NATIONAL HEAVY VEHICLE REGULATOR

MANAGING EFFLUENT IN THE LIVESTOCK SUPPLY CHAIN

A registered Industry Code of Practice under Section 706 of the Heavy Vehicle National Law

ALRTA
Australian Livestock and Rural Transporters Association

NHVR

Attribution and thanks in the development of this Code to Australian Livestock and Rural Transporters Association (ALRTA) and its members for their significant co-operation, attention, time and financial contributions as well as subject matter expertise to inform the content of this Code.

FOREWORD

The *Managing Effluent in the Livestock Supply Chain Code of Practice* (the Effluent Code) is a Registered Industry Code of Practice (RICP) developed in accordance with guidelines published under s 705 of the *Heavy Vehicle National Law* (HVNL) and has been assessed as qualifying for registration by the National Heavy Vehicle Regulator (NHVR) under s 706 of the HVNL.

The Effluent Code is a practical guide that assists livestock transporters, livestock producers and other parties in the Chain of Responsibility (CoR) to comply with their primary duty and other obligations under the HVNL relevant to managing livestock effluent during road transport.

The Effluent Code is to be read and used as a supplement to the Master Industry Code of Practice (Master Code). It provides additional information about risks and controls that are specific to the management of effluent during livestock transport, but does not replace the Master Code.

An RICP should offer practical guidance for all industry parties who have obligations under the HVNL. It may also serve as a guide for training or as a point of reference for entities involved with livestock transport when negotiating how to share responsibilities.

An RICP also has an evidentiary function when a court is called on to determine whether a party in the CoR or an executive has discharged their obligations under the HVNL. Authorised officers and investigators may use an RICP to determine whether non-compliance incidents detected on the road have a root cause in actions of parties in the CoR. An RICP may also be referred to when issuing an improvement notice or prohibition notice.

The Australian Livestock and Rural Transporters Association (ALRTA) is the peak industry body in Australia representing the rural road transport sector. The Effluent Code has been developed by ALRTA in consultation with a wide range of representative stakeholders, including livestock producers, transport operators and drivers, vehicle manufacturers, agents, saleyards, feedlot managers, processors, regulators, animal welfare advocates, government agencies and the community.

A draft of the Effluent Code was released for public consultation on 7 October 2022, and the code was endorsed by the NHVR for registration on 23 December 2022.

To inform future development of the code, the NHVR relies on advice from industry participants and welcomes your feedback, addressed to The Manager, Codes of Practice at codes@nhvr.gov.au.

1 INTRODUCTION

1.1 Purpose

Effluent is an unavoidable by-product when livestock are transported by road. Some effluent spillages might be tolerable on remote or rural roads, but with urbanisation and the relocation of meat processing facilities, effluent spillage has a greater effect on the safety and amenity of road users and of residents in local communities. Those impacts include the risk of a vehicle (particularly a bicycle or motorbike) slipping and losing control and the risk of biosecurity or environmental contamination. Large or repeated spills near towns or urban areas harm the reputation of the livestock industry.

The factors that affect livestock effluent production are understood. They include the species and condition of the livestock, its feeding pattern and stress levels prior to loading, climate and weather conditions, access to water on the journey, and the length and characteristics of the journey. Though transporters are aware of these factors, they can only control some of them. Transporters rely on other parties to prepare livestock for transport, provide them with accurate information and assist with the disposal of livestock effluent produced during the journey.

Livestock vehicle drivers are bound to manage their own fatigue and the welfare of the livestock according to the Land Transport Standards (LTS).[1] They must also adapt to road and traffic conditions, and work around the opening hours of facilities en route and at journey's end. When things do go wrong, and compliance action results, in almost every case it is a driver – or their employer – that receives an infringement notice for an effluent spill.

The following case study, which is based on real events, illustrates some of the challenges for livestock transporters.

Case study: A driver operating under Standard Hours (i.e., with a 12-hour work limit in a 24-hour period) has already been working for five hours when they arrive at a farm to pick up a load. The driver is surprised to see that the cattle are feeding on lush green pasture. When this load had been arranged, the grazier had been asked to keep the cattle off green feed for three hours prior to the pick-up time.

The driver advises the grazier that the trailer belly tank may not be able to hold all the effluent produced during the five-hour trip and that effluent loss onto the road would therefore be likely. The owner pressures the driver to accept the load immediately, or else the cattle won't arrive at the saleyard in time. The owner promises to improve livestock preparation practices in future. The driver accepts the load.

The driver stops to check the situation two hours into the journey and can see that the effluent tank is almost at capacity. There is no effluent disposal facility on the planned route. There is an option to empty the tank at a facility that is 40km off-route, but leaving the route would have negative consequences for fatigue management, scheduling and travel costs, so the driver decides against this option. (The time spent at the facility counts as "work" time, as well as the time to drive the extra 80km. The driver also has to allow time to unload the animals at the destination, clean the vehicle, and return to base.)

The approach to the destination processing facility is through an urban area. As the driver navigates a sharp right-hand bend, a significant amount of effluent is lost into the road corridor. The driver is liable for a breach of loading requirements (s 111 of the HVNL) and/or a breach of the road rules. In some circumstances, they may also have breached environment protection legislation or similar.

Graziers and feedlot operators are also committed to ensuring animal welfare by applying the LTS. When their livestock is sent for slaughter, they have a real interest in the feeding regime prior to transport and the rate of effluent production during transport, because these can substantially alter the quality and value of the end product.

Receivers of livestock, such as farms, livestock agents, feedlots and abattoirs, are able to influence effluent management through their operational activities and demands on livestock transporters. Receivers of livestock and saleyard owners and operators are also able to influence effluent management through the provision and management of ancillary infrastructure.

Under the HVNL, failure to eliminate or minimise livestock effluent spillage would be a breach of the primary duty – a duty that applies to all parties in the CoR. It may also infringe the load restraint obligations of a driver, or of a person who permits a person to drive a heavy vehicle. For all the above reasons, all parties in the livestock supply chain have a strong interest in seeing measures adopted at each stage in the journey, from paddock to destination, that will manage the risk of effluent loss from the vehicle.

The Effluent Code combines industry knowledge and experience to propose a range of measures that can be implemented at each of the stages of a land transport journey, from preparing livestock for transit, to unloading livestock at the destination. These measures are designed to eliminate or minimise the risks associated with effluent loss without impacting animal welfare.

1 Australian Animal Welfare Standards and Guidelines - Land Transport of Livestock 2012 www.animalwelfarestandards.net.au/land-transport/

1.2 Scope

The Effluent Code is an industry specific supplement to the Master Industry Code of Practice (Master Code),[2] and focuses only on measures to eliminate or minimise the risks of livestock effluent loss into a road corridor. For guidance about managing other safety risks in heavy vehicle transport, the Master Code is the appropriate resource.

The Effluent Code does not cover other loading requirements not directly related to managing livestock effluent in transit, for example limb protrusion. *The Load Restraint Guide 2018*, available from the NHVR website,[3] provides further information about loading, unloading and transporting livestock. The Effluent Code does not provide general or on-farm guidance about livestock waste risk management.

1.3 Who may use this code?

Any person or business may use the Effluent Code for guidance about reducing the incidence of livestock effluent loss during road transport, including farmers and non-commercial carriers.

The code is targeted at people or businesses that are parties in the CoR for a heavy vehicle transporting livestock. These parties include producers, farmers, feedlot managers, agents, loaders, unloaders, depot managers, persons preparing livestock for transport, commercial and non-commercial transporters, saleyard owners and/or managers, animal product processors, and the company executives responsible for the operations of any of these businesses.

The recommendations in this code will assist each of these parties to comply with their primary duty to ensure the safety of their transport activities "so far as is reasonably practicable". It will also assist the executives of these parties to discharge their duty to exercise due diligence.

The Effluent Code also assists transport operators and drivers to meet the distinct loading requirements of s 111 of the HVNL.

The Effluent Code has no legal status in Western Australia or the Northern Territory.

1.4 Interpretation

This code includes references to sections of the HVNL and Regulations that set out legal requirements. These are included for convenience and should not be relied upon in place of the full text.

Definitions of the terms and abbreviations used in this document are included in Section 7 Definitions.

1.5 What are the potential benefits of adopting this code?

A code of practice is a way to share industry knowledge and experience about how to work safely. A code's recommendations can deliver substantial improvements in safety to individual businesses and to overall safety within an industry.

Apart from its safety benefits, the Effluent Code may also promote consistency in the way that tasks are carried out. If businesses share an understanding of risks and the best ways to avoid or manage them, they can coordinate better when they work with each other by using common terminology and aligning systems, processes, and equipment.

In line with the objects of the HVNL, potential benefits of adopting this code include:

- improved safety for all road users
- improved public amenity
- appropriate management of obligations under the HVNL, "so far as is reasonably practicable"
- reduced risk of environmental damage, including the spreading of weeds, pests and disease.

Implementing a risk management approach will have additional benefits for the livestock supply chain and the community, such as:

- improved health and safety of workers involved in livestock road transport activities, including authorised officers
- improved animal welfare outcomes
- reduced risk of stained or contaminated animal hides
- reduced risk of bruising and consequent devaluation of meat products
- increased job satisfaction and driver retention
- a reduction in water use and time and money spent in washing out trailers (which also helps to keep the costs down for customers)
- ongoing community support for the livestock industry
- reduced negative financial impacts and regulatory and other legal sanctions, that could potentially result from the failure to manage livestock effluent loss in transit.

2 Master Code - A registered industry code of practice under section 706 of the Heavy Vehicle National Law
3 www.nhvr.gov.au/files/202112-1285-load-restraint-guide-2018.pdf

2 HVNL PROVISIONS

2.1 Who is a party in the Chain of Responsibility?

An individual or business is a party in the CoR when they perform any of these functions in relation to a heavy vehicle:

- employ a heavy vehicle driver (employer)
- engage someone to drive a heavy vehicle under a contract for services (prime contractor)
- direct the control and use of a heavy vehicle (operator)
- schedule the transport of goods and passengers in a heavy vehicle, or schedule a driver's work and rest hours (scheduler)
- consign goods for transport by a heavy vehicle (consignor)
- receive goods delivered by a heavy vehicle (consignee)
- pack or assemble goods for transport in a heavy vehicle (packer)
- manage premises where five or more heavy vehicles are loaded or unloaded each day (loading manager)
- load a heavy vehicle (loader)
- unload a heavy vehicle (unloader).

