

The Collateral Benefits of Cattle Welfare during Handling and Transport

**Realising the potential of animal welfare for the
Australian beef industry**

A report for



By: Alistair Corr

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Executive Summary

“Getting animals from farm to abattoir forms the first link in the chain of meat production and one which is both important and to some degree contentious; because the process of handling and transport provides many opportunities for the animal’s welfare to be compromised” (Warriss, 1992).

The challenge facing the Australian beef industry is to increase productivity and profitability whilst satisfying or exceeding consumer expectations in order to retain market share against other proteins. Amongst several strategies to achieve this, the understanding, focus and continual improvement of animal wellbeing during handling and transport of beef cattle, has the potential for benefits that can be extended throughout the supply chain.

Through understanding the cause and effect of stress on cattle, the basis can be formed for knowing where to target improvements in order to achieve production gains, or to mitigate against production losses or discounts. The strategies to minimise stress and accomplish these benefits are:

- Use stock handling techniques that recognise cattle’s reaction to pressure and stress and its release.
- Using facility design to provide an environment where animals can be effectively handled.
- Use supplements to influence the physiological response of animals to stressors.
- Employ monitoring devices to better understand environmental influences during transport.

The value of these strategies can be realised at a retail and market share level, by advocating the standards that the production systems abide by and demonstrating these through reporting and transparency. Significant consumer confidence also arises from engaging with the consumer and creating an understanding of cattle and beef production, which allows for informed purchasing choices.

This report is targeted at the producers of the Australian beef industry as they have the biggest influence on the quality of the product and also the responsibility to uphold the highest standards of animal welfare. Through providing and sharing information about the techniques and tools available to producers that can improve profitability, improved animal welfare outcomes will be an inevitable consequence.

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Foreword

As a manager and owner of beef cattle in Central Queensland, I am responsible for these businesses to be ethically sincere and entirely sustainable. This incorporates many facets of operational, environmental, and animal welfare factors on a daily basis. An increasingly important aspect of any business that is directly involved with or associated with livestock today is the need for the animals within our care to have basic physical, material and mental wellbeing.

The ethical component of providing these basic needs, and satisfying consumer expectations and providing purchasing confidence has by far the greatest positive gain for the industry. Secondary to this, there is a significant economic benefit in having cattle that can withstand the rigours of handling and transport through maintaining body weight and condition, and the resulting high meat quality at slaughter. The ability to positively influence cattle through a range of factors, and have measurable improvements in saleable value and animal health, has the potential to increase industry profitability at all levels.

With so many cattle handled, transported and slaughtered on a daily basis in Australia, the benefits in being able to improve each animal's experience during these processes are far reaching. Having experienced this firsthand, and witnessed the positive impact change can have on ultimately the animal's ability to cope with stress; I felt this was a topic area with far reaching benefits.

I travelled through the United States of America (USA), Japan, Netherlands, United Kingdom (UK), Ireland, New Zealand, and Brazil, with surprising insights coming from the most unexpected places. Some visits were directly related to the improvement of animal welfare and others were associated with the economic and industry benefits of high welfare standards.

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Finally to all of my fellow scholars, especially those internationally that hosted me or helped to organise visits and meetings, as well as any of the farms, or industry I have visited, I am truly grateful for the experience of a lifetime.

Abbreviations

BQA – Beef Quality Assurance (the US Beef industry’s quality assurance program).

CMA –Confinamento Monte Alegre (a Brazilian feedlot company)

LPA – Livestock Production Assurance

LSS – Low Stress Stockhandling

MLA – Meat and Livestock Australia

NGO – Non Government Organisation

NVD – National Vendor Declaration

QA – Quality Assurance

RSPCA – Royal Society for the Prevention of Cruelty to Animals

UK – United Kingdom

USA – United States of America

Objectives

The objective of this study is to create awareness of the consequential benefits of beef cattle wellbeing during handling and transport through:

- Outlining the impact that stress can have on cattle during handling and transport.
- Detailing the direct influences that can be manipulated to minimise this stress.
- Highlighting the effectiveness of other indirect tools.
- Discussing the opportunities for the industry through setting and maintaining high standards of animal welfare policy and their advocacy.

Chapter 1: Introduction

The evolution of man has been forged on the need for a protein-based diet that has historically involved meat as the primary source. To accommodate for this, animals have been domesticated, and industries developed over the years to continually provide and increase production for the world's population. The ongoing challenge for the beef industry worldwide is to meet this increasing demand of the growing population, whilst utilising the same finite land and resources. Hocquette *et al.* (2018) identified that as well as these production challenges, the urbanisation of human societies and the consequent separation of production and consumption has created another level of challenges.

