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The Impact of ESCAS on Generating Surplus in the Australian Livestock Export Chain[1]

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Abstract

Partially due to public perception pressures, and partially due to international standards to export live animals, the Australian livestock export industry has many government-enforced and self-imposed regulations. These were heightened in 2011 after the temporary suspension of the cattle trade to Indonesia in the wake of footage aired by the Australian Broadcasting Corporation (ABC) uncovering inhumane treatment of Australian cattle in that market. As a consequence, the Exporter Supply Chain Assurance Program (ESCAS) was developed. This study aims both to assess various value chain models to measure the effectiveness of ESCAS in generating supply chain surplus for the Australian livestock export industry and to provide the background research to conduct a full value chain assessment. The study includes a literature review on the various means of conducting value chain analysis, and determines that a contemporary model is likely to be the best approach. The foundation research utilises existing findings on the cost of regulatory compliance; assesses previous research on animal welfare; analyses international livestock trade data; and conducts an original industry survey. The conclusion is drawn that while ESCAS reduces value chain surplus through higher economic costs, it enables the industry to continue to ship livestock to overseas markets. This access also assists to improve public perceptions and the social licence to operate, and therefore results in ESCAS being effective in generating value chain surplus.

Keywords: Animal welfare, effectiveness, ESCAS, livestock export, value chain surplus.

Introduction

The Australian livestock export industry is an important economic contributor to Australian agriculture, valued at $2 billion annually, and responsible for employing over 10,000 people (ALEC, 2018).

The global livestock export industry exists for three main reasons. Firstly, some countries are not self-sustainable in meat production and prefer importing the whole animal so they can utilise the offal and hides in addition to the meat. Secondly, due to religious preferences for livestock slaughter, some countries prefer to conduct the process themselves within their own cultural mores. Thirdly, some

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developing countries do not have the infrastructure or cold chain storage capacity to handle meat requirements solely in the boxed form (LiveCorp, 2018).

Largely due to the length of voyages and time at sea there are numerous Department of Agriculture regulations in place to ensure livestock are shipped to standards (Deards et al., 2014). These regulations were strengthened in June 2011 in response to public discontent related to television footage of the inhumane treatment of Australian cattle in some Indonesian abattoirs. The Australian government temporarily suspended shipments of cattle to Indonesia until new measures for animal safety were implemented. The result was the Exporter Supply Chain Assurance System (ESCAS) (Coombs and Gobbett, 2014). ESCAS was then developed over a six-week period and trialled in Indonesia in response to the ban. It was gradually rolled out to most Australian livestock export destinations in 2012 (Department of Agriculture, 2015). ESCAS was intended to guarantee that Australian feeder and slaughter cattle are treated in accordance with international animal welfare standards and to provide an instrument to control animal welfare issues when they arise, and ultimately prevent the need for other potential future trade suspensions (Deards et al., 2014). Before ESCAS, Australia had rigorous systems for controlling animal welfare from farm gate through to the animals arriving in the importing market. ESCAS extended that system, necessitating exporters to account for the treatment of livestock from arrival in the importing destination until slaughter (Department of Agriculture, 2015).

In 2016, another quality assurance program, the Livestock Global Assurance Program (LGAP), was proposed (MLA 2015, 2017a, 2017b, 2017c), but as of the time of writing this program has been not implemented. This is a welfare certification program independent of both government and the live export industry.

While ESCAS enabled the trade to resume, a downside is that the regulations have added an average $9/head in costs to the cattle value chain, and $0.77/head to the sheep chain (Department of Agriculture, 2015). There has been value chain research conducted in the past assessing ESCAS in the livestock cattle export chain. The conclusions were that ESCAS benefits animal welfare standards, but negatively impacts facilities, information, transport and pricing drivers, resulting in reduced chain surplus; and the chain needs to remain competitive through minimising costs and increasing responsiveness in order to allow strategic alliances (Nama and Griffith, 2017).

There was also research completed by the Australian Farm Institute on the competitiveness of the Australian live export industry which determined that there is a requirement for trade participants to engage with government to improve transport infrastructure and develop an understanding of the changes occurring in countries with rapidly growing populations and consumer wealth; and for research to identify ways to maintain world leading animal welfare standards, but at minimal cost (Keogh, Henry and Day, 2016).

Since the release of the aforementioned publications, a number of developments have occurred in the livestock export industry, including a revision to the stocking densities of sheep exported to the Middle East over the northern hemisphere summer. This was in response to over 2,500 sheep dying of heat stress on a voyage to Qatar in August 2017 (Worthington and Sweeney, 2018). As a consequence of the limited volumes from Australia this year, Qatar, a country that previously only sourced Australian sheep, have now commissioned purchasing 80,000 Somaliland sheep to fill the void during the Eid al-Adha festive season (Arab Times, 2017). These sheep will not be subjected to the same welfare guidelines required under the ESCAS program (Keogh, Henry and Day, 2016). Furthermore, among other developments, Vietnam became a major live export destination for Australian cattle in 2016, which was after ESCAS was enforced (Petrie, 2016).

Gaps in past research include an assessment of value chain surplus since the previously noted changes to the trade occurred; a thorough review of international livestock trade flows; and a broader consideration of both economic and non-economic factors.

Aims and Methods

The aims of this project were twofold. The first aim was to research methods for conducting a full value chain assessment on the effectiveness of ESCAS on generating supply chain surplus in the livestock export industry, and propose the best approach to conduct the assessment. This was accomplished through a literature review.

The second aim was to conduct a preliminary assessment of the *effectiveness* of ESCAS on the live export value chain for Australian sheep and cattle, where *effectiveness* is defined as the amount of supply chain surplus generated, and is proposed to be measured through changes in welfare, trade patterns and costs of compliance. This was achieved through analysing secondary data and collecting primary data through a small industry survey (University of Melbourne, Ethics approval ID no. 1852624).

The small industry survey was targeted at people that have intimate knowledge of the industry that can provide a well-grounded opinion of the impacts on factors that cannot be found through current literature or trade data. These elements are to include social and political aspects of the trade, which again will complement the previous findings to provide an indication of the effectiveness of ESCAS. The interviews were intended to take up to 60 minutes. Appendix I outlines the interview questions.

The number of participants was 10, sufficient to remove any biases in opinion. Due to the relatively small number of professionals in the industry, and limited timeframe to conduct the research, any greater number was thought likely to be difficult to obtain. With regards to targeted personnel, the authors had a large network of industry contacts from previous employment to be called upon for the survey.

The information was then synthesised and consolidated in the results section. Areas for further investigation were identified and discussed with potential further steps.

Literature Review

This review provides an overview of the livestock export supply chain to provide context for the remaining assessment; determines means of measuring and capturing supply chain surplus; identifies gaps in the literature; and suggests the best approach for assessing the effectiveness of ESCAS on generating surplus in the Australian livestock export industry.

Background

Supply chain overview

Supply chains comprise all members involved, directly and/or indirectly, in meeting a customer's request; and this includes manufacturers, transporters, retailers and consumers themselves. The ultimate goal of any supply chain is to grow surplus, or in other words, generate value (Chopra and Meindl, 2013). The basic calculation to measure the chain surplus, or value generated, is by subtracting the supply chain cost from customer value. As defined by Chopra and Meindl (2013), the only source of revenue in any supply chain is the customer. All other cash exchanges are funds moving within the supply chain.

In order to work effectively, there is a constant flow of product, information and money between each stage of the supply chain, and these flows can occur in both directions. The chief purpose of supply chains is to meet customer needs and in doing so, generate a profit (Kaplinsky, 2010).

Supply chain drivers

The key drivers of supply chain performance are grouped as i) logistical drivers, which are inventory, facilities and transportation; and ii) cross-functional drivers, which are sourcing, information and pricing. The primary objective is to organise the drivers to realise the desired level of responsiveness at the lowest cost, and in turn, enhance supply chain value (Chopra and Meindl, 2013). The key logistical drivers are:

- Facilities – the physical location in the network. The actual location and capacity of the facility are two highly influential factors on responsiveness (Walker et al., 2008). In livestock exports, this includes farms where sheep and cattle are produced, quarantine yards in the departing country and importing nation, and the abattoir;
- Inventory – includes resources. Responsive supply chains will have greater inventory levels, and vice versa for an efficient chain (Walters and Lancaster, 2000). Due to the cost of feeding livestock in quarantine facilities, the livestock export chain is efficient, as they are typically sourced on an as needs basis; and
- Transportation – encompasses physically shifting items along the supply chain (Roper and Love, 2008). For the livestock export industry this includes ships, and trucks.