Full legal definitions of each term can be found in Section 7 Definitions.

A party in the CoR has a primary duty to eliminate or minimise the risks arising from the heavy vehicle transport activities they influence or control, so far as is reasonably practicable.

The primary duty obligation applies to individual employees who are parties in the CoR, and also to the businesses that employ them. Because employers generally have more control over work practices, training and resources, they are expected to take the lead in carrying out the primary duty.

For more information about the parties in the CoR, see: www.nhvr.gov.au/safety-accreditation-compliance/chain-of-responsibility/the-primary-duty/parties-in-the-cor

2.2 The primary duty

The primary duty is similar to the primary duty of care that applies to persons conducting a business or undertaking (PCBU) under work health and safety (WHS) laws, except that its focus is the safety of transport activities involving a heavy vehicle, rather than safety in a workplace. In particular, it's a duty to eliminate or minimise public risks associated with the use of a heavy vehicle on a road.

Public risks include risks to drivers, passengers, other road users and members of the public in the vicinity of roads and public places, damage to property, including vehicles and loads, damage to road infrastructure, and harm to the environment.

Spilt effluent may be a public risk because of its potential to make the road slippery, and for its potential to cause harm to the environment. (Other legislation that regulates effluent loss is discussed in Section 4 Other legal obligations.)

Both WHS laws and the HVNL use the same standard for complying with the duty. In each case, a duty holder must do what is reasonably practicable to manage risk.

For a party in the CoR for a heavy vehicle, the primary duty applies to the party's "transport activities", which are defined to include all the activities normally associated with the transport and logistics sector, such as training, scheduling, route planning, managing premises, vehicle maintenance, packing and loading, as well as business processes, safety systems and decision-making, and human resource management. It includes board decisions, and their implementation, business processes, recruitment, induction and training, organisational structure, communication systems, negotiations and contracts with other parties, and all the policies and procedures of the business that influence the use of heavy vehicles on roads.

A party's duty is limited, however, to the extent of its capacity to influence and control matters, and ensuring safety frequently requires input from more than one party.[4]

2.3 Duty not to cause or encourage breaches of the law

The primary duty also requires a party in the CoR to ensure that it does not directly or indirectly cause or encourage other parties and drivers to breach the laws. This clearly prohibits any kind of reward or inducement for practices that would breach HVNL provisions. It would cover non-deliberate conduct where the outcome is a breach of loading requirements.

2.4 Shared responsibilities

In most situations, there is more than one party whose activities influence the safety of the same heavy vehicle. Principles in the HVNL about the primary duty recognise this. They state that each of the parties shares responsibility and that each of them has a duty.

Although responsibility for the primary duty is shared, it is never reduced. Each party must still do what is reasonably practicable for them, based on the function they perform, the public risk created by the activity they perform, and their capacity to control, eliminate or minimise the risk.

Each party will have a different ability to influence and control the same risk and may need to do different things to discharge their primary duty.

Heavy vehicle safety is affected by decisions that are made and things that are done or not done, well before a driver gets into a vehicle, and at many points along the way. These many factors contribute to overall safety, but no one person controls all the factors. To eliminate or minimise risks arising from heavy vehicle transport activities requires a total system, with different parties contributing different elements.

As a rule, parties have control and influence over their own premises, vehicles, equipment, and workers, but they can also affect overall safety, including how other parties behave, through communication, collaboration and negotiation.

Your focus as a party in the CoR should be to identify and control the risks that arise from your own transport activities, and by managing the things within your influence and control to the extent that it is reasonably practicable.

2.4.1 Recommendations are not CoR party specific

The Effluent Code does not designate which parties are responsible for implementing control measures. This is because each party in the CoR has the same duty, and because the duty is a shared responsibility. Achieving safety requires each party to do what is reasonably practicable for them and depends on what they can control or influence.

4 s26A, HVNL

This code recommends different kinds of controls that will be more or less relevant to every business. When you review the Activities and Controls in the Effluent Code, you should be able to identify which measures are ones that are within the scope of your influence and control.

Your knowledge of control measures that other parties may implement is also useful information for understanding the full safety environment and collaborating with business partners.

2.4.2 Working with other parties

Many of the recommended controls relate to procedures and the sharing of information. These can't be implemented by one party alone but require collaboration between parties.

The model WHS act requires all duty holders in relation to a matter, so far as reasonably practicable, to "consult, co-operate and coordinate activities with all other persons who have a duty in relation to the same matter."[5] The HVNL does not have an equivalent provision, but this is certainly best practice, as well as being an existing obligation for all parties if they are to comply with their WHS obligations.

It is recommended, therefore, that CoR parties work together to develop the systems and ways of working that will enable each of them to discharge their duty.

It is recommended that duty holders use the contents of the Effluent Code as a basis for collaborating with other CoR parties, including their business partners, clients, subcontractors and receivers, to devise the safe systems and procedures that will protect their workers and the public from harm and prevent damage to infrastructure and the environment.

It is recommended that those arrangements be documented for clarity and consistency, and to ensure that new workers work to the same systems.

Parties can also choose to include those arrangements in written agreements but should note that a contract can't change the duty. For example, a contract stating that a driver is entirely responsible for the safe loading of a vehicle does not remove or diminish another CoR party's responsibility for safe loading, if in fact they have influence or control over the activity.

2.5 What does "Reasonably Practicable" mean?

"So far as is reasonably practicable" is the standard for how far you have to go to eliminate or minimise a risk. Put simply, it means that you must take every measure that you know of, that is effective and possible to do, and that is not overly excessively expensive, compared to the overall risk.

You should make this assessment by putting yourself in the position of a hypothetical reasonable person, and asking whether that person would think you had done enough to manage the risk, taking account of:

- the likelihood of an incident occurring and the degree of harm that could result;
- what you know or ought to know about hazards, risks and controls;
- whether control measures are available and suitable; and
- whether the cost of implementing measures is proportionate to the degree of risk.

5 For example. *Work Health and Safety Act 2011 (Qld)* s46.

2.5.1 Likelihood of a safety risk and resulting harm

In relation to each risk, you need to consider the likelihood that it could occur, and the amount of harm or damage that it could cause. The overall seriousness of the risk determines how much effort and expense is required to prevent or minimise the risk. Something that is likely to happen and could cause substantial harm would have a higher priority than something that is unlikely to happen and would cause little harm or damage. Assessing and comparing different combinations of likelihood and harm can be challenging. One method for assessing and ranking overall risks is a risk matrix.

Regardless of the method you use, you should ensure that the control measures you implement are proportionate to the identified risk.

2.5.2 Knowledge of risks and controls (Evidentiary effect of the Effluent Code)

Your knowledge of risks and controls is relevant to what you are expected to do. Subject to limitations (such as availability and effectiveness), you must use known measures to manage known risks to an acceptable degree – unless you manage those same risks in another equally effective way. You can't be expected to control risks that no-one is aware of, or to use methods that have not yet been developed. However, you can't avoid responsibility simply by not knowing about risks and how to manage them.

Part of the definition of "reasonably practicable" includes what a person "ought reasonably to know". This is information that is common knowledge within your industry, and that you would be expected to know.

Proving what a person knows or ought to know can be complicated, but information in an RICP, such as the Effluent Code, has a special evidentiary status under s 632A of the HVNL. A court can regard information about hazards, risks and controls in an RICP as information that a person knows.

You aren't obliged to implement any or all of the recommendations in this code but, if you don't know its contents, you are at a disadvantage. You won't know safety information that your industry has agreed is relevant, and that a court would expect you to know. You might also overlook an effective control measure that is relatively inexpensive to implement.

Generally, CoR parties for livestock transport will be best placed if they familiarise themselves with the guidance in the Effluent Code. Executives of businesses that are CoR parties have a more compelling reason to inform themselves about the Code. Ignorance of relevant information about managing effluent may indicate that the executive has failed in their duty to exercise due diligence.

2.5.3 Availability and suitability

Your obligation is to do what is reasonably practicable to manage safety. This excludes measures (including those recommended in this code) if they aren't available or aren't suitable for your situation – for example, equipment that is not available in Australia or that hasn't been adapted to your operations or practical training that's only available at a remote location.

A control measure that won't always work would not be suitable – for example, training that is ineffective because of high staff turnover or a procedure that isn't flexible enough for each of the working methods used in your business.

Where a recommended control measure is not available or suitable, you are still required to find other ways to eliminate or minimise the risk.

2.5.4 Relative cost of control measures

You are not required to implement recommended control measures if their cost would be grossly disproportionate to the risk. You must use judgement to determine what would be proportionate, taking account of all the circumstances. You can't conclude that the cost is disproportionate based on personal opinion or preference, or because your business can't afford it. The conclusion must be one that would also be reached by another reasonable person, in the same position, and with the same information as you.

It is difficult to anticipate what measures and what cost a court would hold to be reasonable in a given situation. The best approach may be to assume that, where overall risks are high, a substantial investment would be expected to protect the safety of workers or the public.

2.5.5 Selecting and applying control measures

When considering which control measures would be reasonably practicable to implement, you may have a choice of more than one control measure to use. Some types of controls tend to be more effective than others.

The most effective control is one that eliminates the risk altogether. The next most effective controls are ones that rely on equipment or modifications to equipment or premises to control a risk – that is, engineering controls.

Administrative controls are ones that rely on systems or procedures. If they are properly implemented, administrative controls can be very effective, but they may need to be supported by continual monitoring, and can fail if people aren't properly trained or motivated to use them all the time.

Consider how effective each control will be in your circumstances. For example, if you have a high turnover of casual employees, controls that rely on systems or training may not be appropriate. In some situations, you may need to implement a combination of controls to manage the same hazard or risk.

You should implement the control measures that will be most effective in managing risk, giving priority to measures that eliminate risks altogether.

You are not restricted to using the control measures recommended in a code of practice. If there are other measures that are as effective as or better than those recommended by this code, it's perfectly acceptable to apply those measures instead of, or in addition to, the code suggestions. If you did use different measures, then in the event of legal proceedings, you would have to give notice of the types of measures that you had used, in advance of any hearing. (See s 632A(5) of the HVNL.)

2.6 Duty of an executive of a legal entity

If you are an executive of a business that has a primary duty, you must exercise due diligence to ensure that the business complies with its primary duty. Failing to do this could expose you to a charge against s 26D of the HVNL.

The term "executive" includes an executive officer, a manager or another person who takes part in the management of a business. It also includes a director of a company and a partner in a partnership.

