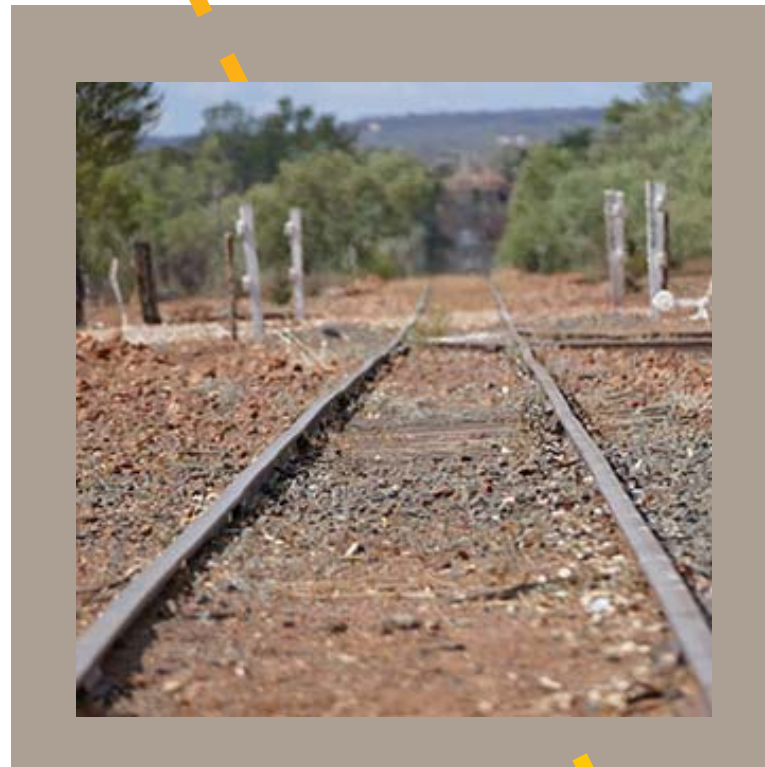




Research



**Quilpie to Brisbane, moving cattle
by rail freight: The regular reliable
and responsive services challenge**

The Australian Centre for Sustainable Business and Development (ACSBD) is a research centre of the University of Southern Queensland, Toowoomba, Queensland, Australia. The Agricultural value chains and food systems team is led by Professor Alice Woodhead.

This report complements the report 'Toowoomba to China: Cold chains and premium food exports by air freight' where opportunities and challenges of exporting premium chilled food to China and the cold chain developments are explored.

The agricultural value chain and food systems team works with local and national industries to better understand critical infrastructure, product development and agricultural export opportunities, risks, pathways and business relationships. The research is founded in systems thinking. This enables the team to make sense of the complexity and emerging issues that define our agricultural and food systems and export markets.

The team works closely with a broad range of stakeholders with the aim of developing targeted and practical strategies and decision support material.

The project 'Facilitating the transformation of Queensland's agricultural value chains' is funded by Queensland Government and University of Southern Queensland. The steering committee members include Prof. Steven Raine, Prof. Julie Cotter, Malcolm Letts, Elton Miller, Richard Routley, Russell Hoelzl, and Prof. Alice Woodhead.

We appreciate the expert input from Malcolm Martin and Jason Higgins, Queensland Government Department of Agriculture and Fisheries. We also acknowledge the input from industry, Queensland Government Department of Transport and Main Roads, Western region councils and stakeholders in Quilpie, Charleville, Roma and Dalby.

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Executive Summary

Agricultural production in Queensland is spread over a vast area and is very diverse. The coastline is 7,000 km and the land area is 1.853 million km². Livestock travel vast distances from the outback to the processing and export ports in south east Queensland. In the past rail was used for long haul point to point transportation of livestock, but over recent years there has been a decline in use of rail. This study examines the Western rail system, rail infrastructure and associated facilities. We explore the decline in the use of rail for the transport of cattle; we assess what conditions would enable the revival of trains should they be considered a viable option; and we discuss how hybrid models of trains and trucks could provide the optimum solutions for the future of livestock transport.

USQ worked with the cattle industry and transport sector to assess the challenges to livestock transport by rail. This approach to cross-industry dependency and collaboration offers a more systemic, flexible, relevant and impactful approach than would be possible with assessing one sector. Road and rail transport of cattle are compared with regard to regular, reliable, responsive services. We argue that, to support the vision for growth across Queensland, transport networks need to be designed from a whole of system perspective, with passengers, freight, road, rail, sea and air viewed as complementary elements of business systems and logistics infrastructure. The goal of such a perspective is to develop a system where each leg of a journey is accomplished by the most effective and efficient mode of transport. Regular, reliable, responsive and cost effective transport systems are essential to enable the growth of food value adding in Australia. We explore the potential of rail to enhance the existing road transport systems. There has not been an attempt to precisely value the externalities of rail against road for livestock freight transport from the Western region.

Rail provides some advantages. Rail is widely considered to provide safer and more fuel efficient livestock transport than trucks because of these factors:

- cost effective volumetric freight
- efficient point to point transport
- better animal welfare conditions than trucks (consistent travel speed with no traffic lights and sudden stops)
- reduced maintenance burden on highways.

Agricultural freight is seasonal and highly dependent on regional rainfall. A bumper season produces a massive increase in productivity, potentially a tripling of yields across all sectors, cattle, cotton, grains, pulses and horticulture. Consequently there is concern as to the capacity of the road network to handle increasing freight burdens. Delivery delays and increased costs are inevitable. Indeed businesses across the Brisbane catchment would be negatively impacted by a bumper harvest.

Rail freight presents a means to expand freight capacity in good seasons without placing additional congestion and maintenance burden on road networks. The

underutilisation of the Western rail system indicates that centralised rail freight management, namely infrastructure and logistics management has not been responsive to local needs. How the Queensland Western Rail System transforms may result from strategically based collaborative relations between stakeholders, such as Queensland transport providers, livestock farmers, communities, and government. The diversity of load and destination offered by the trucking industry is an important aspect of cattle freight and should be carefully considered when evaluating rail opportunities. Solutions to some of these barriers include the use of farmer transport co-operatives, based on US examples of rail freight models, and creating integration of rail freight. To this end, the study considers how collaborative or co-operative enterprises may offer alternative ways to own and manage South West Queensland rail services.

To help understand the diversity of views, stakeholders along the Western rail system, from Quilpie to Brisbane, were interviewed about their views on the current rail service and options for future transport services. They expressed a desire for a more regular, reliable, responsive and cost effective rail service that complemented and in some cases replaced trucking services. From these discussions we identified some barriers to use of the Western rail system by the local cattle industry and provide recommendations to enable future utilization. These include:

- better integration of train and truck transport systems;
- improved performance and responsiveness by rail service providers measured by specific KPIs;
- the appointment of local cattle freight booking agents and the integration of trucking services with rail services;
- the formation of a regional South West agricultural freight advisory group to facilitate communication and reporting;
- strategic infrastructure planning and investment to establish logistics hubs; and
- closer cooperation and asset sharing with other users of rail services.

The revival of train services on the Western rail line and synchronizing rail and truck livestock transport systems is critical. Without integration of rail and truck infrastructure more pressure will be placed on the congested south eastern road network. However providing a service that changes the dynamics of the transport system is more complex than assigning a contract for rail services; the success of the revival of livestock rail freight is conditional on the service provider delivering a regular, reliable and responsive service.

Introduction

Queensland's current agricultural strategy includes the growth of agricultural production and the export of value added produce. To achieve this the government aims to drive productivity growth across the value chain while at the same time minimising the costs of production. The vast majority of Queensland agricultural produce is exported as a commodity, including almost 100 percent of cotton (Cotton Australia, 2014) and 74 percent of beef (Meat and Livestock Australia, 2015).¹ Nearly all of these exports are shipped from the Port of Brisbane, necessitating trucks to travel across Brisbane's road network. Therefore growth and efficiency across agricultural and other business sectors requires co-ordinated, reliable and efficient infrastructure and transport.

Rail has been recognised as contributing to the resilience of Australia's agricultural freight network (Deloitte, 2011). Trucks are considered to provide a more flexible service in terms of scheduling, destination and size of load. The development of high productivity vehicles and improved road infrastructure has improved the efficiency of trucks while rail freight technology and infrastructure have remained static. However, agricultural freight needs are constantly changing, driven by market demand and regional weather conditions. Rail is a means to meet this demand while also reducing the burden of trucks on roads. To support this expansion The Queensland Government has identified two challenges:

- Expand the use of rail freight and to implement strategies to increase mode share for rail freight on defined strategic rail freight networks.
- Develop regional connectivity and freight market access.