The key cross-functional drivers are:

- Information – comprising of analysis and data from the three logistical drivers, along with prices, costs and customers involved in the supply chain. According to Chopra and Meindl (2013), information is potentially the most influential driver of performance in supply chains. In the livestock export industry this includes information on the number of animals traded, prices sold, and wet market / consumer prices;
- Sourcing – considers the parties that will conduct certain chain activity, including each of the aforementioned drivers. Decisions made regarding sourcing can have a major influence of a supply chains efficiency and responsiveness (Dekker, 2003). This includes farms and distance from the quarantine facilities in Australia; and
- Pricing – stipulates the amount charged for the goods produced in the supply chain (Kaplinsky, 2014). Pricing influences buyer behaviour, market share and target market, with items sold in more responsive supply chains typically at a premium to efficient chains.

Each of these drivers interact with each other to determine supply chain surplus, and good management involves closely analysing each driver to enhance surplus (Chopra and Meindl, 2013).

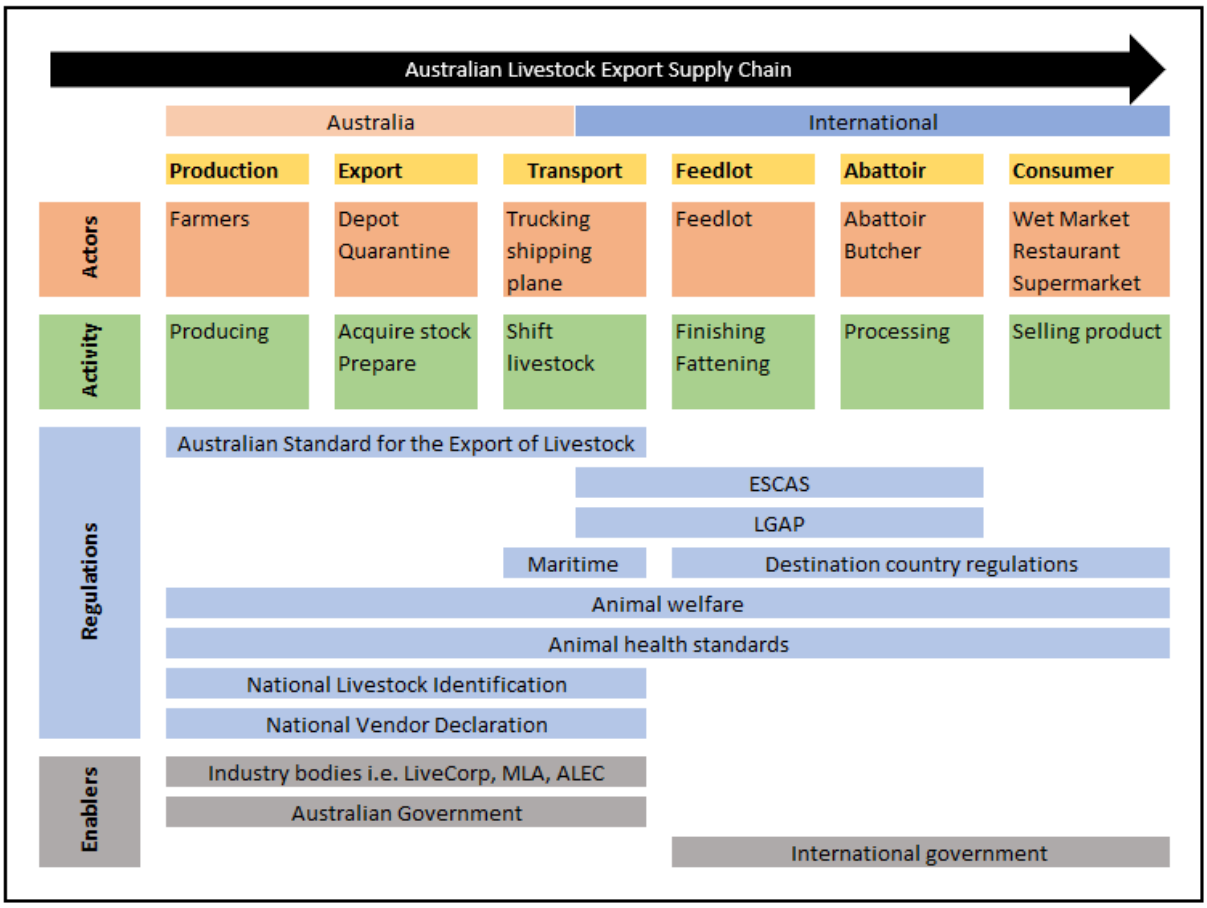
Supply chain enablers

Coordinating a complete value chain requires enablers in order to reach strategic goals. Enablers can include financial performance, information sharing technology and platforms, and government regulations to ensure fair and ethical trading (Chopra and Meindl, 2013). The regulations, in particular, are of critical importance in international trading due to the varying laws between countries, tariffs, biosecurity, currency fluctuations and cultural and language barriers (Essaji, 2008). Therefore, while considered an impediment in some instances through reducing responsiveness, regulations are also considered important to enable value chains to act.

The livestock export supply chain

The Australian live export value chain is summarised in Figure 1.

Figure 1. Australian livestock export supply chain



Source: LiveCorp (2018), Department of Agriculture (2015), Nama and Griffith (2017)

Unlike many meat export value chains operated by large multinational trading companies, this chain is unusual in that there is not one company that is solely involved in all activities of the supply chain; therefore, there can be commercial challenges where individual parties act in their own best interest, and not for the greater good of the entire supply chain (Nama and Griffith, 2017). This is particularly the case for information sharing. Similarly, as a result of trading in multiple countries, with different animal welfare and religious laws, and biological controls, there are many regulations in place to minimise the risk of any of these influences impacting the trade (Department of Agriculture, 2015).

Measuring supply chain performance is of critical importance to all industries, and justified theoretically by Gunasekaran et. al. (2004) as improving profitability and productivity. Performance metrics play an important role in objective setting, performance evaluation, and determining future strategic direction. These findings are supported by Baldauf et al. (2003), through their conclusions that evaluating value chain performance is one of the most important issues in management in the new economy, and has significant benefits to company and industry market value.

Further research concludes that supply chains lack valuable indicators of performance for decision making and benchmarking, as they rely solely on financial indicators (Beamon, 1999). Similarly, Gunasekaran et al. (2001) determined that there are very few balanced approaches to measuring the value captured in supply chains, other than straight financial indicators. With regards to the Australian livestock export chain, this shortcoming is further exacerbated by the political and social pressures, which in turn are major determinants of the regulations (Department of Agriculture, 2015).

Supply chain measurement

There are multiple means of measuring the value generated in a supply chain.

Balanced Scorecard Approach

The Balanced Scorecard (BSC) approach involves conducting literature analysis, case study research, and interviews. Bigliardi and Bottani (2010) argue that the benefits of this approach are a structured approach for measuring financial and non-financial drivers in food supply chains. Furthermore, it is concluded that a BSC model could be developed and utilised to create performance indicators. Kaplan and Norton (2001) conclude that the exclusive reliance on financial measures to determine the effectiveness of generating supply chain surplus are insufficient. Accordingly, financial indicators were determined as lag indictors that report on outcomes of past actions. Additional conclusions are drawn that solely relying on financial indicators inhibits long-term performance for short term gains. The major benefits of the BSC approach is that it maintains measures of financial performance, and supplements them with measures on the drivers of future performance.

One of the benefits of the BSC approach for measuring supply chain performance is that it is a non-prescriptive framework with a small number of performance measures to focus on – including five central topics – strategies, objectives, targets, information feedback, and reward structures. Wongrassamee et al. (2003) concluded that despite there being merits of this system, it is difficult to perfectly match performance measurement frameworks with industries and organisations. Furthermore, Sim and Koh (2001) support the benefits of BSC, as they serve as a "dashboard" and provide guidance to better serve employees and customers. Their findings determined that supply chains that measured performance and have strategically linked their objectives to BSC objectives perform better than those that do not. Attributes of the BSC that could be used for the livestock export value chain analysis are interviews due to the research gaps, and the literature review.

A Conceptual Performance Measurement System

Another commonly used performance measurement in agri-food supply chains is the conceptual model for performance measurement. Studies conducted by Aramyan et al. (2007) in the Dutch-German tomato supply chain concluded that a framework comprising of efficiency, flexibility, responsiveness and food quality is useful in measuring performance. Conclusions are also made that the system is valuable in measuring supply chains that contain financial and non-financial indicators.