Exercising due diligence means to:

- acquire and maintain knowledge about conducting transport activities safely
- understand the nature of the business's transport activities, including the hazards and risks associated with those activities
- ensure the business has and uses the resources required to eliminate or minimise the hazards and risks created by its transport activities
- ensure the business has and implements processes to eliminate or minimise the hazards and risks created by its transport activities and that information about hazards, risks and incidents is received, considered, and responded to in a timely way.

This means that if this code of practice is relevant to your business's activities, as an executive, you have a duty to familiarise yourself with its contents. You can also use the code to develop the safety systems necessary for the business to meet its primary duty obligations.

Examples of executive due diligence activities include:

- collecting information about incident rates to see if the safety management plan is working
- participating in industry-led forums and safety seminars
- ensuring work procedures are being followed and result in improvements in safety
- ensuring safety incidents are responded to and investigated
- implementing learnings from the investigation of safety incidents.

2.7 How the Effluent Code applies to drivers and other employees

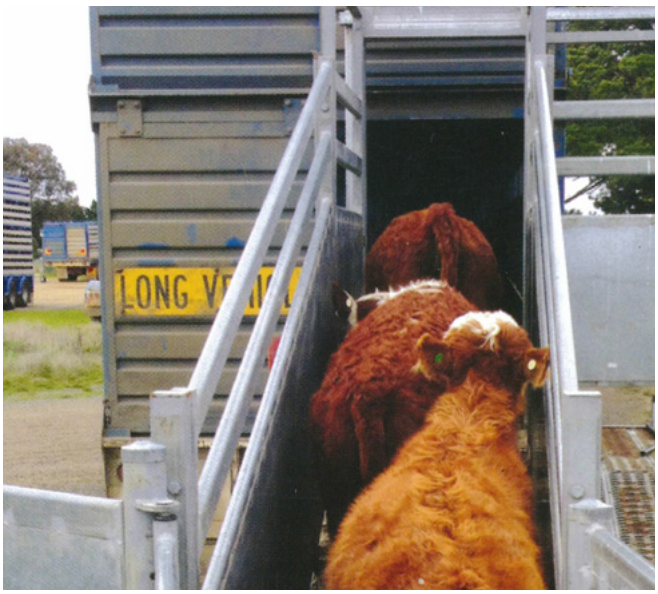
The owner-driver of a livestock vehicle is an "operator" for the purpose of the CoR definitions and has a primary duty to ensure safety, like any other party in the CoR.

An employed driver is not a party in the CoR, and the primary duty does not apply to them; however, CoR parties cannot discharge their duties without the involvement and cooperation of drivers. To manage the risk of effluent spillage, employers need to recruit drivers with the right skills and experience, provide them with the vehicles and equipment they need, and train them to follow appropriate procedures.

It is fairly common for livestock vehicle drivers to also perform other CoR functions, such as loading or unloading. When they perform those functions, they are parties in the CoR, as are their employers.

Other parties in the CoR must support drivers to follow appropriate procedures by providing facilities and equipment, implementing their own procedures, training their own staff, and communicating relevant, timely information. Employees at farms, feedlots, lairages and abattoirs are also required to be trained about the recommendations in the Effluent Code, so that their employers meet their primary duty obligations.

All CoR parties need to assure themselves that the measures they implement to manage effluent are being carried out consistently. If they are not, then those parties need to identify the obstacles and address them. Drivers and other employees should be encouraged to report incidents and safety issues, and be supported when they do.



3 RISK MANAGEMENT PROCESS

In effect, the primary duty requires a CoR party to implement risk management within their business processes to prevent or reduce potential harm and make sure that their transport activities are safe. It is recommended that you develop a risk management system for your business that complies with the AS/NZS ISO 31000:2018 Risk Management — Principles and Guidelines.

Risk management is a step-by-step process that includes:

1. **Identify hazards** — find out what could cause harm.
2. **Assess risks** — understand the harm that could be caused by the hazard, how serious it could be and how likely it is to occur.
3. **Select control measures** — once you have assessed a risk, consider control measures in this code, in other codes, and from your own knowledge or experience, to choose a measure or combination of measures to manage the risk. You should look for measures that will eliminate the risk, but if it is not reasonably practicable to eliminate it, then you should select the measures that will minimise the likelihood of the risk so far as is reasonably practicable. You should also look for controls that will minimise the resulting harm or damage so far as is reasonably practicable. (See Section 2.5.)
4. **Implementation and training** — implement the selected controls within your business, and provide training and information to all workers involved in the control measures, including your business partners.
5. **Systems to monitor and report on the effectiveness of controls** — find ways to measure the degree to which the controls are being implemented, and whether or not they are effective. Encourage workers and business partners to provide feedback about whether the measures are working. Maintain records.
6. **A process for periodic review of the system and a process for responding to incidents, lead indicators and lag indicators** — allocate responsibility and set schedules for reviewing reports and feedback about the effectiveness of the controls. Support and provide resources for improvements to control measures, or to implement new control measures, in the event that risks are not being eliminated or minimised so far as reasonably practicable. New information from technical bodies, research organisations, industry reports and other businesses should be sought out to identify emerging risks and new control methods, which can be assessed and considered for inclusion in a risk management process.

More information about risk management is available from Safe Work Australia, or from your state or territory's work health safety regulator.

3.1 Implementing a risk management process

Effective risk management starts with a commitment to safety from those who manage and control transport activities. It requires consultation at each step of the process and includes cooperating and coordinating activities with other CoR parties.

The Effluent Code is one of the resources you can use to start developing a risk management system, or to augment an existing system. It will help you identify and assess hazards and risks associated with effluent, and proposes effective control measures. You will also need to work through steps 4 to 6 above and should document your system. Depending on the size of your business, and its exposure to risk, this process may be straightforward or relatively complex.

It is recommended that you use a safety management system (SMS) to integrate all of the elements of risk management into a single system for your business. The NHVR website has resources you can use to develop, document and implement an SMS. One of these is the 9 Step SMS Roadmap, which gives structured information and direction through each stage of developing and implementing an SMS. There are also templates, quick guides and toolbox talks that can be tailored to suit your business's needs, regardless of its size or complexity.

See www.nhvr.gov.au/safety-accreditation-compliance/safety-management-systems for more information.

4 OTHER LEGAL OBLIGATIONS

Transporting livestock is like no other task in the road freight sector. There are overlapping Commonwealth, state/territory and local government laws that simultaneously regulate heavy vehicles, the safety and health of workers, welfare of livestock and management of animal waste products, such as effluent (and specific contaminants contained within).

4.1 Work health and safety (WHS)

While specific legislation can differ across state and territory jurisdictions, everyone in the workplace has a work health and safety duty. The main duties stipulated in the national Model Work Health and Safety Act are set out in Table 1.

Table 1: Main duties from the national Model Work Health and Safety Act

Who	Duties
Person conducting a business or undertaking	A person conducting a business or undertaking must ensure, so far as is reasonably practicable, that workers and other people (for example all persons who may be exposed to risks at a livestock loading location) are not exposed to health and safety and welfare risks arising from the business or undertaking.
Officers	Officers, such as company directors, have a duty to exercise due diligence to ensure the business or undertaking complies with the Work Health and Safety Act and Regulations. This includes taking reasonable steps to ensure the business or undertaking has, and uses, appropriate resources and processes to eliminate or minimise risks at the workplace.
Workers and others	Workers and other people at the workplace must take reasonable care for their own health and safety, cooperate with reasonable policies, procedures and instructions, and not adversely affect other people's health and safety.

4.2 Load restraint

Under the HVNL, a person who drives, or permits another person to drive, a heavy vehicle on a road must ensure the vehicle, and the vehicle's components and load, comply with the loading requirements applying to the vehicle (s 111 of the HVNL).

The relevant loading requirement for effluent management is the requirement specified in Schedule 7(1)(2) and 7(1)(3) of the *Heavy Vehicle (Mass, Dimension and Loading) National Regulation 2018* that:

> "(2) A load on a heavy vehicle must be secured so it is unlikely to fall or be dislodged from the vehicle.
>
> (3) An appropriate method must be used to restrain the load on a heavy vehicle."

Section 115(1)(b) of the HVNL specifies that evidence that a load, or part of a load, has fallen off a heavy vehicle is evidence that the load was not properly secured.

Taken together, these provisions indicate that a driver may be subject to enforcement action if effluent falls from their vehicle. The provision also applies to a person who "permits" the driver to drive the vehicle for which the load does not comply with the loading requirements. In theory, this provision would apply to another person – for example, a loader, an employer or the operator of the heavy vehicle.

Sections 112-114 of the HVNL specifies minor, substantial and severe loading requirement breach categories, depending on the risks to safety, road infrastructure and public amenity.

The 'Livestock' section of the *Load Restraint Guide 2018* contains basic information concerning livestock transport and responsibilities for effluent management.

4.3 Animal welfare

The LTS are nationally agreed animal welfare standards. They cover the transport of livestock by road (and other means) and apply responsibility to all persons involved in the livestock transport process. They have largely been adopted into law by state and territory governments.

The LTS address six main aspects of livestock transport for all animals:

- Responsibilities and planning
- Livestock handling competency
- Transport vehicles and facilities for livestock
- Pre-transport selection of livestock
- Loading, transporting and unloading livestock
- Humane destruction.

The LTS also provide animal-specific information about curfews, maximum time off water, minimum spell periods, loading densities and other considerations. Heavy emphasis is placed on 'shared responsibilities' to ensure that parties communicate and manage risks throughout the entire journey.

The LTS were developed to complement existing animal welfare legislation. The following are the current state and territory Acts for the prevention of cruelty to animals:

- *Animal Care and Protection Act 2001 (Qld)*
- *Animal Welfare Act 1992 (ACT)*
- *Animal Welfare Act 1985 (SA)*
- *Animal Welfare Act 2002 (WA)*
- *Animal Welfare Act 1999 (NT)*
- *Prevention of Cruelty to Animals Act 1979 (NSW)*
- *Animal Welfare Act 1993 (Tas)*
- *Prevention of Cruelty to Animals Act 1986 (Vic)*

When taken together, Australian animal welfare laws require that persons in the livestock supply chain protect animal welfare. In practice, this means handling livestock competently, providing adequate food, water, shelter, as well as an appropriate environment and protection from injury, disease, pain and distress, and ensuring that livestock are transported in safe and suitable vehicles at an appropriate stocking density, and are fit for the intended journey.