Interest in shared market power and infrastructure control has seen renewed interest in co-operative or collaborative enterprises. Co-operatives, and similar collaborative enterprises, have been considered effective bases for the kind of efficiency and knowledge sharing activities known to benefit regions. However the co-operative owned infrastructure in the agricultural had not been explored within the context of livestock trains.

Our approach

Taking a whole of system approach means assessing the interdependence of each transport system. Unfortunately, road and rail are generally viewed as competing modes of transport. Planning and organisation is typically focussed on one mode of transport with the other framed as a competitor. Further, freight and passenger train transport are viewed as different entities, leading to fragmentation and isolation of complementary infrastructure.

¹ Based on 2015 total carcase weight.

Consultations were conducted jointly by researchers from the University of Southern Queensland and the Queensland Department of Agriculture and Fisheries. Participants were invited to raise issues and topics that they considered important to the past and future role of the Western railway line. Researchers asked open questions to foster discussion and encourage contributors to talk about their priorities and concerns.

During April and May 2016 the team conducted industry stakeholder consultations at strategic points along the Western Line and with key stakeholders in other locations across southern Queensland. Participants included Mayors, Shire and Regional Council Members and local business. In several cases participants were present in more than one capacity, e.g. Council members who are also primary producers. At Roma and Dalby, the local council owns and manages rail adjacent saleyards, which are important hubs for cattle movements.

In conducting this research, over forty stakeholders expressed their views during focus groups at regional towns along the Western line (Figure 1) and during semi-interviews. Participants varied in their technical knowledge and familiarity with rail systems. Some participants had a technical background and expressed views on rail infrastructure and network capacities; others responded from a freight customer perspective expressing their needs for a livestock and general freight service. Yet, others were interested in discussing the provision of passenger and tourism train services. All of these perspectives are important to inform the development of transport services on the Western rail line.

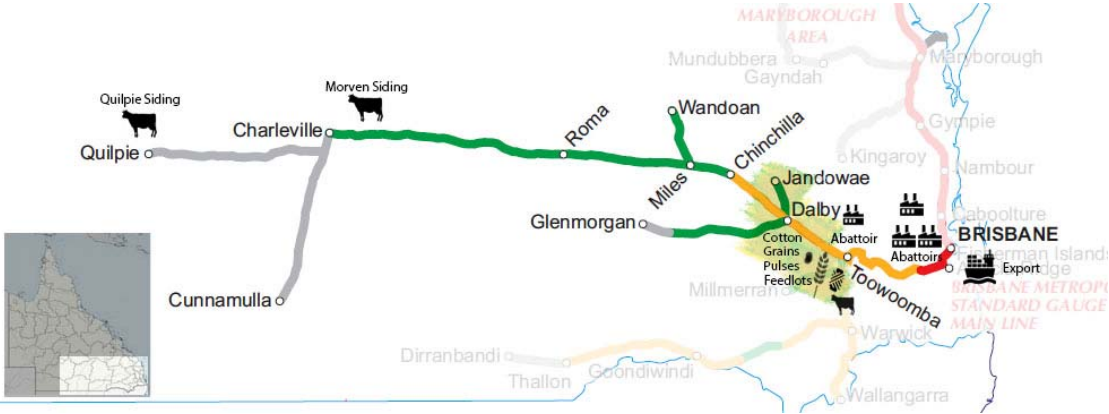


Figure 1: Queensland Western Rail System and freight

This study explores the barriers and opportunities of expanding the use of rail livestock freight. We discuss the current use of the rail system to transport livestock, in particular cattle, on Queensland Western Rail System to the port of Brisbane and other destinations and explore options for increasing utilisation.

Freight and transport options

The freight network comprises all transport infrastructures that support freight movement. This includes 13,600 km of road and 9,550 km of rail line as well as ports, airports and terminals.

Freight is generally considered in two handling categories:

- Bulk Commodities - single commodity movements in high volume or bulk configuration.
- General Freight - all other freight, including palletised and containerised freight.

Road is the dominant form of transport for bulk commodities accounting for 69% of Queensland freight movements. Rail contributes most of the remainder with a 29% modal share. These two main forms of freight are complemented by small amounts of coastal sea freight (2%) and air freight (0.005%) (see Figure 2 below).

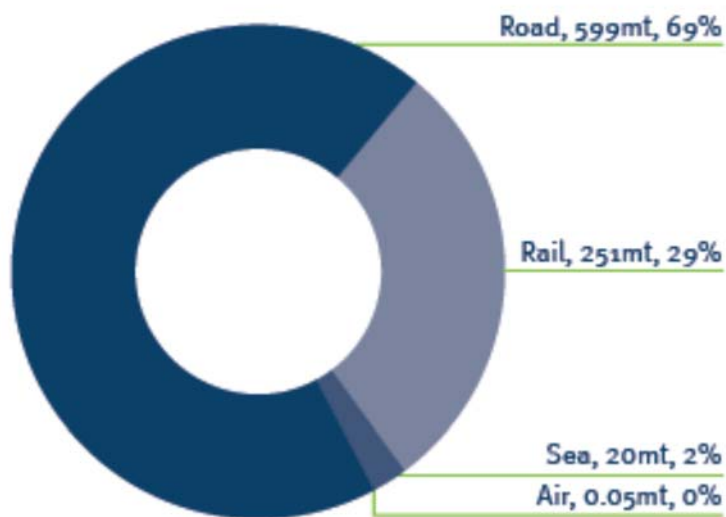


Figure 2: Freight movement by mode 2010-11

Source: (TMR, 2013)

Rail is ideally suited to freight tasks that are high volume with point-to-point pick-up and delivery over long distances (TMR, 2013). Rail has a lower line-haul cost than road when large volumes and longer distances are involved.

Road remains cheaper in most states for distances less than 1,500 kilometre. For these shorter journeys, the cost benefits of rail are outweighed by the need for additional handling and short haul transport to the rail siding. (Hitchins, 2013)

Rail operations are typically divided into above and below rail. Below rail operations relate to the rail network, including track construction and maintenance, electric systems, bridges, and signalling and network access (Aurizon, 2014).

Above rail infrastructure comprises the rollingstock, wagons, and containers used to transport freight and passengers on the rail network. Queensland Rail and Aurizon are the main above rail operators in Queensland (Aurizon, 2014).

Above or below rail infrastructure may be owned by a single entity, or held separately with above rail operators paying rent to below rail operators for track access.

Below rail operators charge above rail operators rent for use of their track network. The rents levied by Queensland Rail do not necessarily capture the full cost of track maintenance. In this way rent can be used as a means to indirectly support lines and encourage volume building.

Agricultural freight can be categorised as either container, bulk, or livestock (see Table 1). This report focuses on livestock transport however a brief explanation of the container transport is included in Appendix I because it has specific implications for the optimum utilisation of the South West train line system.

Table 1 Key potential rail users and western rail system utilisation

Category	Quilpie	Morven	Charleville	Roma	Dalby	Oakey	Toowoomba	Ipswich	Port of Brisbane
Cattle				Sale yards	Sale yards	Abattoir	Airport	Abattoir	
Goat carcase or packaged cuts			Abattoir				Airport		Port
Beef carcase or packaged cuts						Abattoir	Airport	Abattoirs	Port
Cotton									Port
Grains									Port
Pulses									Port

Queensland rail western system

Queensland Rail owns the majority of rail networks in Queensland (see Figure 3). Aurizon operate a coal rail network comprising 2,670km of track in Central Queensland (Aurizon, 2014).



Figure 3 Queensland Rail System Map

Sourced (24 June 2016) <http://www.qca.org.au/Rail/Queensland-Rail/Qld-Rail-rail-systems>

Queensland rail western system, provides an important freight route between the Darling Downs, South West Region and the Port of Brisbane. The most significant use of the line by volume is the transport of thermal coal from New Ackland Mine to the Port of Brisbane for export. The line is also used for agricultural and general freight and for passenger services. In terms of passenger services, the Western Downs and Outback regions of Queensland occupy a large geographical footprint stretching from Camooweal and the Overlander's Way in the north, Birdsville in the west, Cunnamulla in the south and Hughenden, Barcaldine, Charleville, Roma, Dalby and Toowoomba in the east. The region incorporates the Channel Country floodplains, the rolling Mitchell grass downs and ancient spinifex deserts, prime grazing and agricultural production areas and offers an amazing landscape experience. However, this region is currently not attractive to the short-break traveller due to the lack of accommodation available and the long distances between attractions and tourist sites.

In addition to cattle, which will be discussed in more detail, these are the other major agricultural produce that can be transported by rail.