These challenges of supplying meat to the consumer are apparent not only in the ongoing requirement to provide food safety and quality, but as the choice and selection of food in the western world increases, so does the influence of ethical buying and purchasing power. In an independent Australian survey conducted by FutureEye (2018), titled *Commodity or Sentient Being*, it states "The quantitative research shows that an overwhelming majority (95%) of the public is concerned about the treatment of farm animals and considers farm animal welfare in Australia to be an issue to some degree."

As the consumer in the western world has considerable choice when it comes to purchasing proteins and food in general, they need to be satisfied that the producer's social responsibility has ensured that the animals within their care have had as good a life as possible, and a humane slaughter. Undisputedly, the risk of losing this consumer trust is the primary concern for the beef industry, and that which has the greatest economic impact. The opportunity for the industry, however, exists in demonstrating high animal welfare standards which will add value through the supply chain through production increases and marketing advantages.

This has been reflected by Meat and Livestock Australia¹ (2016) in, amongst other things, the Strategic Plan 2016-2020. One of the six key pillars outlined to achieve by 2020, Consumer and Community Support has identified that "there is an opportunity, and a need for industry to improve the level and consistency of our engagement with the community in setting animal welfare and environmental standards".

Animal welfare is a broad topic with a huge area of focus, and because of this it is pertinent to firstly provide a definition of farm animal welfare and thereafter outline which areas this report will focus on. One of the accepted definitions of animal welfare encompasses three elements:

¹ Meat and Livestock Australia (MLA) is the Australian beef, lamb and goat industry marketing and industry research body.

1. The animal's normal biological functioning (which, among other things, means ensuring that the animal is healthy and well-nourished);
2. Its emotional state (including the absence of negative emotions, such as pain and chronic fear); and
3. Its ability to express certain normal behaviours (Fraser *et al.*, 1997).

There is quite clearly no concession in any animal industry in Australia for any animal abuse or suffering, and therefore the focus of this report will not be on providing minimal basic standards, as referred to in this definition as normal biological function. More so, this study investigates influences that permit animals to express certain normal behaviours, and the need to be conscious of the emotional state of animals during all aspects of their life, including, but not restricted to, handling and transport.

Practically speaking, the best indication whether a normal behaviour is being challenged is if the animal shows a stress response or unusual behaviour, when prevented from conforming to its normal behavioural pattern. Hogan *et al.* (2007) stated that there are several treatments (stressors) that produce physiological stress in cattle, which can include removal from familiar to novel surroundings, curfews, mixing with unfamiliar companions, as well as loading and unloading into and from, vehicles and transportation. All of these stressors are potentially apparent during the handling and transport of cattle, but through understanding, all can be positively influenced to create better outcomes for the animals, and ultimately in the quality of the end product.

Meat and Livestock Australia (MLA) is primarily funded by transaction levies which are formulated by charging a nominal amount (AUD \$5.00 for cattle) per head sold, paid by the vendor, which is then used to support marketing, research and development activities. As detailed in the MLA Financial Report (2019), in the 2018/19 financial year, the grass-fed and grain-fed cattle levy revenue generated, was AUD \$70.3 million, equating to 14.06 million cattle that were sold throughout Australia. An assumption can be drawn that all of these cattle will be handled to some degree during the selling process, and that virtually all of these sales will result in a minimum of one component of transport in this transaction. Through refining animal welfare during this process the potential impact of direct and indirect marginal gains on these 14 million head will target another pillar of the Strategic Plan 2016-2020; *Productivity and Profitability*.

To understand the potential for opportunities in animal welfare for the industry there needs to be an understanding firstly of what stress is, and the impact that it can have on cattle. Once a basic level of understanding has been outlined, the next step is to detail the direct influences that can be manipulated to minimise this stress, and by doing so start to establish the potential gain of this right through the supply chain.

Having highlighted these influences for a perspicacious producer, this report will illustrate the effectiveness of additional tools that can be used to achieve greater welfare results. Other international examples of industry and corporate advocacy of welfare standards relating to best management practice adoption will be evidenced.

Chapter 2: The Impact of Stress

2.1 Physiological and clinical effects

Similar to the definition of *animal welfare*, the specific detail of the causes and effects of stress across all farm animals are wide and varied, with many scientific papers outlining the relevance for each animal (Ewbank R. 1985, Blokhuis, H.J. *et al.* 1998, Etim, N.N., *et al.*, 2013). This chapter will solely focus on the consequences of stress on cattle generally, but more so beef cattle.

Carroll, *et al.*, (2013) defines stress as it relates to bodily functions, as “the sum of all biological reactions to physical, emotional, or mental stimuli that disturb an individual’s homeostasis”. This is an overarching definition and depicts the multitude of ways in which stress can impact an animal, the reaction to which will result in a series of other physiological or behavioural responses to try and regain this homeostasis.