4.4 Environment and biosecurity

Federal, state/territory and local governments jointly administer the environmental protection laws in Australia through bilateral agreements. Environmental matters are primarily regulated at a state and territory level.

The key environmental legislation for each state and territory is as follows:

- *Environment Protection Act 1997 (ACT)*
- *Environment Protection Act 2019 (NT)*
- *Protection of the Environment Operations Act 1997 (NSW)*
- *Environmental Protection Act 1994 (Qld)*
- *Environment Protection Act 1993 (SA)*
- *Environmental Management and Pollution Control Act 1994 (Tas)*
- *Environment Protection Act 2017 (Vic)*
- *Environmental Protection Act 1986 (WA)*

Biosecurity is the implementation of measures to protect humans, crops and livestock from the impacts of disease, pests and weeds. Damaging weeds, pests and diseases can be spread in livestock effluent. Examples include Paterson's curse, Johne's disease, liver fluke, leptospirosis, salmonellosis, foot-and-mouth disease (FMD) and zoonoses, such as Q fever.

Governments are empowered to establish biosecurity zones and apply restrictions on the movement of items to prevent the spread of pests and diseases. Livestock owners and transporters must adhere to all applicable laws and are often required to complete documentation, including health declarations, prior to livestock movements.

Environmental laws may also prescribe livestock effluent as a water contaminant – for example, Schedule 9 of the *Environmental Protection Regulation (Qld)*. Unlawful disposal of livestock effluent in the road corridor or failure to effectively manage effluent can result in legal directions, penalty or infringement notices, or prosecution.

4.5 Examples of other laws and regulations

Australian Road Rules – Rule 293 applies to a driver if they "put" something on the road and there is a possibility that the thing may injure a person, obstruct the path of other drivers or pedestrians or damage a vehicle or anything else – for example, the road surface. The driver must remove the thing (safely) or face the applicable penalty.

Other state transport laws – *Roads Regulation 2018 (NSW)* s 8(1)(d) states a person must not allow to escape onto a road any liquid or any loose or waste material. Maximum penalty: 20 penalty units.

Local council by-laws – For example, a by-law established by Huon Valley Council under s 145 of the *Local Government Act 1993 (Tas)* states that "A person, other than a Council employee or a contractor authorised by the Council, must not deposit or drop any material or allow any material to flow, fall, be dropped or in any other way be deposited on a road. Penalty: A fine not exceeding 10 penalty units."

Waste and recycling laws – For example, s 103 of the *Waste Reduction and Recycling Act 2011 (Qld)* states that "A person must not litter at a place". The Act elsewhere defines livestock effluent as an industrial waste product.

Motor Vehicles Standards Act 1989 (Cth) – This Act empowers the Commonwealth Government to establish Australian Design Rules (ADRs), which apply to vehicles supplied to the Australian market. While the ADRs primarily relate to vehicle safety, anti-theft and emissions, detailed specifications in one area can limit the scope of modifications that can be made in another. For example, rules relating to trailer axle position, axle spacing, braking systems and under-run protection limit the space available for optional effluent containment tanks to be fitted.

Note: Laws are not quoted in their entirety in this Code. CoR parties should refer to each specific law for more detail.

5 USING THE EFFLUENT CODE

The Effluent Code describes the essential information and resources required to control the risk of livestock effluent loss during in transit.

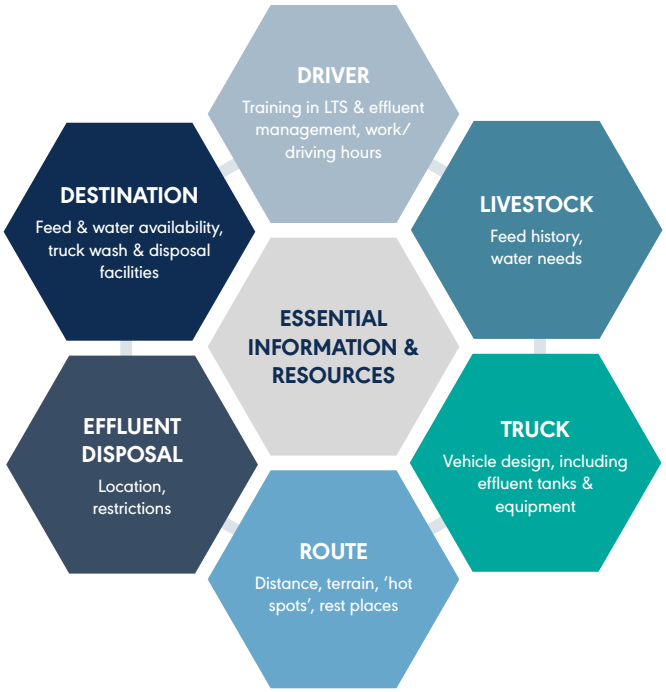


Figure 1: The network of information and resources needed to control the risk of livestock effluent loss in transit.

5.1 Code framework

The Effluent Code identifies effluent-related load restraint risks at critical points in the livestock supply chain and proposes controls that can be applied as each of the listed activities is being undertaken. Within each activity, suggested controls are generally listed under the following headings:

- Actions
- Information required
- Equipment/facilities

Where relevant, the controls have regard for overlapping legislative requirements that may simultaneously apply.

Note on selecting controls: It is each CoR Party's responsibility to assess the suggested controls contained in this code and select the appropriate controls. Not all the controls suggested in this code may be required and/or you may be able to develop other controls that are equally effective. The examples are provided for explanatory purposes; they are not prescriptive. The suggested controls are intended to highlight possible methods based on known industry practices and real-world examples. The examples presented in this code are not an exhaustive list of all measures that can be implemented to control risk – there may be other ways to control risk. More effective or appropriate controls may become available as more is known about risks, or if new supporting infrastructure becomes available, or new technologies or practices are developed.

5.2 Relationship to Master Code

The Effluent Code has been written to supplement the Master Code by specifically addressing livestock effluent related load restraint risks. The Master Code is an important reference for more detailed information about risk management of all matters covered by the HVNL. For example, Section 7 of the Master Code addresses the risks associated with excessively loaded heavy vehicles, and should be read and applied in conjunction with the Effluent Code.

5.3 Effluent risks

Spilled effluent is a recognised risk to public safety and to the environment. It is known that significant bodies of inert liquids – for example, water – present on roads can increase safety risks, especially in higher speed locations or on bends, corners, undulating surfaces, or where otherwise unexpected by a driver.

Large amounts of livestock effluent present in a road corridor can present a risk to public amenity, especially in urban or densely populated areas. Road users have also raised concerns about small amounts of livestock effluent being a risk or nuisance for cyclists, motorcyclists or other persons or property that are more directly exposed.

Effluent spills tend to be treated as a breach of loading requirements, because the spillage itself is evidence that the load has not been properly restrained or contained. Any loss of livestock effluent from a heavy vehicle can be treated as a load restraint breach under the HVNL.

However, there is a fundamental difference between an effluent breach and other load restraint breaches. While a driver is in a position to adjust other kinds of load before driving, they have no

control over the amount of effluent that will be generated during livestock transport. How this can be managed will be determined almost exclusively by the actions of off-road parties in the period before livestock are loaded for transport, and the availability of supporting infrastructure – for example, livestock effluent disposal facilities.

In sufficient volume, contained effluent also impacts animal welfare, with increased risk of slips, trips, falls and, in extreme circumstances, suffocation or cold stress.

In extreme cases, the persistent presence of livestock effluent impacting safety, amenity or the environment in road corridors can undermine public support for the livestock supply chain, and thereby threaten continued operation and expansion.

5.4 Consultation, communication and information-sharing

Consultation and proactive information-sharing throughout the livestock supply chain is one of the best controls for improving effluent management. By compiling and sharing relevant information, supply chain parties can identify causes, assess the effectiveness of control methods, and collaborate to develop a community of best practice.

6 ACTIVITIES AND CONTROLS

6.1 Activity: Choosing a livestock transporter

6.1.1 Actions

a. Choose a transporter who will help minimise the risk of effluent spillage, having regard to the information in 6.1.2.

6.1.2 Information required

a. Whether the transporter has experience in transporting livestock and complies with the requirements of the LTS.

b. Whether the transporter/driver is accredited in a scheme that gives assurance of good animal welfare practice.

c. What the transporter/subcontractor/driver knows about managing livestock effluent.

d. The practices they will use to manage the risk of effluent spills.

Equipment/facilities required

a. A vehicle fitted with effluent containment tanks.

b. Equipment for minimising livestock effluent spillage.

6.2 Activity: Preparing livestock for transport

6.2.1 Actions

a. Assess the need for a feed curfew before loading. (See Annex A – Feed Curfew Guide.)

I. The appropriate feed curfew period will depend on the factors mentioned in 6.2.2 and the characteristics of the livestock, including:

- species
- class and condition
- mass and number
- recent feeding regime.

II. Principles to follow when considering what, if any, feed curfew to apply:

- Feed curfew time should be the minimum necessary to manage the risk of effluent spillage.
- Suggested green feed curfew periods are 6 hours for cattle and 12 hours for sheep and goats.
- Feed curfew exceeding 12 hours should be avoided due to its impact on animal comfort.
- If the total time off feed exceeds 24 hours, it may impact meat quality, live weight, and carcass weight.
- A 4-hour green feed curfew can reduce effluent generation by 50% during transport.
- Providing access to good quality dry feed is an alternative to green feed curfew.

Note: See Annex B – Good Quality Dry Feed

Note: See Annex C – Guide to Estimating Livestock Effluent Production in Transit

b. Apply the minimum feed curfew that will reduce the risk of effluent spillage during livestock transport.

c. Minimise stress to livestock prior to transport:

- Allow sufficient time for mustering, yarding, and loading, so that livestock don't need to be hurried.
- Limit the use of quad bikes or dogs during mustering or keep them at a reasonable distance from livestock.
- Well-designed ramps and yards can speed up the loading process and reduce animal distraction or alarm during loading.
- If livestock are unaccustomed to being handled, consider providing them with a pre-transport spell (water and rest period).
- Co-mingle animals from different mobs well in advance of the journey and avoid mixing herds during the two weeks prior to transport.
- If possible, yard animals overnight.
- Provide sufficient time for animals to recover following high-stress activities, such as crutching, dipping, mulesing, spaying and dehorning, before loading.

d. Provide accurate Livestock Preparation Information prior to loading (see Definitions).