An additional merit of the conceptual performance measurement system is that it is effective in supply chains containing multiple actors with conflicting goals, like the Australian livestock export supply chain. According to Van Hoek (1998), each actor has its own performance indicators, and these do not bode favourably to the entire supply chain because an individual's performance can be consequential on the other actors up and down the supply chain. These conflicts limit the amount of information shared, and the overall value captured by the chain (Wijnands and Ondersteijn, 2006). However, as explained by Bowersox and Closs (1996), greater co-operation usually leads to win-win situations, with clearer, more accurate, information shared, which increases the likelihood of supply chain success.

There have been many studies conducted in the past across multiple industries to develop conceptual supply chain performance measurement systems, including:

- Van der Vorst (2000) in logistics, focussing on the supply chain level (e.g. delivery reliability, product availability, and total supply chain costs), the organisational level (e.g. throughput time and total organisational costs), and the process level (e.g. throughput time and process costs);
- Li and O'Brien (1999) in manufacturing, who proposed models aimed at enhancing effectiveness and efficiency centred on lead-time performance; waste elimination; profit; and delivery responsiveness;

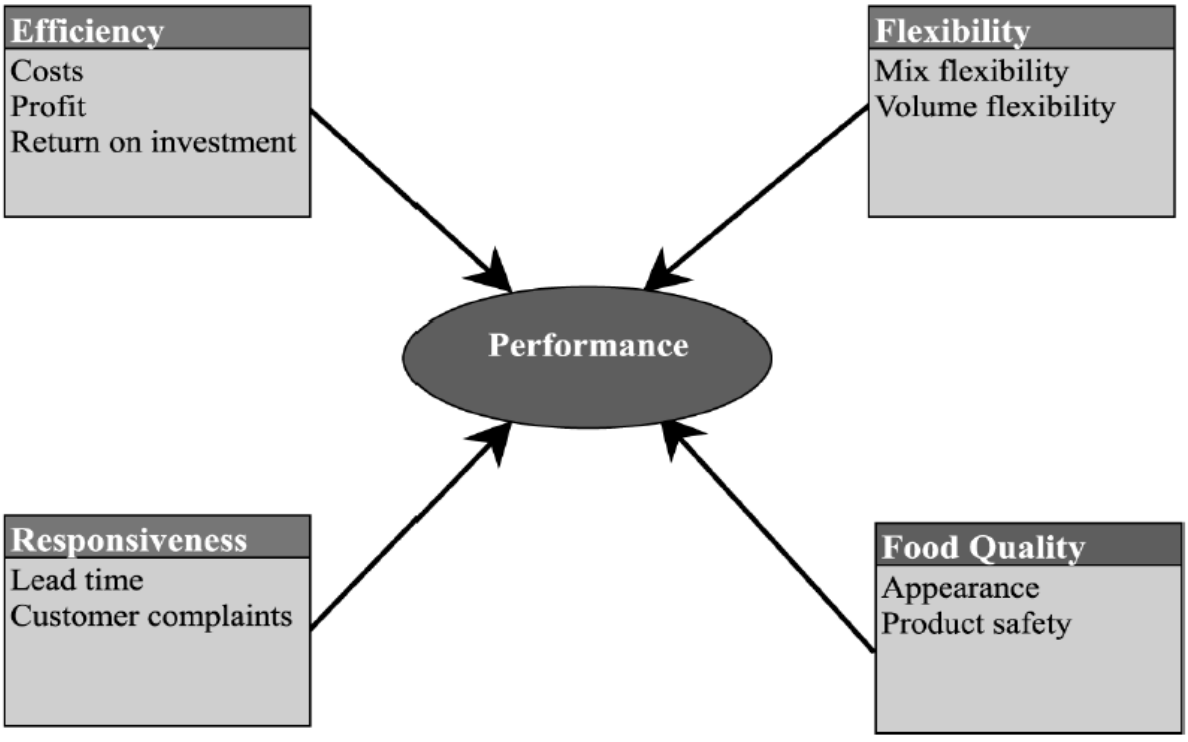
- The Supply Chain Operations Reference (SCOR) (Supply Chain Council, 2004), which is a guide based on reliability measures, such as order fulfilment; asset measures, such as inventory; cost measures, including the cost of goods sold; and responsiveness measures, for example replenishment times; and
- Lai et. al. (2002) in logistics supply chain performance management, focusing on service efficacy for shippers; service efficacy for consignees; and operational effectiveness.

However, despite the range of performance measurement systems developed for industries outside of agri-food supply chains, there has been very little developed for agriculture, and in particular, the Australian livestock export chain. Aramayan et al. (2006, 2007) have developed a model that integrates the aforementioned approaches, along with considering factors for food safety and quality as a conceptual framework. Their framework consists of four main categories:

- Efficiency – defined as how well the resources are utilised and includes measures of profit, return on investment, return on inventory (Lai et al., 2002);
- Flexibility – defined as the rate at which a supply chain can respond to the trading environment and to customer demands. Measures include delivery flexibility, inventory adjustability, and customer satisfaction (Beamon, 1998);
- Responsiveness – defined as providing products to consumers in the shortest lead time (Persson and Olhager, 2002). Metrics include delivery times, customer complaints and shipping mistakes; and
- Food quality – which encompasses attributes unique to agriculture supply chains, and includes measures of product health and safety; shelf life; and reliability and convenience (Luning et al., 2002). Product safety is further defined as food being free of hazardous chemicals; while process quality can be further described as environmental aspects and the production system characteristics, including animal welfare.

The conceptual measurement framework of Aramyan et al. (2007) can be summarised in Figure 2.

Figure 2. Conceptual framework of agri-food supply chain performance with key performance indicators



Source: Aramyan et al. (2007)

The model was tested in a Dutch-German tomato supply chain through a set of focus interview questions and open-ended interview questions, to develop a case study. As concluded by Aramyan et. al. (2007) this framework has potential; however, it is difficult to measure the performance of the links in the supply chain. It was also concluded that interviewees in the tomato supply chain were supportive of the above framework, although it was noted that adjustments would be necessary for other industries. Therefore, this conceptual performance measurement system will likely be of benefit for assessing the effectiveness of ESCAS in the Australian livestock export chain, with food quality substituted as animal welfare.

Further research and case studies

Supply chain performance measurement research conducted by Akyuz and Erkan (2009), noted that amongst multiple measures of supply chain performance, further research is required regarding framework development; and cross industry research to include the development of collaboration, flexibility, partnership, agility, information sharing, and business performance metrics.

In addition, Marsden et al. (2002), covered the role of short food supply chains in developing rural economies. Discussion is centred on the importance of understanding how supply chains are built over time and space, as opposed to only concentrating on product flows. The study was based on a beef supply chain case study in Southern Wales, and concluded the importance of supply measurement for rural development. Noting that while this study encompassed multiple actors, it only incorporated production within a small region of one country.

Further agri-food supply chain measurement research has concluded that market developments arising from greater vertical integration in agri-food supply chains have raised awareness of an array of issues, including contract transparency (or information sharing), terms, dispute settlement, and producer access to supply chains (Young and Hobbs, 2002). These issues are likely to be greater where there are fewer vertical linkages.

Finally, consistency in regulations is determined to potentially result in freer trade and greater supply chain surplus. Winchester et al. (2012) found that trading among the European Union with various trading partners was enhanced for agricultural products where regulations were harmonised. They were also further enhanced through reduced tariffs. This suggests that consistency for trade regulations amongst other countries, for example Australia and Indonesia, is likely to have a similar result.

Research gaps

There are three major gaps arising from this brief review. Firstly, there is very little literature specifically on the livestock export industry. This includes from Australia to any of its international customers, or from any of the other global livestock exporters, including Canada, Mexico, and within the European Union. Secondly, there has been little research conducted on supply chains where there are numerous actors along the supply chain, that are managed by multiple entities i.e. value chains where there is very little vertical integration. Thirdly, there is no research available on the consumers' willingness to buy livestock that have been handled to Australia's standards.

Conclusion of the literature review

Of the frameworks assessed, the one most likely to be suitable for assessing the effectiveness of ESCAS in the Australian livestock export chain is the conceptual framework. This is due to the consistency of individual drivers between the chains.

Results

The results are separated into a summary of the survey results; analyses of trade data; identification of inhibitors and enablers of the trade, including animal welfare and costs of regulatory compliance; and justification of the best value chain analysis model to utilise in future research.