Cotton and chickpeas

In 2013, 49% of Australia’s cotton crop was exported via Port of Brisbane (Australian Cotton Shippers Association, 2014). Grains are also important export crops and the Darling Downs produces good amounts of wheat and sorghum.

Chickpea and other pulse production is smaller in scale. Pulses, cotton and grain may be shipped in bulk or containerised. While bulk shipment provides the lowest cost per tonne, container shipments allow for smaller shipments and can be more easily handled by receivers and received in ports that are not equipped for bulk shipments.

Goat and sheep

Western Meat Exporters at Charleville (the next major station after Quilpie) musters and kills up to 16,000 wild goats per week. Rail presents a possible link in the supply chain for goat meat to be exported via port of Brisbane. Sheep have historically been important to the Charleville region. Sheep farming has however become challenging due to ongoing problems with wild dogs. If ongoing dog control measures such as baiting and cluster fencing are successful, then sheep and goat farming may regain popularity. Sheep and goats are not currently shipped by rail but have similar requirements to cattle in terms of handling and spelling.

Table 2: Sheep handling standards

Class of sheep			
Sheep known or visually assessed to be between 14 and 19 weeks	24	24	12
Sheep known or visually assessed to be more than	4	4	24
Lactating sheep travelling with	28	28	12
Sheep less than 4	28	28	12
Any other sheep	48	48	36

Source: Animal Care and Protection Regulation 2012 Schedule 3, Code of practice for transport of livestock.

Rail freight constraints

The constraints to rail freight on the Western system can be listed thus:

1. The branch line between Quilpie and Charleville is very light with the lowest axle load capacity on the line, 10.62 tonne/axle and a speed limit of 60km/h (Queensland Rail, 2006). The low axle load capacity prevents widely used 90 tonne locomotives from accessing the track. Stakeholders reported in interviews

that this means that trains from Quilpie must use 60 tonne locomotives and may need to be reconfigured at Charleville.

The track from Charleville to Port of Brisbane has an axle load capacity of 15.75 tonne/axle. Track condition does however impose constraints in the form of speed limits: 80km/h between Toowoomba to Roma and 70km/h between Roma and Westgate.



Figure 4: Change in rail weight at Westgate, Qld

2. The single lane crossing of the Toowoomba range. This crossing provides access to Brisbane and both the Western and South-Western lines and therefore limits the total number of slots available for travel from these areas to Brisbane (Deloitte, 2016). This bottleneck is further constrained by the aging rail infrastructure which places limits the types of trains that can cross the range. The low tunnel height prevents the taller high-cube containers from crossing the range. Possible solutions to these issues have been explored such as the development of additional passing loops and lowering of tunnel floors on the Toowoomba Range (Deloitte, 2016).
3. Alignment is the physical route the track takes across terrain. Track curvature and gradient are important considerations and limit the speed and maximum train length that the track can support. The route between Toowoomba and Port of Brisbane has been criticised for poor alignment. This creates efficiency problems along this segment.
4. Finally, above rail infrastructure in Queensland is owned predominantly by Aurizon or Queensland Rail. Queensland's rail network is narrow gauge (3'6"). This means only narrow gauge rollingstock can be used. Other sources for rollingstock are Tasmania and Western Australia which both have narrow gauge networks. There are a number of overseas manufacturers who are able to build narrow gauge rollingstock. This would however be more expensive than restoring existing rollingstock.

Transporting cattle by rail

Approximately 300,000 head of cattle were moved by rail through to abattoirs in Queensland during 2012-2013 (R. Hoelzl, pers comm, 1 November 2016) which is equivalent to approximately 5,000 B-doubles. Most cattle were moved by truck; cattle by rail to abattoir represents less than 10% of all cattle transport to abattoirs (Transport, Housing and Local Government Committee, 2014).

The Queensland Government contracted Aurizon to offer 325 livestock rail services annually throughout Queensland (Stunzner, 2015) offering financial support through the livestock freight services contract. With full utilisation of these 325 rail cattle train services, this number could increase to approximately 315,000 head a year (R. Hoelzl, pers comm, 1 November 2016). The potential livestock loading and unloading points cover the full length of the western rail system, with multiple potential loading and unloading points.

The livestock route from Quilpie was infrequently used between 2013 and 2015. Use has been increasing; in 2016 five cattle trains have travelled from Quilpie to abattoirs in Dinmore and Holmview with a further four planned 2013 (R. Hoelzl, pers comm, 1 November 2016) Oakey Beef Exports will have also the capacity to receive cattle via rail in the near future.

About nine years ago Quilpie would see up to nine cattle trains loaded a week (ABC rural, 22 July 2015). A spokesman from Aurizon responded, saying that in South Queensland, less than 3 percent of the scheduled services have been utilised by industry over the past three years (Stunzner, 2015). The distribution of the funded services was said to reflect the demand in the Northwest and Central Western regions. However, a cattle freight study in the South-West Region determined that there were 200-210,000 head of cattle that could potentially ship via Quilpie in a reasonable season with 115-120,000 on supply chains that could use at least part of the rail line (Devine, 2013).

Cowtainers

Cattle travel in specialised rail wagons or containers. The Queensland government recently invested in new cattle crates 'cowtainers'. These hold 20 head of cattle each and are designed to be secured by twistlock on standard 40 foot flatbed wagons (Hinchliffe, 2015). A full cattle train comprises forty wagons allowing for a total of around 800 head. The cowtainers are intended to be leased at nominal cost to successful proponent(s) to the *Cattle Transport Services Contracts* request for proposals.

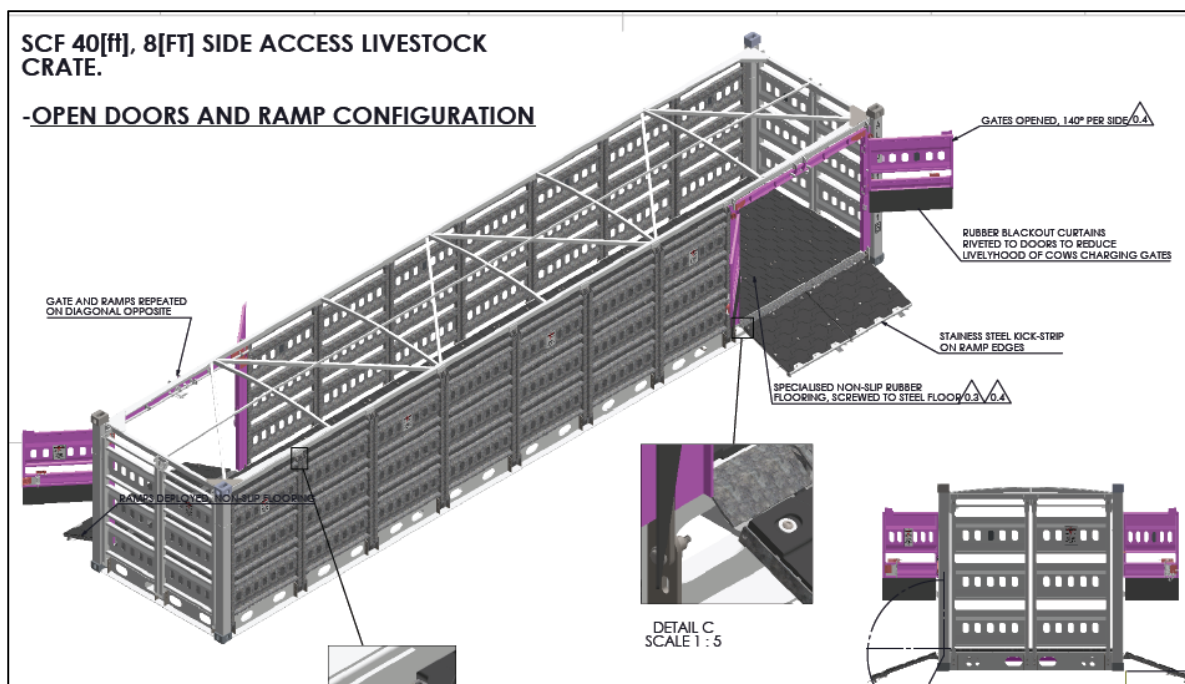


Figure 5: "Cowtainer" specification

Source: (TMR, 2016)

Livestock transport regulations

The Queensland Compulsory Code of Practice for Transport of Livestock has been in place since January 2014 under the *Animal Care and Protection Act 2001*. The code sets the minimum acceptable standards for handling of common livestock species during transport by road, rail and ship.