Note: It is an offence for a responsible person for a heavy vehicle to give information to another responsible person for a heavy vehicle if the information is false or misleading in a material particular. (See s 703 of the HVNL.)

6.2.2 Information required

a. Proposed date and time for loading.

b. Specific preparation requirements for the receiver, especially a feedlot, saleyard or abattoir.

c. Effluent containment capacity of the vehicle that will transport the livestock.

d. Journey Specific Factors (see Definitions).

e. Route Specific Factors (see Definitions).

6.3 Activity: Forming contracts

6.3.1 Actions

a. Obtain/provide relevant information before finalising a contract. (Some information required for planning and scheduling may need to be provided several days before livestock is loaded.)

b. Ensure that contract terms do not increase the risk of avoidable effluent load loss.

c. Consider including contractual terms that assist in managing effluent, for example:

- requiring loaders and drivers to have demonstrated livestock handling competency or be supervised by a competent person
- compliance with LTS/identification of LTS role
- no penalties (e.g. for delay) when drivers and loaders implement LTS
- authorising drivers to take necessary actions to avoid effluent spillage, without penalty
- reasonable flexibility about arrival times at livestock destinations without penalty for unexpected delays
- requiring relevant information to be recorded or shared in a particular way
- expectations about how livestock will be prepared (type and length of feed curfew, if required)
- warranting that accurate Livestock Preparation Information (see Definitions) will be provided prior to loading
- clarity about which party bears the cost of effluent disposal or truck washing
- provision to adjust transport costs where livestock has not been curfewed as agreed
- describing a procedure for reporting effluent spills and load restraint infringements
- describing a means of dispute resolution, including an agreed escalation point
- including an incentive for presenting clean livestock at destination.

6.4 Activity: Choosing and managing a livestock transport vehicle

6.4.1 Actions

a. Choose a vehicle that has:

- appropriate carrying capacity for the number, mass, condition, species, and class of livestock to be transported
- effluent containment tank capacity sufficient to contain the anticipated volume of effluent produced during the journey, if appropriate.

b. Minimise the accumulation of effluent inside the trailer by using engineering controls tailored to the Journey Plan and route conditions:

- Trailers may be fitted with effluent containment tanks that are as large as can be fitted in the available space under the trailer. Containment tank size should have regard to their total capacity, placement, gradient required for drainage relief and any impact on vehicle tare mass, net load mass, maximum gross mass, or axle group mass. Tanks are most effective when there is access to effluent disposal facilities and access to clean water.
- Install a driver-operated valve to contain effluent. The valve should be able to stay closed, even without a power supply.
- Trailer side panels should be designed to minimise effluent escape, while also maintaining good ventilation for animals.

6 Route Planner | NHVR

Note: See also the **Note on selecting controls** in 5.1

c. Manage the use of effluent containment tanks by doing the following:

- Check that effluent containment tanks are emptied regularly.
- Implement an operating procedure to routinely check that the trailer is clean, and containment tanks and all drains are operational.

6.4.2 Information required

a. The number, condition, species, class and mass of livestock to be loaded.

b. The Gross Vehicle Mass (GVM)/Gross Combination Mass (GCM) and carrying capacity of the vehicle or vehicle combination.

c. The anticipated volume of effluent produced during the journey (see Annex C).

d. Whether the vehicle has equipment or fittings, such as containment tank equipment or trailer side panels, that can be used to manage effluent.

e. The effluent containment tank capacity of the vehicle.

f. The Journey Specific Factors (see Definitions).

6.5 Activity: Planning and scheduling the journey

6.5.1 Actions

a. Develop a Journey Plan, taking into account:

- Livestock Spelling Plan
- Information in 6.2.1(c) (Preparing Livestock for Transport)
- Information in 6.4.2 (Choosing and Managing a Livestock Transport Vehicle)
- Information in 6.5.2 (Planning and Scheduling the Journey)
- Feedback about previous journeys.

Note: You may wish to use the NHVR's Route Planner.[6]

b. Apply the following principles when developing the Journey Plan:

- Plan pick-up and arrival times to best manage animal welfare risks, in particular total time off water.
- Plan the journey to reduce the risk of effluent spillage.
- Where possible, plan so that livestock are loaded in the early morning.
- Where possible, plan so that livestock arrive at the destination at the scheduled time and when people are present to receive them.

c. Develop a Livestock Spelling Plan that meets the LTS.

d. Include information about the location of effluent disposal facilities on the route or close to the route.

e. Propose a Route Variation if the risk of effluent spillage is high. Consider the potential impacts of a route variation on driver fatigue, livestock time off water, travel costs and operational requirements, as well as the availability and suitability of disposal facilities.

f. Provide Livestock Spelling Plan, Journey Plan and Route Variation to transporter and other parties.

g. Monitor Dynamic Information for each journey and provide timely communication to other parties of changing conditions.

h. Manage driver schedules if new information indicates that the risk of effluent spillage is increased - for example, a severe weather warning about very heavy rainfall.

i. Record effluent management feedback alongside the Journey Plan and Livestock Spelling Plan.

j. Record feedback about routes, locations and facilities in a system that can be shared with other parties.

6.5.2 Information required

a. Pick-up location and proposed date and time.

b. Number, condition, species, class, and mass of animals.

c. Opening hours, access limitations and unloading times at destination.

d. Driver's work and rest hours requirements.

e. Livestock Preparation Information (see Definitions).

f. Whether the livestock will need spelling, as per the LTS, and at what time.

g. Journey Specific Factors (see Definitions).

h. Route Specific Factors (see Definitions).

Note: The information required for planning and scheduling the journey should be provided to the transporter before they accept the contract and load the livestock trailer.

6.6 Activity: Loading livestock

6.6.1 Actions

a. Load animals calmly and quietly in a way that does not cause stress.

b. Monitor livestock loading densities:

- Livestock should be loaded to maximise stability and livestock comfort.
- Overloading and underloading compromises vehicle stability and the welfare of livestock.
- Consult and implement the species-specific requirements of Part B of the LTS.

6.6.2 Information required

a. Number, condition, species, class and mass of animals.

b. Are livestock accustomed to being handled?

6.6.3 Equipment/facilities required

a. Access to safe and efficient loading equipment that:

- minimises loading delays
- reduces livestock stress
- reduces WHS risks for loaders, unloaders and drivers.

Note: Consider the Australian Standard for livestock loading/unloading ramps and forcing pens, AS 5340:2020.

6.7 Activity: Transporting livestock

6.7.1 Actions

a. Minimise the amount of effluent in trailers at the start of the journey.

b. Verify that all drains and valves on containment tanks are operational before each journey.

c. Require Livestock Preparation Information (see Definitions).

d. Monitor journey duration and maximum time off water limits (LTS).

e. Follow the Journey Plan and Livestock Spelling Plan.

f. Empty effluent containment tanks before they become full. Consider the availability and suitability of effluent disposal facilities on the planned route and any facilities off-route. Take into account potential impacts on driver fatigue, additional travel costs and operational requirements.

g. Use smooth driving techniques to reduce the risk of effluent loss from trailers.

h. Manage speed, slow down around corners, and avoid stop/go driving.

i. Take extra care when driving in known 'hot spots' (see Definitions).

j. Monitor, record, and report incidents of significant effluent spillage.

Note: See 6.10: Assurance Activities for the types of information which should be shared following a livestock transport journey.

6.7.2 Information required

a. Accurate Livestock Preparation Information (see Definitions) prior to loading.

b. Journey Plan and Livestock Spelling Plan (see Section 6.5).

c. Information in 6.5.2 (Planning and Scheduling the Journey).

d. Insights from previous journeys and from other transporters and parties.

6.7.3 Equipment/facilities required

a. Trailer and equipment that is fit for purpose (see Section 6.4).

6.8 Activity: Livestock transport training and driver monitoring

6.8.1 Actions

a. Provide information and training to employed drivers and subcontractors about managing livestock effluent in transit, the legal requirements, and safety outcomes from preventing load restraint breaches.

b. Implement an induction procedure for new drivers, both employees and subcontractors, that:

- confirms competency, or provides training, in low-stress livestock handling techniques
- provides training in driving techniques that reduce the risk of effluent spillage, including how to manage speed and corners
- requires drivers to employ those techniques
- provides training in the use of effluent containment systems: raised side walls, pipes, tanks and disposal facilities
- requires drivers to regularly monitor effluent levels in effluent tanks and on trailer floors, especially early in the journey when most effluent is produced
- advises the location of spelling, truck wash and effluent disposal facilities
- encourages reporting of effluent-loss incidents and load restraint infringements
- requires them to document the circumstances of an incident in a movement record or the comments section of a Work Diary
- encourages reporting of “hot spots”.

c. Monitor whether drivers:

- check containment tanks – especially early in the journey when most effluent is produced
- empty tanks and trailer floors when able
- dispose of effluent in an effluent disposal facility
- monitor effluent accumulation in tanks and trailer floors during the journey and while conducting livestock welfare checks
- ensure excessive effluent is not accumulating in the trailer to levels that may threaten animal welfare
- record and report effluent spillage incidents or near misses.

6.9 Activity: Managing livestock transport destinations (farms, saleyards, feedlots, abattoirs)

6.9.1 Actions

a. Manage yarding (unloading) times to minimise unloading delays:

- stagger arrival times to assist transporters to manage animal welfare and safety.

b. Provide accurate information about how the animals have been prepared for transport (see Section 6.2).

c. Provide livestock with access to water.

d. Share information about:

- location of 'hot spots' in the vicinity
- location and availability of effluent disposal and/or truck wash facilities in the vicinity.

6.9.2 Information required

a. Number and timing of arriving vehicles.

b. Obstacles to accessing facilities.

c. Time that livestock last had feed and water.

6.9.3 Equipment/facilities required

a. Safe and efficient loading/unloading equipment that:

- minimises loading delays
- reduces livestock stress
- reduces WHS risks for loaders, unloaders and drivers.

Note: Consider the Australian Standard for livestock loading/unloading ramps and forcing pens, AS 5340:2020

b. Provide facilities and equipment to assist with minimising the accumulation of effluent inside trailers. Facilities should be situated either on-site or located with regard to site users' common Journey Plans, route conditions and livestock class, condition and pre-transport preparation status.