Survey results

The full list of survey questions is available in Appendix I, however responses are summarised in the following section. Individual responses are not provided for confidentiality reasons. The total number of respondents was 10, and they included personnel from industry bodies, government, peak industry Councils and commercial livestock exporting companies.

Superiorities of Australian livestock

When discussing whether or not there are any perceived superiorities of Australian livestock in the importing nations, two themes emerged. Firstly, with regards to meat quality in sheep in the Middle East, typically the Awassi Fat-tailed sheep, which are local to the region, are deemed superior based on the average price being three times that of Australian sheep. However, on the other hand, if superiority was deemed to be based on a disease-free status, an ability to provide consistent year-round supply and fit and healthy sheep, then Australia is considered superior in that regard. Interestingly, nothing was mentioned towards any perceived superiorities for animal welfare for Australian sheep. The consistency of supply and disease-free status for cattle was also noted for all destinations.

ESCAS compliance rates

With regards to the compliance rates of ESCAS, the general consensus was that, if the supply chain is short, i.e. one importer, one feedlot and one abattoir, then compliance is better than chains that have multiple abattoirs and feedlots. According to respondents, the greatest non-compliance issue is leakage (Australian animals being sold outside a dedicated supply chain), and longer chains are more likely to have leakage issues.

International perceptions of ESCAS

Questions regarding international perceptions of ESCAS resulted in a common theme of respondents commenting that the only reason importers comply with the regulations is because they have to; i.e., in order to continue importing Australian livestock. Recent examples of Eid al-Adha in Qatar saw the number of Australian sheep imported reduced significantly due to the lower stocking densities. As a result, Somalian sheep were imported in lieu, and the majority of these sheep were treated to the same level of animal welfare standards as Australian sheep would have been treated prior to the implementation of ESCAS. This was common across most importing countries, and demonstrates that, when Australian sheep or cattle are in the designated market, the level of animal welfare is likely to be better than when they are not in the market. This also suggests that importers may apply a higher level of animal welfare standards to the livestock imported from Australia, but be more relaxed about livestock imported from other countries.

With regards to any consumer demand or willingness-to-pay a premium for livestock treated to the standards required in ESCAS, none was evident for any of Australia's livestock importing customers.

Social licence to operate

In response to the impacts of the "social licence to operate", respondents unanimously considered ESCAS to be "future-proofing" the industry. The reason for this is that it provides a platform for the industry to be transparent and have integrity through moving early and calling out poor standards, demonstrating that these do not align to Australian values, and fixing the problem. Respondents also

noted that, without a social licence to operate, regardless of whether the best trade practices were applied, the livestock exporting industry would not exist.

Survey conclusion

Overall, the industry survey was successful in providing a wide range of opinions of ESCAS and its impacts on supply chain performance.

International livestock trade data

The trade data and analysis are separated into cattle and sheep components, and will focus on the key export destinations.

Live cattle exports

As outlined in Table 1, the top five cattle exporting countries in 2016 (latest available global data) were France, Mexico, Australia, Germany and Canada (FAOSTAT, 2016). The total number of cattle exported globally was just over 10.28 million head, and the largest five countries accounted for 51.88 per cent of the global trade. Of note, from the top 20 countries listed, Australia and Ireland are the only two island nations, where maritime shipping is invariably required. The majority of trade is intercontinental within North America, Europe and Africa.

Table 1. Global live cattle exports

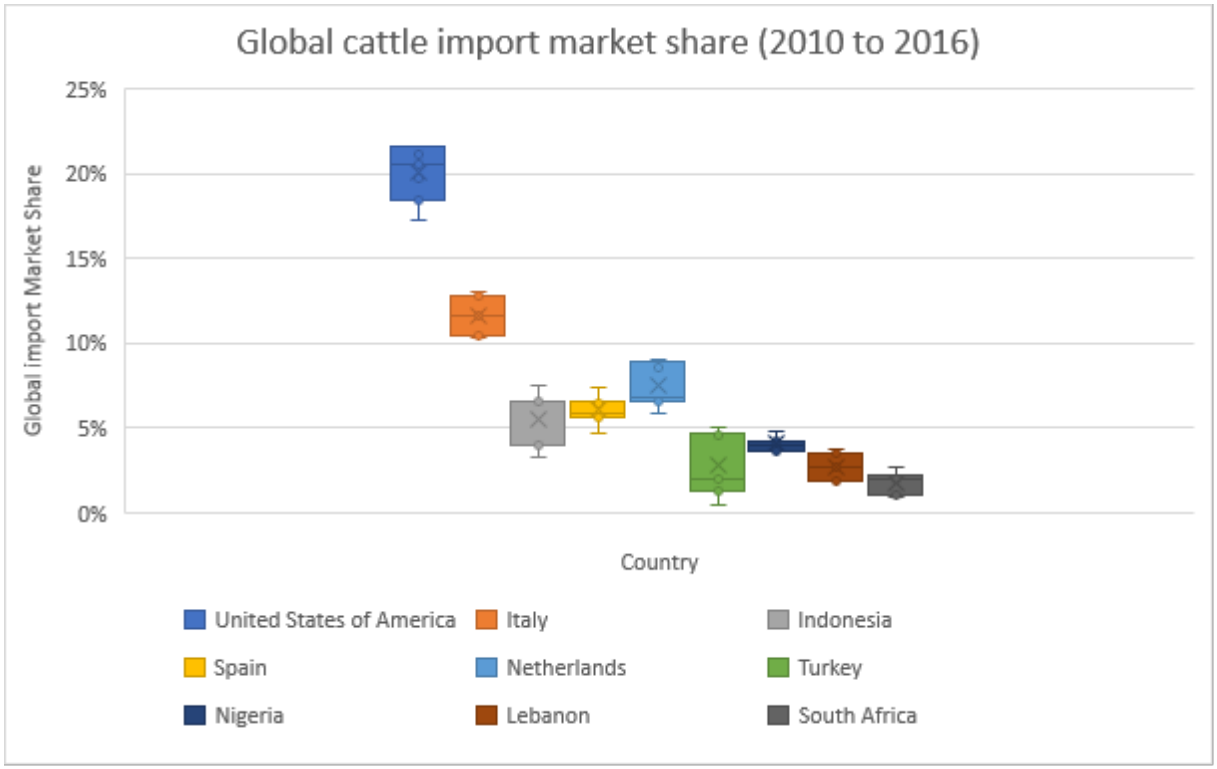
Global cattle exports		2016		2010	
Rank (2016)	**Country**	**Number (head)**	**Share**	**Number (head)**	**Share**
1	France	1,480,824	14.40%	1,403,448	12.84%
2	Mexico	1,130,460	10.99%	1,261,315	11.54%
3	Australia	1,130,328	10.99%	873,573	7.99%
4	Germany	827,024	8.04%	635,483	5.81%
5	Canada	765,914	7.45%	1,089,264	9.97%
6	Mali	314,263	3.06%	100,000	0.91%
7	Uruguay	307,131	2.99%	385,157	3.52%
8	Brazil	292,515	2.84%	926,322	8.47%
9	Ethiopia	287,000	2.79%	157,048	1.44%
10	Romania	276,470	2.69%	279,772	2.56%
11	Netherlands	275,736	2.68%	249,716	2.28%
12	Thailand	250,849	2.44%	227,623	2.08%
13	Czechia	240,451	2.34%	163,911	1.50%
14	Hungary	167,328	1.63%	157,205	1.44%
15	Spain	160,759	1.56%	181,390	1.66%
16	Namibia	131,354	1.28%	80,000	0.73%
17	Ireland	123,630	1.20%	271,663	2.49%
18	Lithuania	122,770	1.19%	130,834	1.20%
19	Croatia	121,766	1.18%	9,496	0.09%
20	Austria	118,922	1.16%	126,546	1.16%
	Other	1,756,507	17.08%	2,220,984	20.32%
	World Total	**10,282,001**		**10,930,750**	

Source: FAOSTAT (2016)

Since 2010, global trade has been relatively stable although the shares from different suppliers have varied. Australia's share has risen substantially, while the shares of Brazil and Canada have fallen.