To be transported livestock must be fit for transport as described in Section 8 of the Code. Section 14 requires handling that minimises harm and prohibits unsafe practices and unnecessary striking. The code also sets out requirements for the journey time, time off water and spell duration for all common types of livestock. The tabled requirements for cattle are listed below.

Table 3: Cattle handling standards.

Column 1	Column 2	Column 3	Column 4
Class of cattle	Maximum journey time (hrs)	Maximum time off water (hrs)	Minimum spell duration (hrs)
Cattle more than 30 days of age but less than 6 months of age	24	24	12
Lactating cattle travelling with	24	24	12
Any other cattle	48	48	36

Source: Animal Care and Protection Regulation 2012 Schedule 3, Code of Practice for Transport of Livestock.

The Meat Standards Australia program has its own more stringent handling protocol. To be eligible for the program, participants must comply with a maximum processing time frame between dispatch and slaughter. For saleyard cattle, slaughter must occur within 36 hours of dispatch from farm gate (MLA, 2012).

The protocol for direct consignment is more complex and favours road transport. Cattle may be slaughtered up to 48 hours after dispatch by road provided that they spend no more than 36 hours in transit; cattle dispatched by rail or sea must be slaughtered no later than the day after dispatch from the property (MLA, 2012). It is therefore more difficult to comply with the MSA protocol if cattle are dispatched via rail.

This disparity is the result of 2013 changes to the protocol that lengthened times for cattle dispatched by road but not by rail or sea. Further study is needed to determine whether these changes should be extended to cattle dispatched via rail.

Destinations - Saleyards, abattoirs and feedlots

Cattle were traditionally loaded from two major collection points – Quilpie and Morven (See *Figure 1*). Morven has good highway connectivity to receive cattle from the Warrego or Mitchell highways. Importantly it is also located after the change in line weight at Westgate. Historically, cattle movements comprised of mainly fat cattle suitable for slaughter moving east from grazier to fat markets or abattoirs in south east Queensland (e.g. Toowoomba, Dinmore near Ipswich and Beenleigh).

The current market is more diverse with feeder and store cattle playing a growing role. These lighter cattle are transported to feedlots located close to where stock feed is grown e.g. the Darling Downs. It takes several kilograms of feed to produce a kilogram of live weight so moving cattle to grain is considered more efficient than the reverse.

Saleyards at Roma and Dalby are rail adjacent but are not serviced under existing livestock rail transport arrangements. Devine Agribusiness (2013) has recommended a feasibility study of cattle train services that utilise these loading points.



Figure 6: Saleyards at Dalby (l) and Roma (r)

Brisbane abattoirs are the single largest destination for cattle from the Quilpie region as shown in the chart above (Devine, 2013). These include Tey's Cargill and JBS both of which have rail access and spelling yards. Oakey beef exports accounted for 5% of cattle movements and is in the process of constructing a siding for rail access with the assistance of the Queensland Government. Oakey is attractive as a destination from a network planning perspective because it does not require cattle to travel through the network bottle neck at the Toowoomba range crossing.

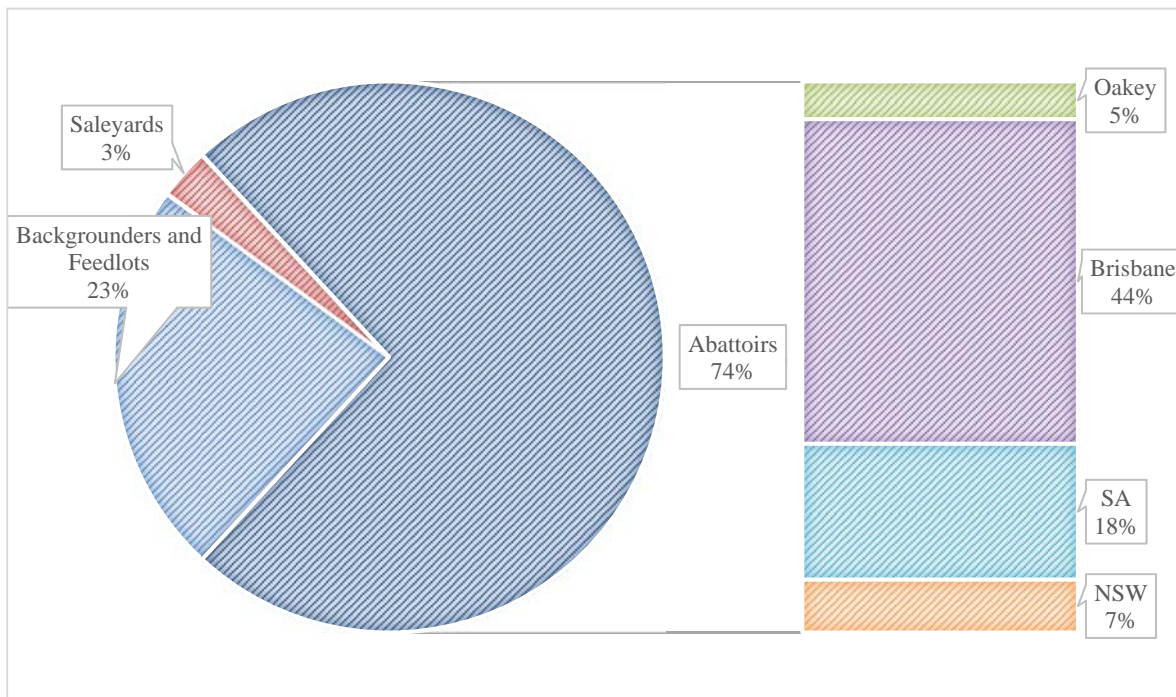


Figure 7: Destinations for cattle (n=210,000) from Quilpie and surrounds.

Source: (Devine, 2013)

Abattoirs are positioned to make use of rail for both inputs (e.g. cattle, machinery) and outputs (e.g. frozen cuts, bulk tallow, bonemeal). Meat and by-products are exported from the Port of Brisbane. The supply chain for chilled and frozen beef to

port by rail is constrained by tunnel height. Most forty foot reefers containers are high cube and therefore too tall for the range crossing.

Another abattoir that might be considered is Kilcoy. This abattoir does not have access to the line, but could be accommodated via an intermodal supply chain for example by transferring to a truck at Dalby or Toowoomba.

Cattle are mustered by graziers, then picked up from farms by trucks using specialised cattle trailers in high productivity (road train) configurations.

Stakeholder feedback: Quilpie to Brisbane

This section discusses feedback from stakeholders on livestock freight with some supporting feedback on bulk and container freight. Key comments by stakeholder group and region:

Quilpie stakeholders were interested in the renewal of a cattle train service. According to stakeholders the most recent cattle to be transported by rail were collected at Quilpie and delivered to abattoirs in Dinmore, Ipswich.

They spoke highly of the twice weekly service previously provided by Queensland Rail. In particular they cited the importance of having a dedicated cattle agent who liaised with farmers to arrange stock movements. In the view of the stakeholders present, cattle travel better by train from a health condition and welfare perspective. Stakeholders in Quilpie referred to a 2013 study commissioned by South West RED (Devine, 2013). The study examined South West Queensland livestock transportation from properties covering 256 000 km² of grazing land west of Quilpie. It found that 210 000 head of cattle are transported out of the study area during 'reasonable' seasons. Of these, 115-120 000 head of cattle would travel east on part or all of the Western Line / Warrego highway (Devine Agribusiness 2013, 12).

Charleville stakeholders considered rail attractive as a means to reduce the number of long haul truck journeys, and therefore the burden on road infrastructure and public safety. However, they also expressed concern about the affordability of short haul truck services needed to put livestock freight onto rail.

Roma stakeholders considered the rail network to be underutilised other than for coal freight. Participants cited opportunities for tourism trains, general freight and cattle freight to and from the (rail adjacent) saleyards.

Dalby stakeholders saw potential advantages of rail in terms of public safety and damage to roads. It was however suggested that it would be more difficult for a service to be run economically from Dalby due to shorter average journeys which are better suited to trucking. The new Toowoomba by-pass was cited as a further enhancement of the competitiveness of trucks over trains by Dalby respondents. Relatively little data is available on the potential market for movement of cattle from Quilpie to store cattle feedlots, but the Dalby respondents indicated that their new saleyards and growth in feedlots could make Dalby a destination for cattle from Quilpie.

The Dalby area is a key centre for grain and cotton production. Containerised grain and containerised cotton are alternatives to bulk shipping of commodities. Commodity containerisation allows for smaller shipments and takes advantage of the surplus of containers created by Australia's import of manufactured goods.