For example:

- Provide truck wash and/or effluent disposal facilities to assist transporters to maximise the utility of trailer containment tanks and support the biosecurity objectives of the agriculture industry.
- Ensure that the design of disposal facilities does not create a bottleneck that prevents trucks from moving efficiently. For example, providing a ‘drop and go’ facility next to a truck wash provides an option that does not require queuing for the truck wash. Ideally, transporters would be able to empty containment tanks at the same time that livestock are being unloaded.
- Provide adequate water pressure and slab gradient (down slope and cross slope) to maximise effectiveness.
- Consider the safety and wellbeing of site users by including design features such as hand washing facilities and protection from overspray.

Note: Consider the truck wash design and construction guidelines in Transport for NSW *Truck washes - Information guide*.

Note: Consider the vehicle hygiene requirements of the *Australian Veterinary Emergency Plan* - AUSVETPLAN, which seeks to prevent, and plan an emergency response to, the introduction and spread of diseases, such as FMD and lumpy skin disease (LSD).

c. Publish information about opening hours, after-hours/on-site contacts and on-site facilities in a system that can be used by all parties.

6.10 Assurance activities

6.10.1 Actions

a. Monitor and record incidents of significant effluent spillage.

b. Assess the causes of spillage incidents and discuss them with other parties.

c. Adjust procedures, equipment or information-sharing to reduce the risk of effluent spillage.

d. Train employees in changes to operational procedures and communicate these changes to business partners.

e. Monitor whether changes to operational procedures have been effective in reducing the risk of effluent spillage and, if not, consider other measures.

f. Ensure competencies of staff working with livestock, including:

- knowledge of LTS and consistent implementation
- livestock handling competency or supervision by a competent person
- awareness of, and compliance with, WHS laws, regulations, and organisational policies about working with livestock.

Note: Refer to the Master Code for advice about general heavy vehicle transport risk management practices.

- Provide feedback to the consignor of livestock about the amount of effluent produced during the journey.

g. Provide feedback to the journey scheduler about:

- animal welfare throughout the journey
- the amount of effluent produced during the journey
- delays or access problems at any facilities
- effluent 'hot spots'.

7 DEFINITIONS

Animal welfare — The physical and mental state of an animal in relation to the conditions in which it lives and dies.

Biosecurity — The implementation of measures to protect humans, crops, and livestock from the impacts of disease, pests, and weeds.

Business practices — A person's practices in running a business associated with the use of a heavy vehicle on the road, including:

- operating policies and procedures
- human resource and contract management arrangements
- the arrangements for preventing or minimising public risks associated with the person's practices (see s 5 of the HVNL).

Consignee — A CoR party that receives goods delivered by a heavy vehicle.

Consignor (HVNL) — A CoR party that consigns goods for transport by a heavy vehicle.

Consignor (LTS) — The person who consigns and/or the person in charge of livestock at the commencement of the transport process.

Consignors of livestock are usually the owners of the livestock but may also include agents, drivers and transport companies, poultry pick-up crews, and personnel from properties, saleyards, feedlots, depots and livestock-processing plants, who handle livestock to be transported.

Controls — The activities undertaken to eliminate or minimise risk. The hierarchy of controls includes: elimination; substitution; isolation; engineering; administration; and personal protective equipment.

CoR — Chain of Responsibility

Curfew — The withdrawal of access to water, and sometimes feed, before another procedure, such as weighing, leading to transport.

This dry period is included in the total water-deprivation time. This dry period is not part of a spell. **Note:** The recommended maximum time off water for particular species is described in the LTS and the MLA guide *Is the animal fit to load?*

Driver or heavy vehicle driver — Means the person who drives a livestock transport vehicle.

An employed driver is not a defined party in the CoR. However, if a driver is a self-employed owner-operator, then they fall within the definition of an 'operator' under the HVNL.

(See *2.1 Who is a Party in the Chain of Responsibility?* and *2.6 How the Effluent Code applies to Drivers and other Employees*)

Dynamic Information — Information about actively changing conditions, especially weather, road, and traffic conditions.

Effluent — The bodily fluids, urine and faecal matter (manure) produced by livestock, and wastewater.

Effluent Code — This Registered Industry Code of Practice, *Managing effluent in the livestock supply chain*.

Employer — A CoR party that employs a heavy vehicle driver

eNVD — An eNVD is an electronic version of an NVD (see LPA NVD).

Feed curfew — The withdrawal of access to all feed before transport.

Feedlot manager — A person or organisation that oversees the daily operations of feed yards, including managing livestock conditions.

Green feed curfew — The withdrawal of access to pasture or green feed before transport.

Note: High-quality dry feed is a good alternative during this time.

Hazard — Anything with the potential to cause harm or loss. This could be an activity or behaviour, a physical object, a situation or a management practice.

Heavy vehicle — A vehicle with a Gross Vehicle Mass (GVM) or Aggregate Trailer Mass (ATM) of more than 4.5t (a heavy motor vehicle or a heavy trailer), or a combination that includes a vehicle with a GVM or ATM of more than 4.5t (a heavy combination).

HVNL — Heavy Vehicle National Law.

Hot spot — A road that is a high-risk or high-consequence area for effluent loss from a heavy vehicle. Hot spots are characterised by:

- roads with tight corners, a high angle of camber, steep hills or urbanisation with traffic controls that may result in stop/start driving
- roads through an area with high conservation value and/or biosecurity concerns
- road lengths with a high number of public complaints or enforcement actions
- places with concentrations of livestock vehicles - for example, at abattoirs or saleyard locations on sale days.

Journey Plan — See section 6.5.1

A documented plan of the intended transport route developed to:

- meet business needs and the requirements of customers
- comply with the HVNL
- meet animal welfare standards
- implement the Effluent Code
- provide for driver health and safety.

Journey Specific Factors — The following factors which are relevant to the planning of a livestock transport journey:

- the expected duration of the journey
- preferred arrival time at destination or allocated timeslot
- climate and seasonal conditions
- weather conditions - especially the possibility of rain and its impact on containment.

Lairage — An abattoir holding yard and facilities.

LTS — Land Transport Standards – see the Australian Animal Welfare Standards and Guidelines, Land Transport of Livestock.

Livestock — Farm animals including, but not limited to, cattle, sheep, pigs, goats, horses, deer, camels, buffalo, emus, ostrich, alpaca and poultry.

Livestock handling competency — Refer to the LTS section 2, 'Stock-handling competency' for requirements as well as the summary in MLA's *Is the animal fit to load?* guide, revised edition 2019 (see Page 8, Good Animal Husbandry).

Livestock Preparation Information — Documented information (a written or electronic movement record - for example, on a Pig Pass, Waybill, NVD or equivalent document - about the date and time that livestock last had access to feed and to water, the type

of feed provided in the previous 48 hours (dry or green) and relevant information about livestock class[7] and condition.

LPA — Livestock Production Assurance program.

The Livestock Production Assurance (LPA) program is the Australian livestock industry's on-farm assurance program, covering food safety, animal welfare and biosecurity. It provides evidence of livestock history and on-farm practices when transferring livestock through the value chain.

LPA NVD — Livestock Production Assurance National Vendor Declaration.

An LPA NVD is a document that enables information regarding livestock history to be transferred through the supply chain to the end consumer so that they can be confident that the product is safe.

Livestock Spelling Plan — A plan developed to apply the factors described in the LTS for managing the welfare of livestock during extended journeys. Important for managing total time off water and maximising livestock fitness for travel.

Load — Includes the transport of goods (including animals or containers) using a heavy vehicle.

Load restraint — The way loads are effectively restrained on a vehicle.

Loader — A CoR party that loads a heavy vehicle.

Loading manager — A CoR party that manages premises where on average five or more heavy vehicles are loaded or unloaded each day.

Master Code — The Registered Industry Code of Practice developed as a practical guide to achieving standards of heavy vehicle safety and compliance under the HVNL. It applies to all parties in the supply chain of a heavy vehicle.

MLA — Meat and Livestock Australia.

Movement record — A document (e.g. a consignment/receival docket) that has provision to record incidents observed in transit, such as effluent spills and downers.

NHVR — National Heavy Vehicle Regulator.

NVD — See LPA NVD above.

Operator — A CoR party that directs the control and use of a heavy vehicle

Packer — A CoR party that packs or assembles goods for transport in a heavy vehicle

Policies — Clear, simple statements of how an organisation intends to conduct its business practices. They provide a set of guiding principles to help with decision-making.

Prime contractor — A CoR party that engages someone to drive a heavy vehicle under a contract for services.

Procedures — Describe how policies will be put into action in an organisation. Procedures outline who will do what, the steps to take, and the documents or forms to use.

Process — A series of actions or steps taken in order to achieve a particular end, objective or outcome.

Public amenity — Relates to the qualities, characteristics and attributes people value about a place, which contributes to their experience of a high quality of life.

Public risk — A safety risk or risk of damage to road infrastructure.

Public safety — The safety of persons or property, including the safety of the drivers of, and passengers and other persons in, vehicles and combinations; and persons or property in or in the vicinity of, or likely to be in or in the vicinity of, road infrastructure and public places, and vehicles and combinations and any loads in them.

RICP — Registered Industry Code of Practice.

An RICP establishes standards and procedures for parties in the CoR to identify, analyse, evaluate and mitigate general risks associated with meeting obligations under the HVNL.

Risk — The effect of uncertainty on objectives. An effect can be a positive or negative deviation from the expected outcome.

Risk management — The coordinated activities to direct and control an organisation with regard to risk. The risk management process consists of four key steps, including: identifying hazards; assessing risks; controlling risks; and monitoring and reviewing controls.

Road and road related area — See the full definition in the HVNL, Part 1 s 8, Meaning of road and road-related area. Generally:

- a road is an area open to or used by the public for driving or riding motor vehicles (includes bridges, cattlegrids, and railway crossings); and
- a road related area can be a shoulder, footpath, bicycle path, shared path, parking area, kerb etc.

Route Specific Factors — The following factors which are relevant to planning the route of a livestock transport journey:

- availability and location of inspection and spelling sites en route and at the destination
- availability and location of driver rest sites en route and at the destination
- availability and location of effluent disposal facilities on the planned route and at the destination
- the presence of 'hot spots' along the intended route
- other relevant conditions that may impact the duration of a journey and driving manner, and potentially affect the welfare of livestock being transported.

Schedule — The journey task provided to the driver. The schedule includes time, distance, route and rest options.

Scheduler — A CoR party which schedules the transport of goods and passengers in a heavy vehicle, or schedules a driver's work and rest hours.

Spell — The provision of water, food and space to lie down to rest. A spell of 24 hours or more resets total time off water.

