government requirements
❑ Reduce effluent/manure production during transport to keep animal hide clean
❑ Reduce effluent/manure production during transport to keep vehicle clean
❑ Reduces animal stress level as they are comfortable before loading
❑ Livestock travel better
❑ Transport distance to end point favours curfew
❑ Not applicable
❑ Other_____

Comments:_____

_____

_____

_____

Q17. If you don't curfew animals prior to transport, why?

Please tick the relevant box(es)

❑ Buyer requirements
❑ Transporter requirements
❑ Abattoir requirements
❑ Local government requirements
❑ Meat Standards Australia compliance
❑ Transport distance to end point too far to curfew
❑ Livestock travel better
❑ Affects meat quality
❑ Affects animal stress level
❑ Affects livestock liveweight
❑ Not applicable
❑ Other_____

Comments:_____

_____

Q18. Do you alter animal diet, or require animal diet to be altered, prior to transport?

❑ Yes ❑ No ❑ Not applicable

If Yes, describe how and why_____

_____

Q19. Do you perceive there has been a change in effluent management practices over the past 10 years for livestock trailers?

Please rate each practice

Management Practice	Yes/No	Rating (1 Positive change – 5 Negative change)				
Require livestock transport vehicles to be clean prior to entering or exiting the premises	❑ Yes ❑ No	1	2	3	4	5
Provide washdown facilities for livestock transport vehicles	❑ Yes ❑ No	1	2	3	4	5
Require effluent containment on livestock transport vehicles	❑ Yes ❑ No	1	2	3	4	5
Staff training of vehicle drivers	❑ Yes ❑ No	1	2	3	4	5
Livestock transport vehicle design changes	❑ Yes ❑ No	1	2	3	4	5

Possible solutions to effluent spillage

We would like your ideas and thoughts on possible solutions to effluent spillage. Some suggested mechanisms are provided in the following questions. However your further thoughts would be greatly appreciated.

Q20. What solutions do you suggest may minimise effluent spillage from livestock transport vehicles?

Please rate each possible solution

Possible Solution	Rating (1 Very important solution – 5 Not a solution)				
Compulsory effluent containment on livestock transport vehicles	1	2	3	4	5
Animal curfew	1	2	3	4	5
Diet modification (e.g. feed roughage) prior to transport	1	2	3	4	5
Effluent dumps to empty effluent containment tanks from livestock transport vehicles	1	2	3	4	5
Selective containment in urban/built-up areas (e.g. closing drop pipes)	1	2	3	4	5
Alternate routes around towns	1	2	3	4	5
More readily available washdown facilities	1	2	3	4	5

Other, please describe:_____

_____

_____

_____

_____

_____

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Q21. Who do you suggest should be responsible for solving effluent spillage problem from livestock trailers?

Please rate each sector

Sector	Rating (1 Most responsible – 5 Not responsible)				
Graziers	1	2	3	4	5
Feedlots	1	2	3	4	5
Livestock transport companies	1	2	3	4	5
Abattoirs	1	2	3	4	5
Saleyards	1	2	3	4	5
Local Government	1	2	3	4	5
State Government	1	2	3	4	5
Federal Government	1	2	3	4	5
Live export companies	1	2	3	4	5
Meat and Livestock Australia	1	2	3	4	5

Other, provide details:_____

_____

_____

_____

_____

_____

_____

_____

Q22. Would you be willing to participate in a voluntary integrated system involving the whole animal supply chain to minimise effluent spillage from livestock trailers?

❑ Yes ❑ No

Q23. If minimisation of effluent spillage for all livestock transport vehicles were mandatory, what impacts would affect your operation?

Please rate each impact

Impact	Rating (1 Positive impact – 5 Negative impact)				
Cost of installing effluent containment tanks on livestock transport vehicles	1	2	3	4	5
Increased fuel cost to contain effluent on-board livestock transport vehicles	1	2	3	4	5
Meat quality impact due to animal curfew	1	2	3	4	5
Liveweight loss due to animal curfew	1	2	3	4	5
More frequent vehicle cleaning	1	2	3	4	5
Installation of effluent dumps to empty effluent containment tanks from livestock transport vehicles	1	2	3	4	5
Maintaining effluent dumps to empty effluent containment tanks from livestock transport vehicles	1	2	3	4	5
Re-designing vehicle trailer to contain effluent	1	2	3	4	5
Animal curfew prior to transporting animals long distances	1	2	3	4	5

Other or more details, please describe:_____

_____

_____

_____

_____

_____

_____

_____

The New Zealand model

Following proactive consultation amongst all stakeholders, a voluntary effluent containment system and code has been developed in New Zealand.