Industry stakeholders

An agricultural logistics provider discussed two barriers to making use of the rail for containerised freight to port. Firstly, the tunnel height on the range crossing is too

low to accommodate high-cube format containers, a container format widely used for imported manufactured goods that is abundant at Port of Brisbane (Deloitte, 2016).

Secondly, the axle load limit on the rail line is too low for grain containers filled to capacity. Grain containers currently need to be placed on partly empty dollies, which is not cost effective.

Industry stakeholder indicated that the rail line could be economical for cotton transport if these issues were corrected. One cotton industry stakeholder stated that transport to the Port of Brisbane would need to be accomplished at or below \$7 per bale of cotton to be competitive with trucking.

Themes arising from discussions:

The interface between road and rail systems was identified by stakeholders as a critical issue. They indicated that rail cannot succeed without the cooperation of the trucking industry on short haul transfer to loading points and efficient intermodal transfers. Trucking companies are a fundamental part of the transport network and the extent of their collaboration will be a determining factor in the future success of the train network. Some stakeholders indicated that in their opinion if the trucking industry did not embrace efficient short haul transport, then any economic benefit of rail could be consumed by the cost of short haul truck transport to and from loading points.

Animal welfare

Cattle travelling by train are limited to point to point destinations dictated by the line. Participants discussed road and rail transport from an animal welfare perspective. Graziers and cattle handlers at Quilpie stated that despite taking longer, the train was gentler on cattle than trucks. They reported their cattle arriving with less bruising and in better overall state.

It was suggested that trains allow more options to support animal welfare. Rail cattle yards can employ an agent who specialise in coordinating and managing animal handling and loading. If cattle are weak or drought stricken, the agent can make use of a low density 'sick bay wagon' for weaker cattle. Some participants raised a counter argument that cattle on rail have a greater overall journey time. Further study is needed to determine the relative animal welfare of road and rail options and the economic impact of injury to cattle in transit.

Stakeholders indicated that an important advantage of trucks is flexibility. Cattle can be picked up from the farm in small consignments and driven to feedlot or abattoir without the need for unloading. Trucks also allow for more destinations including access to New South Wales and South Australian abattoirs presenting broader market options.

Longer Type 2 road trains are permitted only between Morven and Roma, with Type 1 road trains permitted between there and Toowoomba. As a result, trucks are often reconfigured at Roma and Toowoomba. Truck reconfigurations do not require the

loading and unloading of cattle; this means they are much simpler than intermodal (road/rail) transfers. They can however pose a threat to animal welfare, some stakeholders stated that cattle are sometimes left for hours waiting for the changeover truck to arrive.

Trains reduce the number of trucks necessary on roads, improving road safety for all users. Study participants also spoke about the maintenance burden of trucks. Trucks and in particular high performance vehicles were perceived as being more damaging to roads and impacting on road access for the whole community, particularly after floods. Trains were considered to have less impact and provide a more reliable service under all weather conditions.

Corporate drivers – livestock freights vs coal freight

Several participants expressed concerns with regard to the current operator's attitude to freight and cattle train customers. Many felt that the current lack of trains was not due to poor demand but rather the service provider's disinterest in non-resource business. Producers and other stakeholders who attended the USQ discussions consistently expressed the view that they had not been included in discussions about the services provided and they were frustrated with the lack of consultation by the current provider.

This was consistent with comment by the Department of Agriculture, Fisheries and Forestry stakeholders who cite a perception in the agricultural industry 'that the current service provider has preferred to focus on the more profitable transport of coal and that any reduction in dedicated agricultural freight journeys offers greater ability to put coal on to major rail corridors.' (DAFF, 2014, 2015).

In some cases participants concerns were more specific. Issues raised included:

- That the current service provider only ran livestock trains if one producer filled the train to capacity.
- That it is difficult or impossible to open a new rail freight account.
- That the service provider was not interested in their freight needs.

Support to rail sector

The structure of rail freight industry support was raised by some stakeholders. It was important to stakeholders that any support provided to the industry deliver value in terms of service offering. In particular, participants would like cattle trains to be available even on routes where cattle competes for paths with high value coal or mineral freight.

The future of the line

Many participants raised concerns about the future of the line. These took several forms; in some cases participants suggested the line might close, in others that services would be too infrequent or costly to be useful i.e. the service provider 'pricing themselves out of the market.'

Conversely, some stakeholders believe that the train line has a future under certain conditions and provides the best solution to cattle transport, for certain routes and over long distances. NH foods Australia is investing in a major \$60 million expansion of their Oakey operations to align with the train line.

Railways are important community hubs.

Stakeholders indicated that tourism and passenger trains are another utilisation that could increase the frequency of services on the line. Tourism and passenger trains can also haul freight. However, the lack of flexibility with passenger services (managed by QR) and freight services (contracted to Aurizon) is a barrier to freight services combined with passenger trains. Developing a regular passenger rail option into the South West region would allow local governments and tourism operators to capitalise on the diverse array of attractions that have significant tourism potential in the region, but currently are not easily accessible to many tourists. It would also facilitate expansion of freight services if these trains were multi use, combining passengers and freight services.

Co-operative and infrastructure management

Road and rail are generally viewed as competing modes of livestock transport as are passenger and freight train services. Planning and organisation is typically focused on one mode of transport or service with the other framed as a competitor. Co-operative and collaborative enterprises have been identified as means through which shared intentions may be facilitated, such as the purchase of rolling stock to transport livestock by rail.

Co-operatives are democratic organisations formed to effect a specific common purpose. Their application to the use of rail livestock freight in the Western region is untried in the context of this report, yet their principles of collective ownership and supported production would seem to address regional connectivity and market access challenges. Co-operative business structures are varied due to the diverse potential of their application and the mutual determination of members. The USA has a tradition of short haul co-operatives, see Appendix II, USA livestock transport.

Co-operatives are not a 'one size fits all' solution but can open opportunities for local livestock farmers. Insights from stakeholder discussions reveal that large corporations are often too distanced from the needs of local farmers, and set terms which may not progress agricultural production.

Discussions with key personnel of an interstate grain co-operative confirm that the business interests of large corporations in the grain sector were disadvantaging local growers within and beyond 'the farm gate.' This metaphor is significant for identifying the limits of trade negotiations which are made only on an individual basis because, in the experience of this discussant, large corporations tend to privilege shareholder interests over those of growers. They also prefer to want ownership and control over the entire supply chain. This level of power has broader ramifications in that individual growers are generally unable to negotiate profitable returns which then has an impact on negotiations for other producers throughout the supply chain. Profitability, and potentially the long term viability, of growers is therefore reduced.

Discussions with a management representative from a large global agribusiness revealed that, while co-operative enterprise has appeal, good management is still key to its success. In this person's experience, most co-operatives were not effectively managed and would benefit from experienced management appointments. Another discussant said, however, that appointments of CEOs or the attraction of experienced board members requires a level of finance that start-up co-operatives don't usually have. The problem here is that the core business of the producer can suffer where extensive time commitments are required for managing a co-operative, especially if it is larger. This observation shows the conflict between management and production where inadequate planning has occurred.

Co-operatives and the Western Line:

A new service provider would have to overcome several challenges. In particular they would require access to rolling stock and sufficient capital (potentially from a co-operative structure) to develop above rail infrastructure such as sidings and cattle yards. Rolling stock may be new or refurbished. New rolling stock is available from manufacturers in China and India but is a more expensive option. Queensland's existing narrow gauge rolling stock used on this line is owned by Aurizon and Queensland Rail. Tasmania's rail network is narrow gauge and represents another possible point of procurement.

Accreditation for rolling stock is necessary for both new and refurbished rolling stock. Engineering requirements for accreditation should be considered carefully to ensure they are performance based and necessary for safety and performance. In some cases exceptions might be considered to allow older (more affordable) rolling stock to access the line under appropriate conditions.

Rail services need to be developed in consultation with trucking operators. Changes to rail utilisation are likely to substantially impact on the long haul trucking industry. An increase in rail utilisation would mean a change in the character of trucking from long haul to short haul transport to rail. This means a reduction in long haul truck transport but also new opportunities for trucking companies and small operators who work to understand and integrate with intermodal systems.

A smaller operator could benefit from virtual integration; that is, direct investment in rolling stock by the users of the freight network. In different models, this may mean investment by graziers, feedlots, abattoirs, trucking companies, or a combination thereof. A co-operative that owned both rail and truck assets would be well placed to synchronise the management of both assets because efficient and cost effective short haul trucking is essential to the success of cattle rail transport.

A lack of confidence in the line's medium-to-long term viability is likely to dampen demand for cattle trains as businesses are wary of integrating with services that they see as uncertain to continue. This is especially the case where doing so would require long term investment in rail infrastructure such as sidings or track-adjacent cattle yards. Similarly, third-party service providers such as container yards and freight consolidators may avoid investments.