Code — The Effluent Code.

Transport activities — Encompasses the 'business practices' and components of a transport business - for example, physical, management, labour, and service - and the associated activities for which the parties in the CoR are expected to be responsible – for example, driving, directing, employing, or contracting drivers, or consigning, scheduling, packing, loading, unloading and receiving goods. Transport activities also include carrying out other activities associated with the use of a heavy vehicle - such as, maintaining or repairing the vehicle.

7 As described for each species in the LTS

Transporter — The person or organisation responsible for the operation of a heavy vehicle (> 4.5 tonne GVM) involved in the transport of livestock - that is, the driver or registered operator of a livestock vehicle. This person may be a primary producer or another party in the CoR that has this function.

Unloader — A CoR party that unloads a heavy vehicle.

WHS — Work Health and Safety (also known as Occupational Health and Safety or OH&S).

8 CODE ADMINISTRATION AND REVIEW

This Code will be maintained by the NHVR in accordance with the conditions of registration in s 706(2) of the HVNL, and the *Guidelines for Preparing and Registering Industry Codes of Practice* (February 2022).

As Sponsor of this Code of Practice, ALRTA will support the maintenance of this code and contribute to its review.

9 KEY CONTACTS

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E codes@nhvr.gov.au

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10 REFERENCES

Australian Risk Management Standards: AS/NZ IOA 31000:2018 **Risk Management - Principles and Guidelines.**
ISO 31000:2018

Australian Animal Welfare Standards and Guidelines - **Land Transport of Livestock (LTS)**
www.animalwelfarestandards.net.au

Biosecurity resources

- www.animalhealthaustralia.com.au/ausvetplan/
- www.agriculture.gov.au/biosecurity/legislation/biosecurity-legislation#biosecurity--and-human-health-zones

Curfew effects

- George et al (2022) *Effect of feed withdrawal on truck effluent, animal welfare, carcase characteristics and microbiological contamination of feedlot cattle*.
- Gregory et al (2000) *Effects of pre-slaughter feeding system on weight loss, gut bacteria and the physico-chemical properties of digesta in cattle*. NZ Journal of Agricultural Research.
- McGahan et al (2010) *Review of effluent spillage and animal welfare during livestock transport: a discussion paper.* MLA
- Pethick D (2006) *Investigating feed and water curfews for the transport of livestock within Australia – A literature review.* MLA
- Thull (1999) *Management of stock effluent spillage from trucks in New Zealand - A thesis submitted in fulfilment of the requirements for the Degree of Doctor of Philosophy in Environmental Management.* Lincoln University, Canterbury NZ.
- Walker and Banney (2011) *Maximising beef eating quality while meeting transport regulations*. MLA

Heavy Vehicle National Law (HVNL)

- Section 26C - Primary duty
- Section 96 – Compliance with mass requirements;
- Section 111 – Compliance with loading requirements.

www.nhvr.gov.au/law-policies/heavy-vehicle-national-law-and-regulations

Load Restraint Guide 2018
www.nhvr.gov.au/files/202112-1285-load-restraint-guide-2018.pdf

Meat and Livestock Australia Ltd (MLA) **Is the animal fit to load?** A national guide to the selection of animals fit to transport. Revised edition 2019.
www.mla.com.au

Master Industry Code of Practice – A registered industry code of practice under section 706 of the Heavy Vehicle National Law.
www.nhvr.gov.au/safety-accreditation-compliance/industry-codes-of-practice/master-industry-code-of-practice

National Transport Commission (NTC)

- NTC Discussion Paper - **HVNL Effluent and Load Restraint** July 2017
- Consultation Report: **Loss of effluent and load restraint** July 2018
- **NTC guidelines for non-regulatory management of effluent** (2019 draft)

www.ntc.gov.au

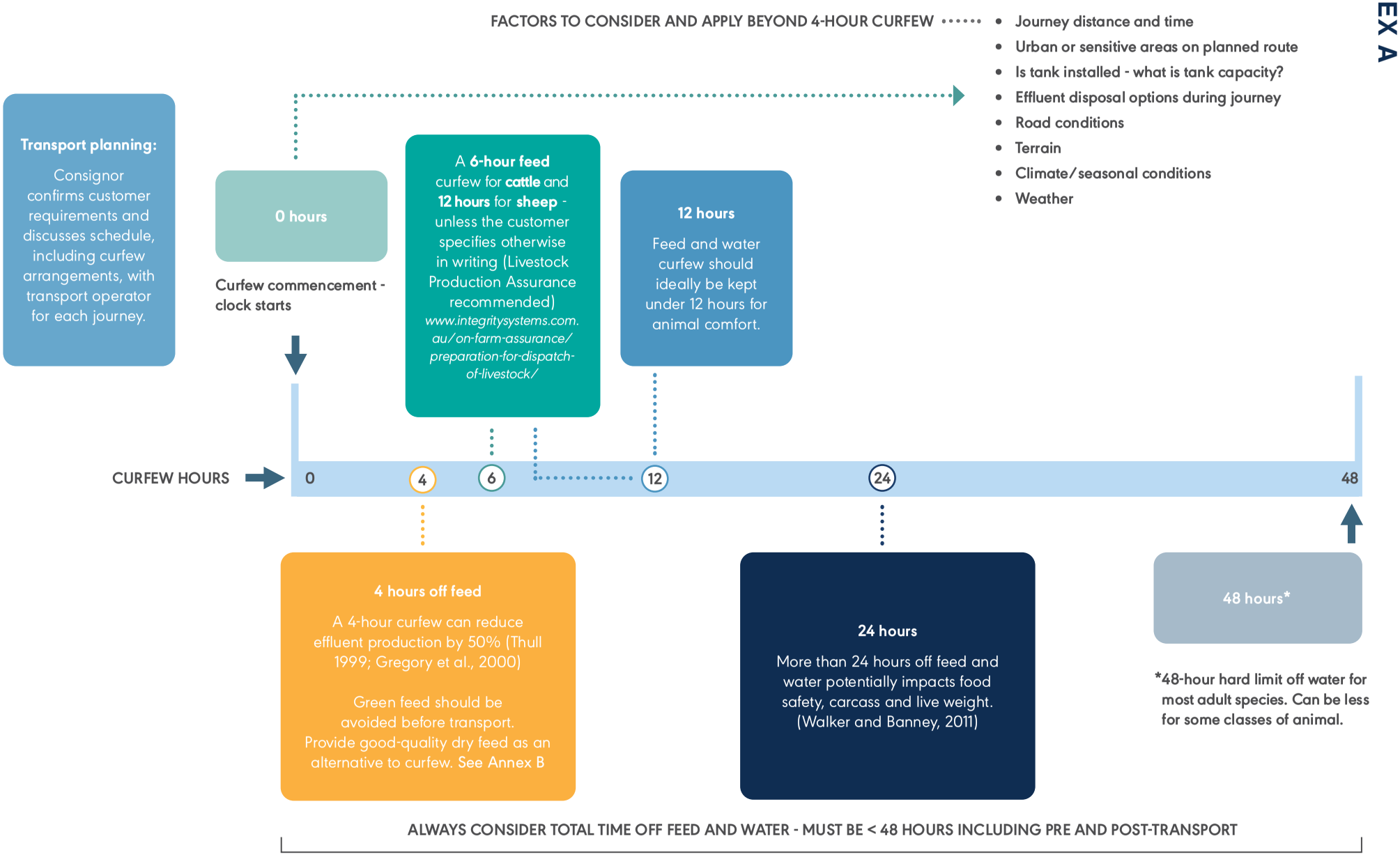
Safe Work Australia Guide: **How to Determine what is Reasonably Practicable to meet a Health and Safety Duty**
www.safeworkaustralia.gov.au

WHS - For guidance about managing WHS risks refer to state and territory government information.
There is a link to each state and territory's website at:
www.safeworkaustralia.gov.au/law-and-regulation/whs-regulators-and-workers-compensation-authorities-contact-information

11 CODE DEVELOPMENT SCHEDULE

Version	Date	Parties Consulted
Consultation pre-development	2018	ALRTA member workshops
	28 March 2019	Initial Stakeholder Workshop
	April 2019	Individual stakeholders (NFF, APL, WPA etc)
Consultation pre-development	29 May 2019	Working group meeting 1 with NHVR
Consultation pre-development	26 June 2019	Working group meeting 2
Draft Code Version 1	17 July 2019	Working group meeting 3
Draft Code Version 2	11 September 2019	Working group meeting 4
Draft Code Version 3	30 October 2019	Working group meeting 5
Draft Code Version 4	13 March 2020	Working group meeting 6
Draft Code Version 5	17 June 2020	Submitted to NHVR for pre-assessment
Draft Code Version 6	6 October 2021	Submitted to NHVR for consultation and writing assistance
Draft Code Version 7	8 March 2022	Submitted to NHVR for consultation and writing assistance
Draft Code Version 8	7 July 2022	ALRTA Forum
Draft Code Version 9	1 September 2022	Working group meeting 7

FEED CURFEW GUIDE



ANNEX B

GOOD QUALITY DRY FEED

Offering dry feed (hay or straw) to livestock prior to transport can be used to reduce effluent production and manage manure consistency: cattle fed hay for 24 hours produced 30% less manure than those sent straight from pasture (Gregory et al., 2000).

For this to be an effective strategy, the feed on offer must be attractive and palatable to encourage eating and must have a high fibre content.

Therefore, as a minimum, the feed offered must be free of spoilage and mould and not excessively stalky.

If livestock are expected to continue gaining weight at their destination, then the quality of the feed should support the desired growth rates.

Nutritional value of the feed should also be considered for some classes of livestock, such as pregnant or under-conditioned animals, to maintain them through the journey, regardless of their destination.

Due to their lower moisture content, hay and straw are better options than silage for pre-transport feed.

ANNEX C

GUIDE TO ESTIMATING LIVESTOCK EFFLUENT PRODUCTION IN TRANSIT

Introduction

The rate of livestock effluent production in transit can vary depending on a number of factors. There is no single measure or formula that can accurately predict outcomes in all circumstances.

The factors that impact the rate of livestock effluent production can be considered both risks and controls.

Livestock supply chain parties should familiarise themselves with the risk factors that affect the rate of livestock effluent production, observe actual outcomes, communicate these outcomes to other chain parties, and where influence or control is possible, take steps to change practices if excessive effluent production in transit will, or is likely to, result in a breach of the HVNL or any other law.