The most accurate indicator of an animal’s ability to cope with stress is the measurement of blood cortisol, as “cortisol is the primary glucocorticoid released from the adrenal gland of cattle during periods of stress, and can be measured in serum through standard laboratory tests” (Carroll, *et al.*, 2013). The purpose of this release of cortisol is the magnitude of biological effects which will essentially support the defence responses, which are pivotal in the “fight or flight” reaction from the animal. Obviously to quantify these levels requires blood samples to be taken and analysed, and is therefore not a realistic gauge from a commercial producer’s perspective.

The most significant outcome arising from stressors on an animal is when they occur in combination, at which point they then have a cumulative effect. To this extent, when animals are already reacting to a stressor, they are less capable to respond to subsequent influences. Naturally this is often the case when cattle can be exposed to numerous stressors for varying timeframes. As a function of sustained cortisol release the stimulation of the inflammatory and immune systems is prevented, this causes significant physiological complications. Examples of the resulting symptoms of these high concentrations of cortisol were given by Lay, *et al.*, (1992) as reduced rates of reproduction, suboptimal growth, suppressed milk production, and suppression of immune function that could increase susceptibility to disease.

In the state of Sao Paulo, Brazil, there is a pragmatic genetics and breed development company called Fazenda Floresta, which the author had the privilege of visiting. The owner/director of this company, Roberta Bertin Barros, is a Veterinarian whose aim is to develop an adapted breed of milking cow for the tropical environment of Brazil. Using IVF techniques to breed cows from a cross between Holstein Friesian and Gir (an Indian milking breed) to produce a Girolando cow with the correct phenotype and temperament as well as being adapted to both tropical conditions and parasites. The relevance of this to the stress impact on cattle is that the Gir breed is by nature more sensitive and reactive to stressors,

and not well adapted to machine milking. If not managed, the stress of machine milking on these cattle can reduce the oxytocin hormone release and the subsequent milk ejection causing a significant reduction in milk yield. To overcome this response and enable the Girolando cows to continue to provide sufficient milk yield and quality, in a tropically adapted milking cow, Barros (pers. comm., 2020) discussed the methodology that has been adopted to achieve this (discussed in Chapter 3).



Figure 1: Girolando breed in foreground and donor Gir cows in background at Fazenda Floresta, Sao Paulo State, Brazil. Source: Author (2020).

Given that physiological attributes such as cortisol levels, or heart rate, body temperature and respiration rate are not easily established for beef cattle, the clinical indicators of stress such as; loss of live weight, feed intake reduction, dehydration, physical injuries or decreased disease resistance can be more easily identified and measured. When the combinations of the physiological and clinical responses are identified, Warris P., (1992) highlighted that if extreme, these stressors can contribute towards a reduction in carcass and meat quality and that this is the link between animal welfare and meat quality.

A critical characteristic to manage for the industry is meat tenderness, which was identified by Egan, *et al.* 2001 as overwhelmingly the most significant aspect of the evaluation of eating quality of beef, by Australian consumers. The challenge in consistently producing this characteristic is that it can be influenced by many factors including genetics, temperament, age and most relevant to this study, the pre slaughter handling of cattle. “Any pre-slaughter treatment of animals that reduces muscle glycogen mitigates the attainment of a desired level of acidity in muscle post-mortem and hence threatens tenderness” (Walker & Banney, 2011). Again, the factors that contribute towards this influential period can be many and varied, and may include time off feed and water, the manner in which they are handled during loading and unloading, novel environments, transport conditions, and vehicle motion and duration of travel.

Another result of the above mentioned stressors is the more extreme effect it can have on meat which is termed *dark cutting* beef. Scanga, *et al.* (1998) explained that these dark cutters result from pre-harvest stress which depletes muscle glycogen, and results in abnormally high pH, which then increases light absorption and results in an undesirable, dark, firm, and dry texture. As this is a less desirable and therefore less saleable commodity, there is a significant cost to the industry from the loss of carcass value, not only from a retail level, but also through the penalty incurred by the producer. This can be influenced by an even greater array of factors including weather conditions, different types of hormonal growth promotants, or even gender or genetics. It is the subject of many research projects with varied definitive results, other than the factors that can be influenced through handling and transport (Jones, S.D.M. and Tong, A.K.W., 1989., Tarrant, P.V., 1981, Voisinet, B.D., et al., 1997).

Chapter 3: Strategies to Minimise Stress

3.1 Stock handling techniques

Bud Williams was one of the pioneers for understanding cattle behaviour, their interrelationship with humans, and how this can be manipulated to habituate cattle to the expectations of conventional production systems. The slogan for this behaviour modification is called Low Stress Stockhandling (LSS). The author was able to visit Dr Lyn Locatelli, a veterinarian in New Mexico, USA, who trained and worked with Bud before his passing, and continues to articulate his ethos. Locatelli (pers. comm., 2019) explained that LSS is using body language in a pressure then release manner, in proper situational context with respect for the animals, and is conveying information that the cattle understand. She went on to explain, that cattle moved by force ultimately experience a great deal of stress, most commonly from simply not understanding what they are being made to do.