Collaborative enterprises such as co-operatives are therefore complex however they can also play an important role where small organization wish to gain greater control by managing an infrastructure asset.

Discussion

There is ongoing public interest in long haul rail for its perceived external benefits. In its present form, rail receives financial support to offer cattle and general freight services. This is provided on a fixed fee basis through the Livestock Services Contract and the General Freight Services Contract.

There has not been an attempt to precisely value the externalities of rail against road for livestock freight transport from the South West region. An economic analysis of externalities is needed to quantify the overall public benefit received from the line. However, a comparison needs to take into account a range of conditions, such as high and low stocking rates, future impacts on urban transport systems and city commutes, markets and market drivers along with climatic conditions and animal welfare. A study by Deloitte estimated the external benefits of rail rather than road in Australia at 95 cents for each kilometre travelled by a tonne of freight. The study considered congestion, accident and carbon emissions costs (Deloitte, 2011).

Freight transport has a significant impact on its social and environmental surroundings. External costs such as road fatalities, congestion and carbon emissions are not fully captured in the market price of freight systems. These external costs are greater in the case of road transport than for rail for a given volume (Deloitte, 2011). Support may therefore enable the public to access the benefits of rail freight to a greater extent than would otherwise be possible. Identified external benefits include:

Rail offers well established advantages over road transport in terms of fuel consumption. It has been reported that trains consume only a third of the fuel trucks need to complete a freight task (Australian Rail Track Corporation, 2015). This is consistent with the common claim that rail is best suited to volumetric, long haul, point to point freight (TMR, 2013). The reduction in fuel consumption achieved by use of rail achieves a proportionate reduction in carbon emissions (Deloitte, 2011). Shifting freight to rail therefore helps Australia to meet its carbon emissions goals.

Some stakeholders supported the use of trucks because they were the most economical and flexible option, and thought that train freight should be relegated to history. However, this argument is premised on current transport times. Peak production conditions are likely to result in substantive delays to journey times, also resulting in higher costs. Further, new regulations in the trucking industry may impact on their economics, e.g. initiatives such as the requirement for relief drivers on longer journeys which characterise much of the freight transport in Queensland.

The formation of co-operative or collaborative business structures has an established history and may be a viable way for better asset coordination and to enable livestock farmers to influence changes in the Queensland transport sector by taking ownership of assets such as train rolling stock. However, a culture of individualism, i.e., self-reliance and independence, has informed how farmers understand and operate their

livestock businesses. Understanding the opportunity to provide a service that meets the needs of the community and renews interest in rail is critical if rail is to succeed as an alternative transport option. Stakeholders were clear and consistent on the service offering which would support a return to rail. This comprised three basic requirements: rail freight needs to be a regular, reliable and responsive service.

Cattle producers would prefer a **regular**, scheduled train service in order to muster and spell cattle for the journey. 'Demand based' services under the current model create challenges for forward planning. For many stakeholders, their preference would be a regular scheduled service that is guaranteed to run during the cattle season. Participants mentioned that under Queensland Rail's management, two services ran each week. This type of timetabled service helped graziers plan for stock movements.

From an operator standpoint, scheduled services are more difficult to run than 'on-demand services'. Demand for cattle freight is variable. Reliably filling a scheduled service requires a high level of engagement and coordination with customers. There is some evidence of this type of engagement prior to privatisation. Stakeholders spoke highly of a booking agent who was proactive in coordinating stock movements with graziers. In the long term, an operator willing to offer scheduled services is likely to benefit from increased patronage. Many stakeholders indicated that they would use the rail if they 'knew the train would run.'

Reliability is more important for livestock than for other freight. Cattle are living animals requiring care, and this is expensive and difficult when services are delayed due to maintenance or breakdown. Reliability therefore, is important both to reduce economic costs and to ensure animal welfare throughout the supply chain. Reliable services require the use of quality rolling stock and well maintained tracks. Options to lease or buy rolling stock might be incorporated into the agreement with the service provider to ensure that services are sufficiently reliable for live freight. Similarly, container movements need to be carefully coordinated to ensure that the right containers are available at the right locations. Locating skilled staff in regional locations may help to manage container logistics.

Cattle rail freight needs to be **responsive** to market conditions and requirements. Total journey cost needs to be at or below trucking freight rates to retain the interest of users. Rail freight benefits from greater fuel efficiency but must contend with high price per kilometre short haul trucking fees, spelling costs and the costs to build and maintain rail access infrastructures such as points and sidings. There is a need for a further inquiry into the scale and character of livestock movements in the South West, including movements from Morven rail and movements from saleyards. Roma saleyards sold over 370 thousand head of cattle in the 2014/15 financial year (Maranoa Regional Council, 2015). This scale of operation at least raises the question of whether rail could be an efficient part of transport to and from the saleyard. Further research on cattle movements would build a clearer picture of the demand for cattle transport that could viably be serviced by rail.

Productivity and growth are important to Queensland's agricultural future. This report has sought to outline existing conditions for rail livestock freight operations in South West Queensland and inform approaches for their review and recreation. We conclude by making the following recommendations to inform future debate.

Recommendation 1- Transport systems integration

Agricultural rail transport is usually intermodal; most stock and produce needs to be trucked to loading points. As part of an intermodal system, rail transport depends upon efficient transfers to and from other transport systems.

Therefore it is recommended that the Queensland Government consider a whole of system approach to transport systems development including consultation and collaboration across modes of transport. In particular, the value chain group recommends collaboration between the rail and trucking sectors to develop efficient short haul and intermodal services.

Recommendation 2 - Service

During stakeholder consultations similar criteria for service were raised by participants in different locations. Based on these, the Value Chain Group developed the recommended service criteria: **regular, reliable and responsive**.

It is recommended that the regular, reliable and responsive KPI's and criteria guide the evaluation of offers for the transport services contracts.

Recommendation 3 - Booking Agent

According to stakeholders, staff who were part of the local community were effective at collaborating with graziers to combine smaller consignments into full trains.

The Value Chains Group recommends that the Queensland Government consider favourably proposals that include staff, and in particular a cattle freight booking agent, based at the Western end of the line to ensure *regular, reliable and responsive* train services.

Recommendation 4 – Advisory Group

A rail freight advisory group comprised of regional representatives could facilitate better communication between livestock providers and livestock users and provide feedback to Government on the provision of regular, reliable and responsive rail services.

The Value Chain Group recommends the formation of a regional South West agricultural freight (livestock, bulk and container) advisory group.

Recommendation 5 – Consultation and transparency

Freight service users consulted were worried that they did not know what services were guaranteed under contract.

It is recommended that community consultation be undertaken to ensure freight users understand what services they can expect under the transport services contract and the providers performance measures. Greater transparency and community

consultation may lead to a better understanding of cattle freight rail services, and better adoption. It would also open a valuable line for feedback on service provision, enabling better and more viable services in the future.

Recommendation 6 – Service provider

Many stakeholders suggested that high volume coal freight is more lucrative than agricultural freight. If this is the case a freight service provider with an interest in both freight types may have a profit incentive to focus their efforts on coal. An agricultural freight provider who does not have an interest in coal transport would not have to prioritise resources between coal and agriculture and may therefore be able to offer a solution which is more *responsive* to the needs of agricultural stakeholders.

The value chain group recommends that, where possible, transport services contracts be awarded to a service provider that is focused on developing services for the agricultural or general (non-resource) sectors.

Recommendation 7 -- Infrastructure

Private rail infrastructure such as sidings and cattle yards are a long term investment. Therefore risk-averse businesses will be reluctant to invest in rail infrastructure without assurance that regular, reliable and responsive services will continue for long enough to recoup the cost of infrastructure.

The planned Toowoomba range crossing tunnel upgrades and access to cattle yards and other rail services are considered to be critical to the economic viability of the South West train line.

It is recommended that the Queensland Government provide details of the access to assets, schedules for upgrades and other infrastructure and rolling stock resources for potential service providers.

Recommendation 8 -- Asset sharing

Investment in private rail infrastructure may be encouraged either directly through matching investments, or indirectly by providing clear guidance on the long term future of the rail. This approach would enable freight users to make long term choices such as the construction of sidings.

Tourism and passenger trains can also haul freight. However, the lack of flexibility with passenger services (managed by QR) and freight services (contracted to Aurizon) is a barrier to freight services combined with passenger trains. It is recommended that

- Arrangements be made to provide prospective service providers and other rail users with affordable access to accredited rollingstock. In particular, asset sharing might be considered as a means to promote the efficient use of rolling stock. Asset sharing or a fixed term lease from another service provider might be considered as a means to promote the efficient use of rolling stock.