The key features of the code include:

- Livestock are stood off feed for at least 4 hours before transport to minimise effluent volume.
- Livestock trucks are equipped with effluent holding tanks to contain effluent during travel.
- Effluent dump stations are available at a number of points along major stock routes and away from urban areas (see Photograph 8 and Photograph 9).
- Effluent dump stations are available at points of livestock delivery (e.g. saleyards).

The effluent dump stations are operated by the local council (which operates an effluent irrigation system or similar) and are free.

Please make any Comments:_____

_____

_____

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_____

Figure 40 – Stock truck dumping effluent over grate (New Zealand)

Figure 41 – Effluent containment dump site beside highway in New Zealand

Figure 42 – Effluent containment dump site beside highway in New Zealand

Trucks pull off the highway positioning their outlet pipes over the grate, a valve is opened to release the contained effluent. When all effluent is drained, the valve is closed and the truck moves off.

Limb protrusion on livestock transport vehicles

Q24. Do you perceive there are welfare issues in transporting sheep?

❑ Yes ❑ No ❑ Not applicable

Q25. What welfare issues do you perceive are important?

Please rate each issue

Issue	Rating (1 Very important issue – 5 Not an issue)				
Curfew prior to transport	1	2	3	4	5
Staff training of vehicle drivers	1	2	3	4	5
Limb protrusion during transport	1	2	3	4	5
Animal injury during transport	1	2	3	4	5
Animal death during transport	1	2	3	4	5

Other or more details, please describe:_____

_____

_____

_____

Q26. Do you associate welfare issues with:

❑ Sharp corners ❑ Traffic lights ❑ Urban areas
❑ Steep hills ❑ Truck rest stops or petrol stations

Specify any particular areas of concern_____

_____

_____

Q27. Do you perceive there has been significant improvement in animal welfare during transport over the past 10 years?

❑ Yes ❑ No

Q28. What factors do you perceive have improved welfare?

Please rate each issue

Issue	Rating (1 Positive affect – 5 Negative affect)				
Curfew prior to transport	1	2	3	4	5
Staff training of vehicle drivers	1	2	3	4	5
Trailer design on livestock transport vehicles	1	2	3	4	5
Implementation of 'Fit to Load' criteria	1	2	3	4	5
Implementation of QA or accreditation criteria	1	2	3	4	5

Other or more details, please describe:_____

_____

_____

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Q29. What methods do you perceive will affect animal welfare in the future?

Please rate each issue

Issue	Rating (1 Positive affect – 5 Negative affect)				
Curfew prior to transport	1	2	3	4	5
Staff training of vehicle drivers	1	2	3	4	5
Trailer design on livestock transport vehicles	1	2	3	4	5
Implementation of 'Fit to Load' criteria	1	2	3	4	5
Implementation of QA or accreditation criteria	1	2	3	4	5

Other or more details, please describe:_____

_____

If there are any other issues that you wish to mention, please include them below.

Other or more details, please describe:_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

When you are finished, could you please fax the completed survey form to 07-46 328 057

or

Post to:

FSA Consulting

PO Box 2175

Toowoomba QLD 4350

Many Thanks!

Appendix B – ALTA letter of response to MLA

21/01/2007 08:04 NO.751 P01

Queensland Government

Queensland Transport

20 APR 2007

Mr Mark Johnston
National Sales and Marketing Manager
Haulmark Trailers (Australia)
PO Box 107
Archerfield Qld 4108

Dear Mr Johnston

Belly Tanks on Livestock Trailers

Thank you for your email of 20 March 2007 requesting written confirmation about implementation of a requirement for livestock trailers to be fitted with belly tanks. I apologise for the delay in responding to you.

The fitting of belly tanks to livestock trailers was raised at the 2006 annual LGAQ conference and representations have also been made to Queensland Transport (QT) on this matter. QT has assessed the evidence currently presented and it does not warrant the introduction of mandatory fitting of belly tanks to livestock trailers.

Despite belly tanks appearing to offer a solution to loss of effluent from livestock trailers, the introduction of belly tanks would have a considerable economic and logistical impact on the trucking and livestock industries and would require considerable vehicle upgrades and infrastructure to manage. Further, the introduction of belly tanks in some situations may make effluent loss more significant and of greater safety risk. Of concern is the possibility of potential high volume loss of effluent from proposed belly tanks when vehicles with full belly tanks negotiate steep grades and sharp corners.