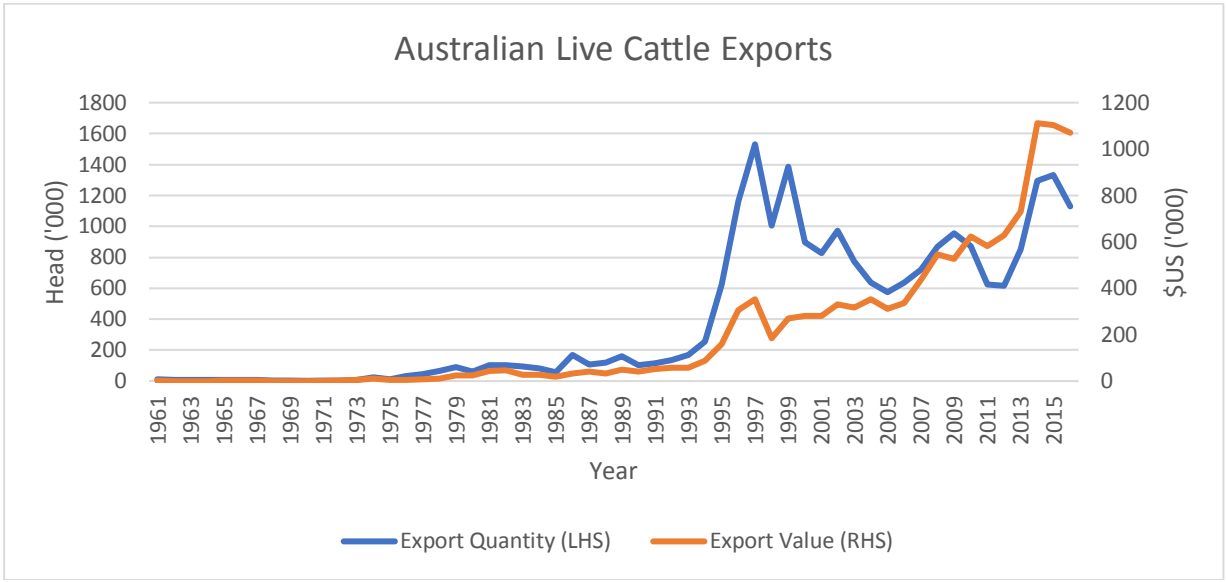
With regards to global cattle imports (Figure 3), the United States is the largest importer of cattle while two of Australia's markets, Indonesia and Turkey, have on average ranked fifth and sixth respectively from 2010 to 2016. Interestingly, the range in their market share is greater than for the other large importing countries, which may reflect the introduction of ESCAS on Australian cattle during that time.

Figure 3. Global share (%) of cattle imports



Source: FAOSTAT (2016)

Figure 4. Australian live cattle exports

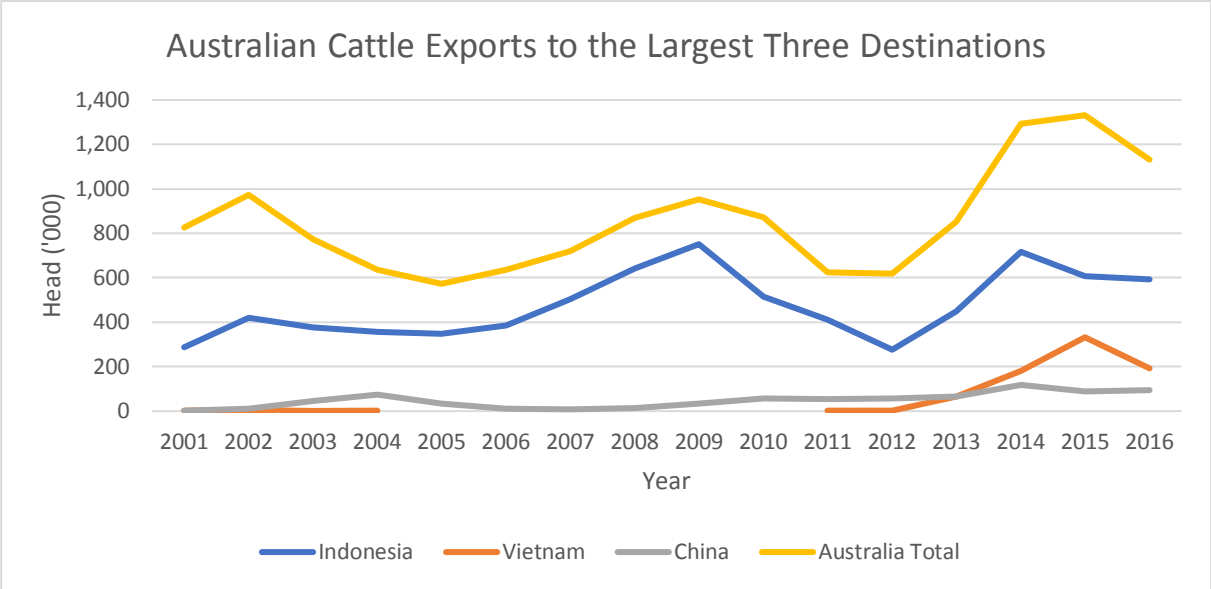


Source: FAOSTAT (2016)

Over time, total Australian live cattle exports have fluctuated, as illustrated in Figure 4. Of note, total Australian cattle exports declined 28.4 per cent from 2010 (873,573 head) to 2011 (625,435 head). Interestingly, over the same time period, the value of exports (in US dollar terms) declined to a significantly lesser degree, at 6.76 per cent. Furthermore, the number of cattle exported in 2012 declined 1 per cent year-on-year and, since that time, the number of Australian cattle traded internationally has consistently been above 2011 and 2012 levels. Despite fewer cattle exported, the value increased 7.8 per cent year-on-year in 2012, and has also consistently remained above those levels. It should be noted that seasonal conditions and the availability of cattle to export from Australia in 2011 and 2012 may have contributed to the reduction in cattle exported over that period, in addition to the change in regulations (MLA, 2018). Also, the historically high Australian dollar against the United States dollar is likely to have limited the impact of the changed regulations on export values in 2011 and 2012 (Martin, 2015).

Australian cattle exports have seen Vietnam increase in importance, accounting for just 945 head in 2011, but rising to 332,258 head in 2015. Shipments to China have not fluctuated to the same degree as Vietnam or Indonesia; however, it is traditionally a breeder cattle and dairy heifer market, where ESCAS regulations do not apply (Department of Agriculture, 2015). Overall, Australian live cattle exports declined by 248,138 head from 2010 to 2011, with the reduction in shipments to Indonesia (294,025 head) the greatest contributor to the overall decline (Statistics.mla.com.au, 2018). Figure 5 illustrates these trends.

Figure 5. Australian Cattle Exports to Largest Destinations



Source: FAOSTAT (2016)

Live sheep exports

Global sheep and goat exports were dominated by five countries in 2016, with Sudan, Somalia, Romania, Australia and Iran the largest exporters (Table 2). The combined exports from these countries accounted for 67.61 per cent of global trade. Like cattle, Australia is one of only two countries where exporting via boat is necessary (United Kingdom is the other for sheep), and the majority is intercontinental trade within Europe, Africa and the Middle East.

With regards to the market share of global sheep importers, the largest markets are in the Middle East. Their range in global market share of total imports is also likely to have been influenced by the inclusion of ESCAS over the period 2010 to 2016 (Figure 6).

Table 2. Global sheep and goat exports

Global sheep exports		2016		2010	
Rank (2016)	**Country**	**Number (head)**	**Share**	**Number (head)**	**Share**
1	Sudan	5,151,847	22.25%		0.00%
2	Somalia	4,161,706	17.97%	2,741,899	11.84%
3	Romania	2,558,514	11.05%	1,595,693	6.89%
4	Australia	1,925,115	8.31%	3,059,168	13.21%
5	Iran (Islamic Republic of)	1,856,680	8.02%	2,278,546	9.84%
6	Spain	1,134,963	4.90%	587,806	2.54%
7	India	709,803	3.07%	416,343	1.80%
8	Hungary	555,506	2.40%	709,183	3.06%
9	Oman	527,851	2.28%	622,275	2.69%
10	Namibia	512,446	2.21%	370,000	1.60%
11	France	495,647	2.14%	743,759	3.21%
12	Jordan	437,251	1.89%	123,465	0.53%
13	Mali	333,700	1.44%	224,500	0.97%
14	Mauritania	331,000	1.43%	335,000	1.45%
15	Djibouti	285,812	1.23%		0.00%
16	Burkina Faso	229,360	0.99%	239,274	1.03%
17	United Kingdom	229,179	0.99%	54,140	0.23%
18	Saudi Arabia	207,392	0.90%	516,103	2.23%
19	Syrian Arab Republic	176,432	0.76%	1,067,758	4.61%
20	Georgia	154,868	0.67%	99,977	0.43%
	Other	1,179,062	5.09%	4,666,001	20.15%
	World	**23,154,134**		**20,450,890**	

Source: FAOSTAT (2016)

The volume and value of Australia's live sheep exports have varied significantly from year to year; however, since the inclusion of ESCAS in 2011, both have generally trended lower (Figure 7). This is likely to reflect a negative overall impact of ESCAS to the trade. The number of sheep exported in 2011 was down 23 per cent from 2010, at 2.36 million head, and in 2016 the number shipped was down 37 per cent from pre-ESCAS, at 1.93 million head. The value (in United States Dollar terms) was down 45 per cent over the six-year period, likely accentuated by currency fluctuations (Ashton et al., 2016).