- The Queensland Government facilitate discussions with potential providers to explore collaborative or co-operative service provision of rail freight services.
- A sub-contracting arrangement be developed with passenger and tourism train providers to facilitate the expansion of freight services.

Recommendation 9 -- Performance indicators

The proposed 'availability' KPI is an effective means to correlate pricing with performance because it ensures support is only provided when the community receives the benefit of the train service.

Key performance indicators based on volumes are however difficult in the case of agricultural freight. Annual demand for freight can double or halve based on weather conditions. A possible alternative is to adjust KPIs based on agricultural production or to set targets as a portion of modal share.

Appendix 1 - Container transport

Containerisation was developed after World War II in an effort to improve intermodal transport. Placing goods in a system of standardised containers greatly improved efficient transport of non-bulk freight by allowing loads to be efficiently transferred between land, sea and rail modes of freight. It also enhances security, as valuable cargo could no longer be easily identified.

Standardised shipping containers are now used for 90% of international non-bulk freight. Markets have also developed for container shipments of bulk freight such as cotton and grain (Agriculture Victoria, 2014). Containers allow for smaller shipment sizes and simpler handling.

Shipping containers are commonly available in two footprints, twenty foot and forty foot (ISO 668, 2013). Twenty foot containers are 33mm shorter than twenty feet. This allows for two twenty foot containers placed end to end with a small gap to have the same footprint as a forty foot container. Containers can be stacked upon containers of the same size and twistlocked in place. One forty foot container can be stacked upon two end to end twenty foot containers. However, twenty foot containers cannot be stacked onto forty foot containers; the midsection of a forty foot container does not include a casting to support them.

The capacity of containers is limited by both weight and volume. It is important to note that, while a forty foot container can carry twice the volume of a twenty foot container, both container sizes are limited to 30 tonnes gross weight. (Export Council of Australia, 2016). This means that, dense loads such as grain are more efficiently packed in twenty foot containers.

There are two common height variants, standard (2.36M internal height) and high cube (2.69M internal height). Forty foot high cube containers are increasingly common while twenty foot high cube containers are rare (Deloitte, 2016).

The high cube variant allows for approximately 15% additional internal volume. It does not however allow for additional weight. High cube containers are subject to the same maximum weight restrictions as their standard height equivalents.

Refrigerated containers ('reefers') are widely available. These have the same external dimensions as dry cargo containers but include an integrated cooling system for the transport of chilled and frozen cargo. Reefers can be powered externally (shore power) or by an integral or detachable diesel generator (genset) (Deloitte, 2016). The most common *reefer* is the forty foot high cube variant; the additional height of the high cube format is ideal for modifications to enhance circulation and cooling.

Appendix II - USA short line freight and collaborative enterprises

This Appendix discusses three rail freight case studies by considering US rail enterprise case examples that focus on the needs of farmers. While the most common method of beef cattle transportation in the United States (US) is by truck (Cottle and Kahn, 2014), the section reviews three case examples which suggest that co-operative, or collaborative, railroad facilitation may help to reconceptualise freight rail transportation and ownership in Australia, and potentially re-create viable livestock rail operations in the Western region of Queensland.

Since the early 1800s rail has played a significant role in the industrialisation of the US, with government land grants laying the foundations for private ownership of US rail networks in the late 19th Century (Library of Congress, n.d.). Until the rise of commercial aviation and the popularity of automobile transport (Dovell, 2012), the US agricultural sector utilised long established networks of privately owned rail, both track and rolling stock (O'Reilly, 2011). Private ownership, here, refers to corporate entity structures, which remain the dominant form of freight rail ownership in the United States (Transportation Research Board, 2009). By contrast, passenger rail services are partially funded by the government and have been operated by the National Railroad Passenger Corporation, trading as Amtrak, since the early 1970s (Amtrak, 2011).

Both freight and passenger rail most often operate on a track share basis with the inherent limitation of speed variations between these two modes—rail freight limits are set at 49mph (~80km) and passenger rail at 59mph (~95km). Rail congestion is common and has been noted as preclusive to the introduction of rapid transit passenger services (Grunwald, 2014), with around 70% of tracks owned by 'host railroads' that have usage and maintenance charges to Amtrak (Amtrak, 2011).

Indeed, the Freight Rail Customer Alliance, a US alliance of freight rail shippers have come together to protest against rising freight costs and other unreliable services. Such is the tenor of their discontent that the call has been made to remove the freight rail industry's exemption from the US antitrust, or 'open market' competition, laws, purportedly destabilising the current monopoly of large scale rail operators (Piersol, 2015). Nevertheless, the US\$60 billion freight rail network is acknowledged as one of the 'most dynamic' in the world, and freight rail companies continue to privately build, maintain, and reinvest in North American freight rail infrastructure (Grunwald, 2012).

Variations in freight rail infrastructure and local services

The US agriculture industry began as a collective of smaller growers, farmers with varied products whose interests were eventually consolidated through farming specialisations (O'Reilly, 2011). Railroads adapted to these specialisations, and crucially, following the deregulation of the rail industry through the Staggers Rail Act

of 1980, an industry which had been tightly regulated since the late 19th Century, decreased their services over time from over forty to only seven major (Class 1) operators by 2011 (O'Reilly, 2011).² The contraction of Class I railroads influenced the re-emergence of short line (Class III) railroads which continue to maintain flexible freight relations with often transport 'captive' farmers whose transport choices are non-existent or limited. To expand,

[s]hort lines serve the larger railroads by collecting and distributing railcars to individual industrial and agricultural shippers and receivers. They provide a critical service, particularly in lower-density rail corridors and markets where the larger railroads cannot operate cost-effectively. From a historical standpoint, many of the nation's short lines operate on branches previously owned and operated by the Class I railroads (Texas Department of Transportation, 2015, 2-2).

In this way, short line railroads operationalise to meet the needs of farmers and agriculture clients, such as processors, rather than expect them to adapt primarily to larger railroad imperatives. While Class 1 operators can provide shorter line services, short line railways are said to be more adaptable and flexible to the needs of their clients, as well as time efficient in product transfer. It is the short line rail collaborations with farmers that build sustainable relationships between 'captive' farmers, local communities and larger railroad operators (O'Reilly, 2011). Notably, short line and regional (Class II) railroads operate 38% of the entire rail network in the US (ASLRRA, 2016).

From these brief but key insights into US freight rail operations, it is evident that governance structures that support deregulation inform both Class 1 freight rail operations as well as grower negotiations of them. But how have alliances emerged which harness the benefit of the freight rail industry's diversely organised infrastructure and on what basis do they operate?

The emergence of collaborative enterprise in the US

There are a number of ways in which farmers can collectively maximise alliances and a common method is through the entity structure of a co-operative. Farmers' co-operatives in the US have a combined payroll exceeding US\$8 billion and provide over 250,000 jobs. It is a vast network, with most of North America's two million farmers belonging to at least one co-operative (National Council of Farmer Cooperatives, 2016). The major representative body is the National Council of Farmer Cooperatives (NCFC) which seeks 'to advance the business and policy interests' of farmer cooperatives and farmer-owned enterprises. It has four core values:

- Farmer ownership and control in the production and distribution chain
- Continued economic viability of America's farmers, ranchers, and the

² The Class of a railroad is determined by its annual revenue, with three Classes currently existing. A Class II railroad is termed a regional railroad, for example, with revenues in the mid-range between Classes I and III (Texas Department of Transportation 2015).

- businesses they own
- Stewardship of natural resources
- Vibrant rural communities.

From within these values issues affecting farmer and farmer-owned enterprises are addressed, with significant attention paid to legislative and regulatory issues.

While there are many internal structures for co-operatives (Mazzarol et al, 2014) most co-operatives are based on egalitarian principles of one member having one equal vote in the decision making process rather than a hierarchical shareholder structure such as that found in corporate entities where the majority shareholder generally holds the balance of power (Mazzarol et al, 2014). As noted above, New Generation Co-operatives (NGCs), or those emerging since the 1970s (Hackman, 2001), were originally 'used in the value-added processing of agricultural commodities ... for producers interested in collectively adding value to their commodities' but have been more broadly applied across the US (Hackman, 2001).

The case examples that follow, then, outline key concepts and structures informing the resurgence of interest in smaller short line railroads as *responsive* to 'co-operative,' or collective, enterprises.