A cooperative approach is often the best way to manage livestock effluent.

Factors that affect effluent production rates in livestock transport

1. Livestock Factors
   a. Species – different species have general effluent production traits
   b. Class – rates may vary with age, stage of production or lactation status
   c. Condition – poor condition may increase stress and effluent production rates
   d. Mass – larger animals will generally produce more effluent
   e. Number – effluent production rates will multiply by the number of individuals
2. Feeding Practices
   a. Feed withdrawal - withholding of all feed prior to transport can reduce effluent production rates.
   b. Green feed – access to green feed immediately prior to transport is likely to increase effluent production.
   c. Dry feed – offering dry feed such as hay or straw can 'bind' gut contents and reduce effluent production rates.
   d. Feed additives – some feed additives (containing enzymes, β-agonists, ionophores, and somatotropin) help to reduce effluent production rates.[1] This is an emerging field of research that may result in the availability of new products in future.
3. Yarding and Loading Practices
   a. Experience – livestock that are accustomed to yarding and transport will be less stressed and produce less effluent. Conversely, livestock unaccustomed to handling will become more stressed during yarding and loading.
   b. Settling – yarding livestock well before transport and allowing a settling period can reduce effluent production rates.
   c. Ramps and holding yards – good quality and well-designed facilities that encourage good livestock flow with low injury risk will reduce stress and resulting effluent production rates.
   d. Dogs and handling aids – threats and loud noises will increase stress and effluent production rates.
   e. Timing – it is ideal to yard overnight and load early in the morning.
4. Other Factors
   a. Effluent production profile – Generally, there is more effluent produced early in a journey before tapering off gradually.
   b. Weather – very hot or cold conditions can increase stress and effluent production rates. Rain can also mix with effluent and quickly fill capture tanks installed on trailers.
   c. Road condition – rough roads can cause effluent production rates to increase.
   d. Driving practices – smooth driving can reduce stress and effluent production rates.
   e. Mixed loads – mixing unfamiliar animals can increase stress and effluent production rates.
   f. Cooling water – water used to cool livestock can mix with effluent, increasing the total volume.

Note: Consideration of all of these factors means that actual rates of livestock effluent production can differ significantly.

Information from industry studies

Walker (2011) "According to McGahan et al (2010), no Australian studies could be found that measured the amount and timing of effluent produced by livestock during transport. Hence, all predictions of effluent load in Australian livestock vehicles need to be treated with caution."

More recently, George et al (2022) reported on *"Effect of feed withdrawal on truck effluent, animal welfare, carcase characteristics and microbiological contamination of feedlot cattle"* and provided data about live weight loss and effluent volumes collected in tanks for a specific set of feedlot cattle transported in B double loads.

1 Technologies to reduce environmental impact of animal wastes associated with feeding for maximum productivity - www.academic.oup.com/af/article/3/3/42/4638638

What is known about effluent production rates of cattle?

- 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).[2]
- According to Pethick (2006)[3] "sources typically quote cattle manure excretion of 5-6% of live weight per day with urine constituting 30% by mass of the manure." This figure is quoted elsewhere by MLA "For cattle of typical live-export body weight, the volume of manure (faeces and urine combined) is in the range of 20 to 30 L per head (5 to 6% of body weight) per day (DPI QLD (2003) Feedlot Waste Management)"[4]
- 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. This trend is confirmed in the study by George et al (2022) involving feedlot cattle.
- Thull (1999) investigated the rate of manure production for truckloads of New Zealand cattle that had been feed curfewed for approximately 4 hours prior to transport compared to those not curfewed. Effluent production was halved for the curfewed cattle compared to the full cattle (100 L versus 200 L) for the first 100 km. (The most common currently operated livestock cartage units in New Zealand are a combination of a truck and trailer able to load approximately 35 to 40 adult cattle or 450 to 500 sheep).

Grazing cattle

McGahan et al (2010)

Table 14 in the McGahan report 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 3 – 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)

The exact mass of the cattle used in this study is not known however it was reported that these data represent the average of a range of data for different animal types (dairy cows, bulls, heifers and steers) and pasture types.

Feedlot cattle

McGahan et al (2010): "The manure estimation and nutrient mass balance model, Beef-bal, ... (is) used to estimate likely manure production of feedlot cattle...."

"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.

... manure production for short trips (1 hr) for feedlot cattle is likely to be in the order of 120 L/hr."

Then, as in Table 3 above, the rate of effluent production gradually reduces over time.

George et al (2022) noted that "The results of this study are representative of a single market category: domestic, non-implanted heifers fed a feedlot diet. Results in cattle grazing pasture with different dry matter and energy may differ greatly and hence further research is required to make any inferences for grazing cattle."[5]

The cattle (480kg heifers, dry fed) in the George et al (2022) study on average generated effluent at the rate of 1.1% live weight in the first 4 hours (the study also found that in general the rate of effluent production gradually decreases over time).

The daily rate of effluent production of cattle described in Pethick (2006) is 5-6% of live weight every 24 hours.

Note: a kilogram and a litre of livestock effluent may not necessarily be the same weight but will be deemed so for the purpose of estimation in this guide.

2 Effluent spillage and animal welfare during transport B LIV 0126 (MLA)
3 Pethick D (2006) Investigating feed and water curfews for the transport of livestock within Australia- A literature review. Final Report LIVE.122A. MLA, Australia
4 www.mla.com.au/contentassets/d230950420bb45d7821e79097860c736/live.221_final_report.pdf
5 www.mla.com.au/contentassets/f6c9200d5e104d96b72d1bb8f702d061/b.flt.5009-final-report.pdf

A general 'rule of thumb'

The information in the following table was developed from data sourced in research papers (see the tables on the following pages) and with corroboration from experienced livestock transporters.

Table 4

General 'rule of thumb' for estimating livestock effluent production in transit (no feed curfew)							
Species	**Average live weight in kg**	**Daily effluent production as % of live weight**	**# Head per pen**	**Average amount of effluent produced in litres in a 4hr trip in an A-trailer**		**Average amount of effluent produced in litres in a 4hr trip in a Semi-trailer**	
Cattle	500	6%	24	Grazing	210	Grazing	420
				Feedlot	132	Feedlot	264
Sheep	50	4%	27	80		160	
Pigs	100	6.6%	20	158		317	

Notes:
1. Remember that most livestock effluent is produced in the early part of the journey.
2. Water collected in a trailer from cooling systems, or a rain event, will significantly increase the volume of effluent collected in tanks.

Table 5

Estimates for effluent production in transit - Feedlot Cattle					
Average Live Weight in kg	**Average amount of effluent produced in L/head in: 4 hours (1.1%)**	**Average amount of effluent produced in L/head in: 24 hours (6%)**	**# Head per pen**	**Estimated effluent production in L in a 4 hr trip in an A trailer**	**Estimated effluent production in L in a 4 hr trip in a Semi trailer**
200	2.20	12.00	38	83.60	167.20
300	3.30	16.50	34	112.20	224.40
350	3.85	21.00	30	115.50	231.00
400	4.40	22.00	28	123.20	246.40
450	4.95	27.00	26	128.70	257.40
480.6*	5.30				
500	5.50	27.50	24	132.00	264.00
550	6.05	30.25	22	133.10	266.20
600	6.60	33.00	20	132.00	264.00
650	7.15	35.75	18	128.70	257.40
700	7.70	38.50	16	123.20	246.40

*Feedlot Heifers mean exit weight in the George et al (2022) study. The text in red reports data from the study.

Table 6

Estimates for effluent production in transit - Sheep							
Average Live Weight in kg	Average mass of effluent (faeces and urine) produced in L/head (at 4% of bodyweight per day) in: 4 hours	Average mass of effluent produced in L/head (at 4% of bodyweight per day) in: 24 hours*	L rate per 4 hours in a 3.0m pen**	L rate per 4 hours in a 4.5m pen	L rate per 4 hours in a 6.0m pen	Estimated effluent production in L in a 4 hr trip in an A trailer (8 x 3.0m pens)	Estimated effluent production in L in a 4 hr trip in a Semi trailer (16 x 3.0 pens)
20	0.14	0.8	42 head produce 5.88	63 head produce 8.82	85 head produce 11.90	47	94
30	0.20	1.2	38 head produce 7.60	57 head produce 11.40	76 head produce 15.20	61	122
40	0.27	1.6	33 head produce 8.91	49 head produce 3.23	65 head produce 17.55	71	142
50	0.34	2.0	29 head produce 9.86	43 head produce 4.62	57 head produce 19.38	79	158
60	0.40	2.4	25 head produce 10.00	37 head produce 14.80	49 head produce 19.60	80	160

*For typical live-export sheep the average mass of manure produced is 1.2 to 1.8 L per head (4% of body weight) per day (ASAE 1999)

**Numbers per pen derived from LTS loading density guidelines

Table 7

Estimates for effluent production in transit - Sheep				
Average Live Weight	Average mass of effluent produced in kg/day* (6.6% of live weight)	#Head per pen**	Estimated effluent production in kg in a 4 hr trip in an A trailer (6 pens):	Estimated effluent production in kg in a 4 hr trip in a Semi trailer (12 pens):
Porker – 50 kg	3.30	32	127.0	254
Baconer – 75 kg	4.94	21	124.5	249

*These figures developed from 'Effluent Management Guidelines for Intensive Piggeries in Australia'

**Numbers per pen derived from LTS loading density guidelines

References

- Carter et al (2013) Technologies to reduce environmental impact of animal wastes associated with feeding for maximum productivity www.academic.oup.com/af/article/3/3/42/4638638
- McGahan et al (2010) 'Review of effluent spillage and animal welfare during transport' B LIV 0126 (MLA) www.mla.com.au/contentassets/d2322f5853a141c487c9e0dcd031d1ff/b.liv.0126_final_report.pdf
- 'Characteristics and Volume of Effluent Produced by Livestock Vessels' Live 221 (MLA) www.mla.com.au/contentassets/d230950420bb45d7821e79097860c736/live.221_final_report.pdf
- George et al (2022) 'Effect of feed withdrawal on truck effluent, animal welfare, carcase characteristics and microbiological contamination of feedlot cattle' www.mla.com.au/contentassets/f6c9200d5e104d96b72d1bb8f702d061/b.flt.5009-final-report.pdf
- Effluent Management Guidelines for Intensive Piggeries in Australia www.waterquality.gov.au/sites/default/files/documents/pub4-effluent-intensive-piggeries.pdf

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