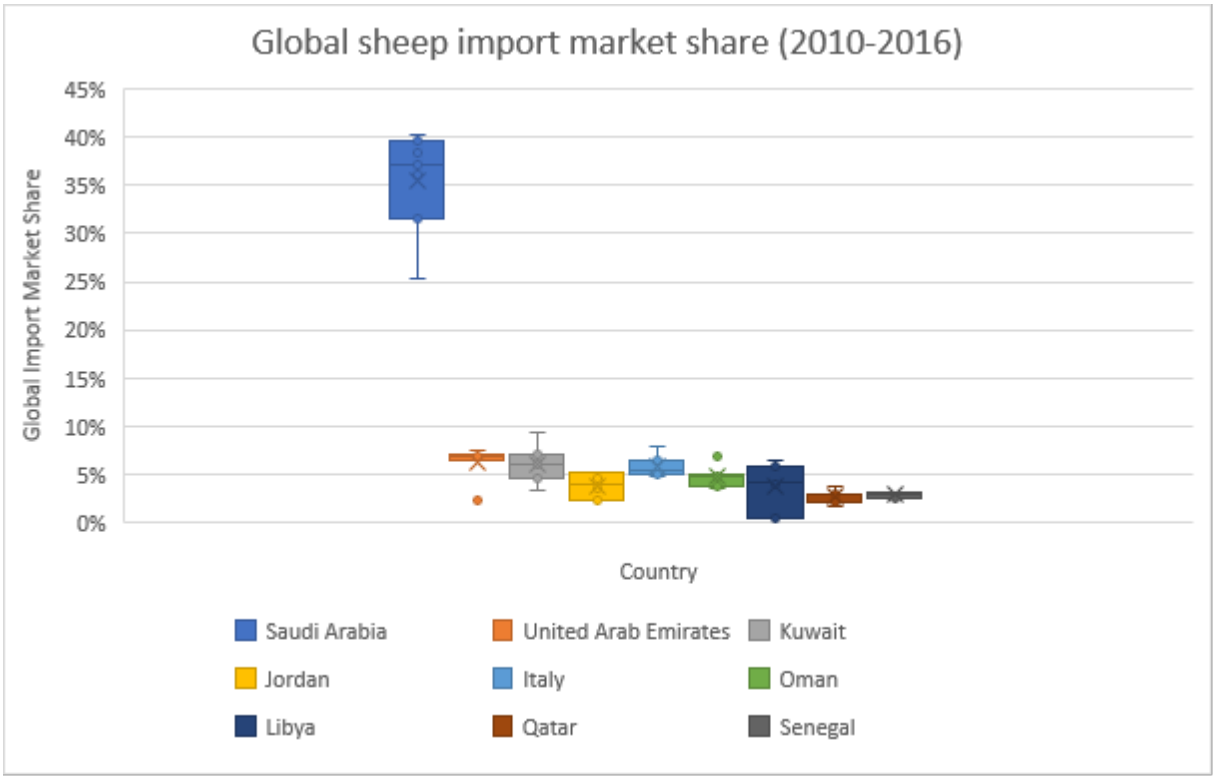
Finally, trends to Australia's largest sheep export destinations have changed slightly since the inclusion of ESCAS, with Bahrain and Jordan declining, and Kuwait and Qatar increasing (Figure 8).

Inhibitors and enablers of generating surplus

Inhibitors to generating surplus - compliance and regulatory costs

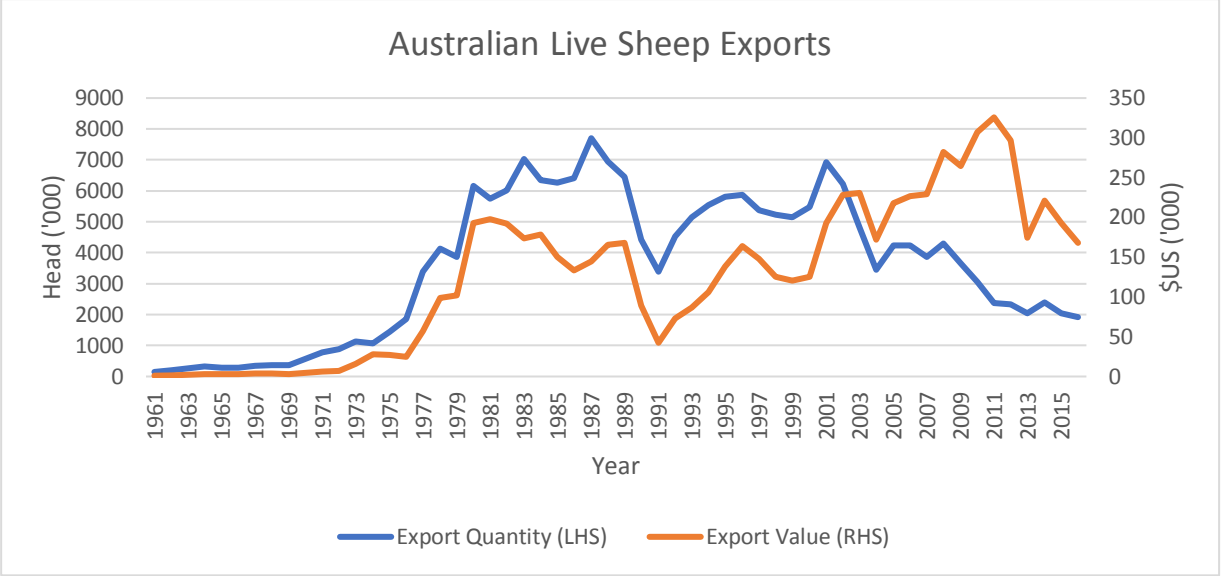
While successes have been achieved in improving animal welfare, the regulatory model for ESCAS is complex, and imposes an estimated cost of $17.6 million per year on the livestock export industry (Department of Agriculture, 2015). The Department of Agriculture have posed the question as to whether the same welfare gains could have been achieved through a more streamlined, less expensive system.

Figure 6. Global share (%) of sheep imports (2010-2016)



Source: FAOSTAT (2016)

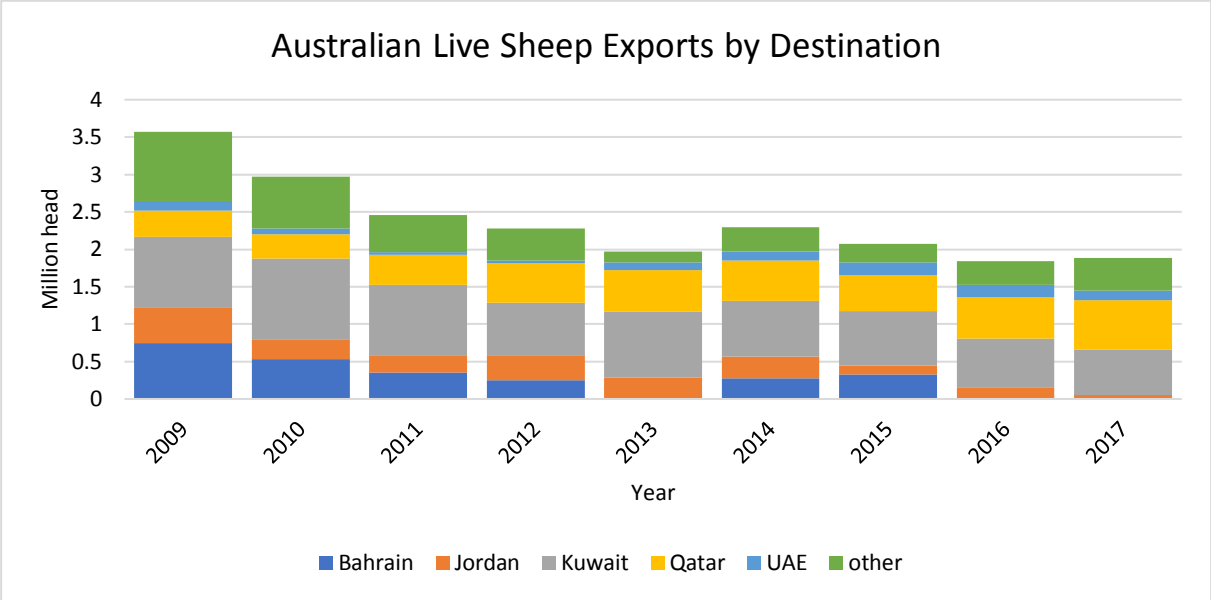
Figure 7. Australian live sheep exports



Source: FAOSTAT (2016)

These regulatory expenses were further quantified by ProAnd (2016), with government influenced (regulation) costs as a percentage of enterprise expenses for cattle producers increasing from 7.4 per cent in 2008/09 to 9.2 per cent in 2014/15. This increase is largely attributed to the inclusion of ESCAS over this period (ProAnd, 2016). For sheep producers, the government-influenced costs as a percentage of expenses were estimated to be 10.5 per cent in 2014/15.