Case example 1: Texas Short Line Rail

Texas has a majority of short line railroads, several of which are owned by the Texas Department of Transportation (TxDOT, 2015). These short lines connect local agriculture products with Class I routes and receive Class I freight for final distribution (TxDOT, 2015). As noted above, beef cattle are generally shipped by truck in the US. This is most likely due to the occurrence of most cattle being farmed in the central Great Plains and the long distances between the various components of the supply chain, such as feedlots and processing plants. These are better serviced by truck, and the beef industry has abandoned the use of freight rail services (Cottle and Kahn, 2014). However, numerous agriculture freight railroads also form a transport network that carries a range of products including sand, crude oil, grain, plastic, rock, aluminium, chemicals, animal feed, fertiliser and so on (TxDOT, 2015). This excerpt from a recent rail industry report provides the following operational details for the South Orient Rail Line (SORR).

The SORR is a TxDOT-owned facility that runs from Presidio, on the Mexican border, to San Angelo Junction. It was constructed to interchange with Ferromex at Presidio, but the Presidio-Ojinaga International Rail Bridge is not currently operational. The line interchanges with Union Pacific Railroad at Alpine and with BNSF Railway and the Fort Worth and Western Railroad at San Angelo Junction. Texas Pacific Transportation Ltd. (TXPF) operates over the South Orient Rail Line under a lease and operating agreement with TxDOT (TxDOT, 2015, 2-8).

The current TxDOT and SORR Lease and Operating Agreement provides for the lessee to have ‘management and control of the operation and maintenance of the Rail Line (including railroad bridges and trestles, culverts, structures, signs, road crossing signals, crossings, and lighting),’ along with equipment and car repair and maintenance so as to facilitate a regular service which complies with the rules and regulations of the Federal Railroad Administration (TxDOT, 2001, 7-8). Just over a third of line improvement and upgrade costs were to be provided by the Lessee at a cost of US\$1.4m (TxDOT, 2011, 1).

SORR currently ships large quantities of sand from an increase in the area’s oil and gas exploration, but the intersection with Class I operators, such as Union Pacific, shows how local producers can benefit through access to export through transcontinental railroads and the receipt of goods from elsewhere.

Another example is a mixed use service owned by the Watco Companies which owns thirty two short line rail services. Watco operate the San Antonio Central Railway (SAC) with the Port San Antonio’s East Kelly Railport by switching service off the Burlington Northern Santa Fe Railway (BNSF) and Union Pacific lines—SAC operates freight rail at night, while passengers use the train during the day.

Case Example 2: Ohio Central Railroad System (OHCR)

The business model for Class I railroads has been likened to wholesale operations which ship large and often varied types of cargo, while Class III short line railroads are like retailers who ship or collect single carloads of goods (Baldwin, 2002). The Ohio Central Railroad System, now owned by Genesee & Wyoming (G&W) (Ohio Rail, 2010), was originally made from nine smaller railroads that were all but abandoned. The company began operations in 1988 and reinvigorated the railroad over time through ‘aggressive marketing,’ and only twelve years later grew freight volume by over thirteen times (Baldwin, 2002). Its cargo includes coal, steel and stone (Genesee & Wyoming Inc., 2010).

As well as the benefits of flexibility for local clients and connection with Class I railroads, the option of using OHCR rail *or* truck transport in the region has increased competitive pricing and efficiency between the two modes. A reduction in the use of trucks for certain kinds of freight has also contributed to an increase in the quality of life of local communities where environmental and safety problems had existed. Road maintenance costs were also reduced through the use of short line rail in Ohio (Baldwin, 2002). These benefits are no doubt echoed throughout the US where transportation options are in effect.

OHCR’s parent company G&W³ owns approximately 20% of short line railroads in the US (Dynamic Equity, 2015), and claims a business model which is about ‘being close

³ Genesee & Wyoming, Inc. owns and operates short line and regional freight railroads and provides railcar switching and other rail-related services in the United States, Australia, Canada, the Netherlands and Belgium. It operates through the following segments: North American Operations, Australian Operations, and U.K./European Operations. The North American Operations segment includes nine operating regions that serve forty one (41) U.S. states and four (4) Canadian provinces. The Australian Operations segment provides rail freight services in South Australia, the

to customers with entrepreneurial decision-making unchanged' (Hellman, 2014, 37). In practice, this means that G&W effectively employs the 'local knowledge' of its acquisitions to facilitate freight transactions for local contexts. While clearly a business built from capital investment and public shareholding, G&W also exhibits many of the characteristics of a virtually integrated business through its dependence on the local knowledge and networks of the short line railroads it has acquired.

But the state of Ohio has heavily invested in multimodal transportation routes which typically utilise air freight, maritime, highway, and rail to maximise options for the movement of containerised and bulk freight. Another method is through intermodal transportation, and while often used interchangeably with multimodal, the aim with intermodal freight is to connect 'different modes into a seamless transportation system through use of efficient transfer terminals' (Ohio Rail, 2010). The movement of non-containerised freight is often referred to as 'transload operations' which affords clients with limited or no direct access the benefits of rail transportation (Ohio Rail, 2010).

In order to plan for the successful execution of intermodal transportation, it would appear that seamlessness is best achieved by transferring uniformly organised freight across a range of transport modes. Importantly, the application of local knowledge within an overall infrastructure of wider connectivity is key (Ohio Rail, 2010).

Case example 3: GoRail – Advocacy from the 'grass roots'

GoRail is fundamentally an advocacy network which lobbies for the use of rail over other freight transportation in the US. Its aim is to bring together rail stakeholders, community leaders and the public to support improved rail transportation. Working with the principle of 'all politics is local,' through anecdotes and local stories GoRail advocates the views of local communities to Congress, and facilitates communication between railroads, rail supply companies and community leaders (GoRail, 2015). GoRail's view is that comparatively small public investment in new rail is in the interests of the public good through improved local economies and quality of life.

Significantly, the combination of both advocacy and network building draws together a number of railroad organisations as well as users. Some of these organisations are the 'back story' to the supply chain, enabling the construction of the infrastructure as well as its use. Hearing from railroad suppliers, for example, which 'build the rail cars and locomotives; produce the train wheels, steel rails and crossties; conduct high tech research and development; and provide all the goods and services needed to run a railroad' (GoRail, 2011), opens out understandings of what makes up a supply chain from its interior detail.

A brief scan of railroad supply members shows wide support from diverse industries, including steel, automotive, forestry, telecommunications, digital infrastructure,

Northern Territory and New South Wales. The U.K./European Operations segment handles the majority of the operations of Freightliner Group Limited. The company was founded on September 1, 1977 and is headquartered in Greenwich, CT. Source: SeekingAlpha, 'Company Description – Genesee & Wyoming,' <http://seekingalpha.com/symbol/GWR>

property, crane and haulage, mechanical, building, as well as numerous rail transportation companies (GoRail, 2011).

It is speculative whether this broad advocacy approach could be useful in an Australian context where private rail ownership is not the main form, and public investment is comparatively high (Department of Infrastructure and Regional Development, 2016). Would it, for example, be useful to understand the supply chain role of an organisation that focuses on 'crane rebuilds, emergency derailments, track construction and maintenance, bridge span repair, railcar maintenance and relocation, heavy equipment transfer and recovery, as well as load adjustment and transfer' (GoRail, 2011)? Creating a 'network of interrelationships' through one entity may, however, open co-operative or collaborative avenues within an agricultural supply chain system which is fundamentally based on competition (Mawson et al., 2014).

Summary of key points

- United States railroads are predominantly privately owned, operated and maintained, with a monopoly of seven major, or Class I, operators
- The US beef industry transports livestock by truck, not rail
- Deregulation of the US rail industry influenced the re-emergence of short line, or Class III, railroads which connect with Class I on an as needs basis
- Short line railroads operate 38% of the entire rail network in the US
- US freight and passenger railways share the same tracks, often with congestion problems
- Co-operatives are common in the US, with most of the two million farmers belonging to at least one co-op
- New Generation Cooperatives sell delivery rights for start up funding
- Mixed use and mixed commodity rail is common in short line transportation
- Short line rail intersects with Class I lines to maximise trade options
- Short line rail can also collect single carloads of goods
- Competitive pricing can be facilitated by multimodal transport, such as using both rail and truck
- Multimodal transport includes air freight, rail, truck and maritime
- Local communities benefit from rail transport economically, environmentally, and socially
- Local knowledge is important for short rail businesses
- Application of local knowledge within wider connectivity is key
- Diverse networks exist which bring together rail stakeholders such as community leaders, government, local communities and rail suppliers
- Frameworks to create a 'network of interrelationships' through a single entity may facilitate new understandings of agricultural supply chains from industries not involved in agriculture.

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