QT has considered the impact of effluent loss on the community and impacts of belly tanks on vehicle safety and freight efficiency, as well as infrastructure and vehicle costs and has found the balance is strongly against the mandating of belly tanks. Given these findings QT is not pursuing new standards that would mandate fitting of belly tanks. Further, QT does not foresee these standards being pursued in the near future or that this would be pursued nationally. QT is however working with the Livestock Association of Queensland as well as local government to facilitate solutions to problems of excessive effluent loss in townships.

Liz,
for your info.
Barrie

Land Transport and Safety Division
Vehicles and Environment
Transport House Valley Metro
230 Brunswick Street Fortitude Valley
PO Box 673 Fortitude Valley Queensland 4006
ABN 13 200 330 520

Our ref E04841 – 900/00493
Your ref
Enquiries Nick Grasson
Telephone +61 7 3253 4206
Facsimile +61 7 3253 4322
Website www.transport.qld.gov.au
Email angus.r.draheim@transport.qld.gov.au

I6

24/06/2008 15:29 0747784846 LTAQ PAGE 02/03

Australian Livestock Transporters Association

Simon Winter
Research Project Manager - FSA Consulting Curfews Project
Meat and Livestock Australia
Locked Bag 991
North Sydney 2059

Dear Simon,

ALTA CONCERNS OVER THE PROPOSED FSA INDUSTRY SURVEY

I write to raise some serious concerns over the content of the proposed FSA 'limb protrusion and effluent spill' survey, which MLA has commissioned. I apologise for the late reply; I have been overseas for the past few weeks.

I am writing this letter in the ALTA's capacity as the key stakeholder, in terms of the eventual impact of the survey and any regulatory fallout that may ensue from its findings. As you know, both limb protrusion and effluent spill are very sensitive issues in the community.

The ALTA recognises that both problems need a practical and sustainable solution. It has therefore been involved in dialogue with many State road traffic agencies, animal welfare groups, police departments and departments of primary industries over recent years. Progress is being made, but some of the questions raised in this draft of your survey threaten that progress directly. I have attached a page summarizing the major ALTA concerns with the survey in this respect.

It is particularly disappointing to me that as stock carriers are self-evidently the key stakeholder in these two matters that their peak industry body's advice to MLA has not been followed in developing the draft. You will recall I represented the ALTA on an initial scoping study teleconference with yourself and FSA consulting some months ago. The same points I raise in the attachment following were made clearly on that hookup, but have not been reflected in the draft.

I would appreciate your prompt consideration of the attached concerns and early feedback on a revised draft. I am hopeful we can work on this matter cooperatively to develop a final survey that meets MLA research requirements and at the same time does not threaten the delicate progress being made on both of these topics by the industry. I can be contacted on 0437 146 274

Thank you for your time and consideration,

Luke Fraser
Executive Director

6 September 2008

PO Box 615 Belconnen ACT 2616 P: 02 6247 5434 F: 02 6247 0476 ABN: 16 0134 545 414
www.alta.org.au

ALTA concerns with FSA draft survey:

I have limited my comments to principles, rather than a line by line analysis. I would ask respectfully that these principles be given due recognition in any subsequent draft:

1. Limb Protrusion
Limb Protrusion is an emotive issue. It is also a matter that in the past two years has been very well dealt with by a number of industry education and legislative efforts.

As the ALTA indicated in your initial scoping teleconference, limb protrusion – particularly with sheep – is not in and of itself an issue of concern, provided that 2 key factors are satisfied:

1. The stock crate in question is in good condition has been designed to carry the species being transported; and
2. Recommended penning densities for classes and species of stock (in line with the State-based codes of practice and the guidelines of the new draft national stock transport legislation) are being adhered to.

As the ALTA has previously advised your research group, if these two conditions are met, sheep in particular may well be able to put their leg out of the crate. But importantly, these conditions also ensure that they will also be able to put that leg *back*. Issues of limb protrusion degenerating into a serious problem are in almost all cases a function of one, or the other, or both of these conditions *not* being met.