Figure 8. Australian live sheep exports by destination



Source: FAOSTAT (2016)

The authors noted that these costs can increase during certain times of the year, when the Australian Quarantine and Inspection Service (AQIS) impose additional regulations. These can include lower shipping stocking densities during certain times of the year when there could be a higher risk of heat stress, and in turn, reduced welfare conditions. Some of the government expenses included other non-ESCAS, including road and transport regulations, and quarantine (ProAnd, 2016).

While these are economic costs, some of the industry benefits of the regulations include retention of the industry's corporate citizenship standing; better ability to control livestock health and disease; and regulation fees and industry levies which provide revenue for research and development. Furthermore, Tran (2018) found that in the Vietnamese seafood supply chain, due to the emergence of food scandals in those supply chains, the cost of non-compliance, or not adhering to food safety regulatory standards, was greater than the costs associated with complying. This may also be the case for the Australian livestock export industry.

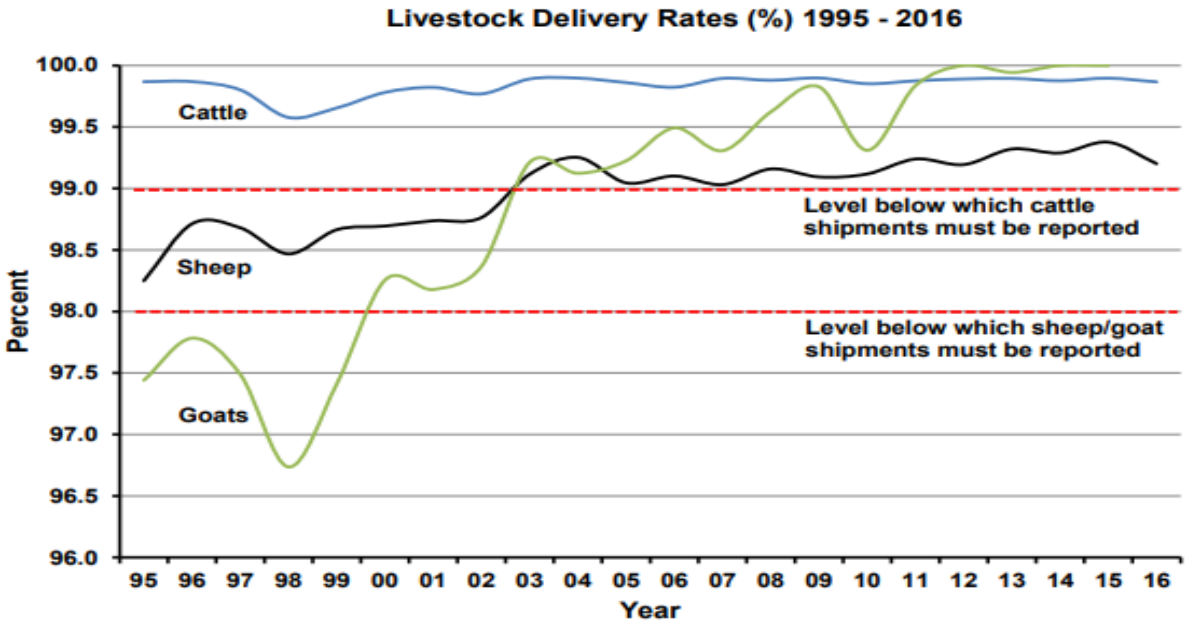
Enabling surplus - animal welfare, consumer demand

Animal welfare is paramount for the social licence to operate. Keogh et al. (2016) argue that without a social licence to operate, or in other words, animal welfare in the livestock export chain that is at a level acceptable to relevant communities and stakeholders, the industry would not be viable.

Research conducted by Norman (2017) demonstrates that over time the level of animal welfare during shipping has improved significantly, as illustrated in Figure 9. The red line represents the level of mortalities per voyage before an incident is required to be reported to the Department of Agriculture. Improved welfare standards (and lower mortality) is likely to be an enabler to generating supply chain surplus. i.e. through improved public perception, and lower economic losses through mortalities.

After livestock have departed the ship and are in their destination market, a requirement is for any breaches of ESCAS to be reported. These must then be investigated by the Department of Agriculture, and the findings, consequences and steps to rectify the problem then made publicly available. In some instances, the consequence may be a complete ban on shipments to that supply chain, or in other instances it may be incremental improvements, such as improved staff training (Department of Agriculture, 2018). This provides a highly transparent platform for any animal welfare issues that

Figure 9. Percentages of sheep, cattle and goats successfully delivered by sea since 1995



Source: Norman (2017)

ultimately causes Australian exporters to be accountable for any breaches. This is again deemed likely to be a positive for the social license to operate, and in-turn, the ability to generate supply chain surplus.

Finally, as mentioned earlier, there is no research available on the consumers' willingness to buy livestock that have been handled to Australia's standards, and hence why it formed part of the industry survey. Furthermore, Australia is unique with the highest degree of animal welfare standards placed on livestock once they reach a destination, thus can be considered a burden by some importers.

Discussion

The contemporary value chain analysis model

Through utilising the measuring tools for assessing supply chain performance that were discussed in the literature review, it is hypothesised that the regulations on the livestock export supply chain have been effective in generating supply chain surplus. On the one hand, and as outlined in numerous industry studies, the regulations add economic costs to the overall trade; and, as identified by the survey respondents, potentially create friction between the Australian Government and international trading partners. However, on the other hand, the regulations have resulted in improved net global animal welfare. They have also assisted with the social licence to operate, improved public perception of the Australian livestock export industry, enabled the trade to continue after respective bans and public outcries to cease the trade, and made Australia a world leading nation at achieving high animal welfare standards. Thus, the regulations have been effective in generating supply chain surplus.

As illustrated through the data analysis, the live cattle export supply chain appears to have embraced the system and regulations, demonstrated through the overall uplift in Australian export volumes and values since the inclusion of ESCAS in 2011. Conversely, the sheep value chain has not recovered in volumes or value since 2011 and, therefore, it can be concluded that while the regulations have enabled the trade to continue, the surplus generated is to a lower degree than for cattle (although other factors such as the dramatic decline in overall sheep numbers and the greater influence of drought in sheep production regions have also contributed).

The alternative to not having ESCAS in place is that the trade may not have been able to continue. This would have had a greater negative impact on the cattle industry, as Indonesia (a sole cattle market) was the instigator for change. Furthermore, without the impetus to improve the animal welfare and social licence to operate in 2011, the trade may be under greater pressure today, and potentially non-existent from Australia. This provides further evidence of the effectiveness of the regulations in generating supply chain surplus.

Examples of regulations underpinning improved supply chain surplus

Current industry examples of the benefits of regulations in improving the social perceptions of livestock export industry include four rival Australian live exporting companies now collaborating in Vietnam to proactively improve animal welfare outcomes in that market (Nason, 2018a). As outlined in the data analysis, Vietnam has quickly become one of Australia's largest live cattle export destinations. However, due to the speed at which it rose to prominence, it is also one of the riskiest in terms of ESCAS non-compliance (Department of Agriculture, 2018). The four companies have developed their own self-regulated model of Collective Standards for Animal Welfare, where any incidents of non-compliance are shared amongst the group, and they then actively work with each other to solve the problem. This is a further example of a regulation (albeit, self-imposed) that enables the trade to continue. Additionally, being self-regulated causes lower overall costs, and therefore better supply chain surplus.

Furthermore, recent developments in the wake of the aforementioned live sheep losses to Qatar in late 2017 include the Australian government imposing a law whereby all vessels exporting livestock by sea must pay for an independent observer at a fee of $1,300 per day, plus pay for their business class flights back to Australia (Nason, 2018b). Unlike the self-regulated Vietnam example, this development creates further economic costs to the trade. However, it could be argued that these independent observers will further improve the public perception, and minimise the likelihood of ESACS non-compliance events occurring. Again, further enabling the longevity of the trade.

How do the survey responses compare to the literature and data?

Overall, the authors were satisfied with the number of respondents and depth of information provided during the survey process. However, while there were consistencies between responses, the authors acknowledge that the research could have been more comprehensive if there were time to interview personnel internationally and, in particular, in importing companies.

As expected, the recent reduction in overall cattle exports, and sustained subdued sheep trade over the past six years, reflects a general unwillingness from the importers to embrace and apply ESCAS standards, unless it is absolutely necessary. A term referred to often in the interviews was "net animal welfare", and it referenced the level of animal welfare for all animals within a market. When ESCAS is a requirement, and by default, there are more Australian livestock in the market, the "net animal welfare" was considered to be better than otherwise. This was demonstrated recently through importer behaviours in Qatar in the wake of fewer Australian sheep being eligible to import due to the reduced shipping stocking densities over the northern hemisphere summer months.

Interestingly, the importance of the social licence to operate was pronounced and demonstrated an overall willingness by Australian exporters to continue striving to improve public perceptions of the trade, and in particular, perceptions in Australia. However, one great challenge is that the importance of the social licence to operate, that is, the sensitivity of buyers to welfare issues, for the livestock exporting industry internationally does not appear to be as strong. Consequently, more than likely there will continue to be conflicting objectives between Australian exporters and international

importers with regards to the standards applied. The underlying result of this will be some impact on the longevity of the trade and the overall ability to generate surplus.

There were no surprise responses in the survey, and while there is presently very little literature available on the questions posed, there were no contradictions with what is available.

Australia's regulations compared to other global exporters

Australia is the only livestock exporting country where the responsibility for animal welfare, irrespective of ownership in the value chain, is on the exporter (Laursen, 2017). Therefore, it can be argued that ESCAS has been effective in improving Australian animal welfare standards once they reach their destination market. However, it has been at the cost of value chain responsiveness.

Standards have been tightened recently following the release of the review into the Australian Standards for the Export of Livestock (ASEL) (Department of Agriculture, 2019). The report recommends a substantial reduction in stocking densities for sheep, the application over time of a Heat Stress Assessment for all livestock voyages that cross the equator and the implementation of more on-board reporting and lower daily mortality rate notifications. Again, animal welfare is expected to be improved, but costs will rise. An Inspector-General of Live Animal Exports is also to be appointed to provide independent oversight of the regulator.

Furthermore, the question was raised by Nama and Griffith (2017) whether the same improved animal welfare outcome could have been achieved through lower costs and policy constraints. This was taken further by Schuster Consulting (2016) who developed the Livestock Global Assurance Program (LGAP), which shifts responsibilities from exporters to an independent audit and certifying body, and the responsibility of certification to facilities in destination countries. This new program was due to be rolled out in 2018; however, there have been delays due to unforeseen commercial events (ALEC, 2018). Moreover, it is likely that the roll out of this enhancement to the regulations will further assist the generation of supply chain surplus in the livestock export supply chain.

An additional suggested improvement to the live export supply chain regulations by Nama and Griffith (2017) is through negotiations between all livestock exporting countries to develop an international standard on exporting conditions and livestock handling through a global umbrella treaty. Nama and Griffith (2017) argue that this will assist spreading the cost of regulations, which are currently solely covered by Australian exporters. This analysis supports this suggestion and agrees with the benefits, indicating the value to the Australian industry of initiating the changes, however a potential impediment is that Australia is likely to place a higher value on social and welfare factors, than those that are importing Australian livestock.

How findings compare to previous knowledge, and scope for further research

While this study depended on utilising some past research, namely industry and academic studies on the cost of compliance and improvements to animal welfare, along with publicly available trade data, there has been little research conducted on the effectiveness of regulations on the complete livestock export supply chain. Notwithstanding this, Keogh (2016) outlined the importance of the social licence to operate in the livestock export industry, and that view is supported here. Similarly, one of Nama and Griffith's (2017) conclusions was that a global approach should be taken to improving animal welfare standards. While this paper does not directly discuss that issue, the findings could also be considered supporting, as the regulations have been justified as enablers for generating supply chain surplus.

Areas for further research include replicating the assessment in other livestock exporting nations to compare the levels of surplus generated compared to Australia. Furthermore, Australia is in a unique position being a developed country exporting to developing nations, where most of the other global trade is either from a developed country to a developed country (e.g. Canada to United States of America, and trade within Europe); or from a developing country to a developing country (e.g. much of the intercontinental African trade). Therefore, comparisons in the generation of supply chain surplus in the relative environments would be beneficial, where the value of the "social license to operate" is likely to vary considerably.

Obtaining real transaction data from intercountry trade would likely further assist in better measuring the impacts of regulations. While there is comprehensive macro data available on the total number of cattle exported and the gross value, there is no public information available on an individual country-to-country basis. A further data issue occurred with discrepancies between Australian export statistics and the import statistics for some countries. This was queried with Meat and Livestock Australia, and determined to be the result of poor data quality in some developing countries (Ryan, 2018).

Additionally, survey response rates could have been improved with more time. This would provide a more robust sample size and potentially a broader range of perspectives. Notwithstanding, under the time constraints, the response rate and quality of the information provided was considered to be of a valuable standard.

Finally, while the best approach to analyse supply chain performance and surplus was decided based on a review of the literature, this approach should be formally tested by applying it to the Australian livestock export industry.

Final Comments

Initial observations quickly concluded that regulations placed on the livestock export industry are a burden for generating supply chain surplus due to the economic costs involved. However, without these regulations, the trade is less likely to exist, and thus the alternative is not even having the opportunity to generate any form of supply chain surplus.

This research has provided new material to further improve the perception of the livestock export industry, and assists in the justification of regulations in the Australian livestock export industry, and how they assist in generating value for the chain.

However, the research has also raised a number of issues. There is no evidence that it is consumers in importing countries who are calling for higher welfare standards on the treatment of imported livestock. On the contrary, it is consumer groups in Australia who wish to extend Australian regulatory systems to uphold animal welfare beyond our border. Should Australian consumers pay some of the costs of the live animal export regulations? Is there any capacity for consumers in importing countries to pay some of the costs? Since Australia is the only country where regulatory systems to uphold animal welfare extend beyond the exporting country's border, should ESCAS be promoted more widely to improve net animal welfare globally so that it becomes the minimum standard for all livestock exports (i.e., intercontinental and from non-developed countries to non- developed countries, and from developed countries to developed countries)?

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Appendix I. Interview questions

University of Melbourne, Department of Agriculture and Food Systems

Project: Regulations in the Livestock Export Industry

Ben Thomas (Project manager) Email: Benjamint2@student.unimelb.edu.au
Garry Griffith (Supervisor) Email: Garry.Griffith@unimelb.edu.au

What is this research about?

The overall aim of the project is to assess the *effectiveness* of regulations on the entire live export value chain for Australian sheep and cattle. *Effectiveness* will be defined as the amount of supply chain surplus (profit) generated, and is proposed to be measured through changes in animal welfare, trade patterns and costs of compliance.

Interview questions:

1. What is your position in the livestock export industry?
2. Are there perceived superiorities of Australian Livestock compared to those from other countries?
3. What is the level of competition between Australian exporters for market share in your country of expertise? Do other countries export to that country? What is the compliance rate like?
4. What is your opinion of international trade perceptions of ESCAS?
5. Can you compare trading sentiment before and after the introduction of ESCAS?
6. Can you identify any consumer demand for livestock traded to the welfare standards that Australia has? If so, where, when, and can you provide more details
7. Is there a willingness from consumers to pay a premium for animals exported under the Australian ESCAS standards?
8. Do you see importers applying the same welfare standards to livestock imported from Australia, compared to those sourced locally or from other countries?
9. The Department of Agriculture estimated in 2015 the cost of ESCAS per head is $9 for cattle, and $0.77 for sheep. Do you see this as being accurate?
10. What are your views on the “Social License to Operate”, and do you think ESCAS achieves this?
11. Any other comments or questions regarding regulations on generating supply chain surplus?