The final draft of national stock transport laws makes it a clear legal requirement to maintain stock crates in a condition that will not cause injury or bruising to the stock and to ensure that crates are designed to cope with the species transported. In addition, the recommended penning densities for stock are made prominent throughout the legislation. All of the industry bodies involved in the drafting process are well aware of this situation. The ALTA has gone further than this, through a public education campaign to its members on penning densities. This can be found on the ALTA website www.alta.org.au

For this reason, as previously stated, a 'cold' survey of the wider industry and community is problematic. It is more than likely to lead to new regulations and directives being pursued by well-meaning industry, government and community groups. The effort involved in dealing with such an outcome will inevitably fall to the ALTA. It would be far better to avoid this problem. Questions related to limb protrusion in the survey should be limited to surveying the extent of the industry's knowledge about crate design and condition and penning densities and their effect on limb protrusion. Such research would be valuable and could direct future MLA education and awareness efforts.

2. Effluent Spill

Like limb protrusion, effluent spill on roads is an emotive issue. It is more complex than limb protrusion, but the basics of the problem relate to the fact that producers and vendors of livestock are not preparing their stock properly before they are transported. This leads to the stock passing significant - and importantly, *avoidable* - levels of urine and or faecal matter *en route*.

In this regard, the ALTA believes that the FSA survey questions to the wider industry asking why people do not prepare their stock properly are useful – they may drive more targeted education and policy development in this area. However, the ALTA is strongly opposed to the several questions and discussions in the draft surrounding the fitting of belly tanks to resolve the effluent spill problem.

In giving much attention to the belly tank solution, the draft survey makes much of New Zealand stock transport practices. These practices may be interesting, but have little relevance to the Australian experience, for the following reasons. I would remind you that all of these reasons were tendered in the original stakeholder teleconference:

- Belly tanks add a significant compliance cost to the industry in terms of purchase, fitting and ongoing maintenance costs.
- The extra weight of the belly tanks increases the tare/gross weight of the truck, reducing the amount of livestock that the crate can carry and thereby reducing the productivity of the freight task. The same overloading risks add to the potential for road safety risks (ie trucks loaded too heavy, becoming unstable and unsafe). In most States these risks extend to the customer through road transport chain of responsibility laws.
-
- Belly tanks require the establishment of considerable infrastructure (ie disposal pits) for the biosecure disposal of the waste. This infrastructure is readily available in New Zealand, which is smaller, operates on fewer regular stock carrying routes and where the large amounts of water required to ensure the regular flushing and cleaning of these storage pits by the local authorities is in ready supply. None of these conditions apply in Australia.
- Belly tanks require frequent washing out. In the Australian experience washouts can be hard to find. In a hot and dry climate, effluent that is not washed out regularly runs the risk 'set' in the belly tanks.
- Belly tanks dispel their waste in a concentrated amount, once the release mechanism is activated. At present, the loss of effluent from stock crates is by and large a gradual process, although the level of effluent loss will be heavier during the early stages of a journey. Placing belly tanks with automatic release in the Australian environment, where few or no disposal points exist, would likely result in carriers 'dumping' their effluent 'in one hit', potentially creating a significant biosecurity and road safety risk.

The stock preparation solution

The ALTA has worked hard with road traffic authorities in particular over the past few years to build awareness that poor preparation dramatically increases effluent loss during transport. State authorities have begun to understand this point. In fact, Queensland's main roads and transport authorities have officially endorsed this position to the entire livestock production chain. A letter in this respect is attached.

Independent of the FSA survey, the ALTA is working with Meat and Livestock Australia's Livestock Transport Taskforce to develop a stock preparation guide for producers that will help rectify the problem of poor stock preparation and associated effluent spill.

To the extent that the FSA survey suggests that belly tanks and other 'transport phase' strategies are a viable answer for solving the effluent spill problem in Australia, FSA and MLA put the ALTA's efforts with road authorities and local governments at very considerable risk.

The ALTA believes the references to belly tanks and other 'in transport' solutions for managing effluent are not ultimately practical for Australian conditions. High effluent spill levels in livestock transport cause not only an effluent problem on road, but also directly affect the following issues:

Poorer quality loading process – overwhelming industry experience suggests that stock loaded with full bellies are less steady on their feet and find transport more trying;

Stock distress en route -- wet stock are much more likely to slip and fall down and a wet floor makes recovery much more difficult, leading to bruising (leading to greater incidence of dark cutting during processing), limb breaks, downers and deaths;

Lower value skins – the increased urine and faecal staining caused by poorly prepared stock lowers the value of skins significantly; and

Higher risk of bacteria level at slaughter – the increased levels of urine and faecal matter represent a greater contamination risk once on the kill floor.

For these reasons and noting the wider concerns above, the ALTA respectfully asks that references to effluent management practices in New Zealand and the 'cold' surveying of the wider industry on their views on belly tanks should be excised from the final survey.