Figure 2: A stockman demonstrating the 'no hands' technique at a Brazilian feedlot at Beef Passion, Sao Paulo State, Brazil. Source: Author (2020)

The low stress techniques are used globally, with great effect, from the provision of *Stockmanship & Stewardship* training courses through the USA beef industry's Beef Quality Assurance (BQA) program (explained on page 21), to the *No-Hands* technique used by producers in Brazil (Figure 2).

In Australia, the equivalent training provider is Low Stress Stockhandling Pty Ltd, and amongst the training course information is the recognition of the basic instincts of herding animals, and fostering an environment of low stress interaction applying the following seven principles:

1. **Flight zone** is the region in which pressure causes an animal to react.
2. **Body language** is the strongest form of communication with animals.
3. If **constant pressure** is applied to animals, they will move into it.
4. When **pressure** is applied it must be **released**.
5. Every mob needs a **leader**.
6. **Position** determines reaction.
7. **Observation** of the animals will tell you where you need to be (Low Stress Stockhandling, n.d.)

Dr Locatelli (pers. comm., 2019) explained that by emphasizing cattle handling skill in a low stress manner, day-to-day tasks can be accomplished to optimise production potential, promoting safety and efficiency and positively impacting profitability, all the while satisfying ideal welfare criteria. Furthermore, Locatelli reported that Bud Williams distinguished that if producers had to write a cheque for the lost weight that occurred every time they handled cattle, they wouldn't do it. It is this seemingly unseen loss that is the difference between cattle weights prior to handling and transport, compared to when they are weighed on a live weight basis at the point of sale, be it a feedlot, saleyard, or private sale. Disregarding excretory shrink, this weight loss is recognised as a relative measurement of an animal's ability to cope with the stressors involved. If an animal has been educated using LSS techniques to accept handlers as not being predators, and accepting of novel changes in environment, this loss can be significantly reduced, and represents an area that has significant potential gains for the industry. Not only is this gain in saleable live-weight value, but also in the overall homeostasis of the animal, thus improving feed intake after handling, disease resilience, and efficacy of vaccinations.

As well as the afore mentioned principles and other basic handling practices that use animal instinct to influence an animal's reaction, there are other techniques that will enable a desired result whilst reducing the animal's fear response. One of these is the use of *acclimation* which is defined by the Collins Dictionary online (2020) as "the process to become accustomed to a different climate, environment, or circumstances". Whilst cattle can be inquisitive to the presence of a novel item, their reaction to suddenly being confronted or forced into a new situation or environment, will be that of stress or fear. Grandin (1997) explained that when confronted with a novelty, or a novel item, it can be a strong stressor for the animal. The handling methods that are used for the Girolando milking cows to prevent a high stress response and subsequent poor milk yield are that of acclimation. Prior to their first calving and lactation, the cows are handled and exposed to the environment in which they will be milked over a gradual process until they can be ushered through the milking parlour without fear.

The first process with acclimation as well as other handling techniques that attempt to train young animals or calm sensitive cattle is to reduce their flight zone. The flight zone of a prey animal is the 'bubble' or distance, which is the safety trigger point at which they will no longer accept an approaching perceived predator. Their resulting movement response will

ensure they can get a head start in the event that they need to take flight. This zone is specific for each individual animal and is constantly changing, but the reaction of the leaders will very much influence the whole mob.

Through the process of reducing this flight zone, the animal acknowledges that the perceived predator is less of a threat than first thought. The training then progresses to the point where cattle are accepting of human interaction, processes and experiences thereafter, such as milking. The following video link depicts certain elements of the acclimation process for the Girolando cows: [click here](#) (PecuáriaLeiteira de Precisão PLP, 2017).

The above mentioned principles and techniques seem to be apparently obvious to the accomplished stockperson, and the author can categorically vouch for their effectiveness. However the techniques involved can challenge some producer paradigms and traditions, and do take time to learn, and yet by simply adjusting attitudes to stock handling, welfare benefits will ensue.

3.2 Facility design

Historically there have been two pioneering perspectives to improving animal welfare outcomes for cattle – from Bud Williams as mentioned, and the other being the most recognised name in this field, Temple Grandin. Whilst both had more in common than that which divided them, Williams’ ethos was on cattle handling, whilst Grandin’s focus is on the facility design in which the cattle are handled, although neither view is exclusive.

Improving animal welfare is the ultimate goal of both pioneers, although the challenge in the cattle industries worldwide is to create change where producers are enshrined in tradition, and often intergenerational habits. Grandin, (2003) observed that people have been more willing to purchase new and expensive equipment rather than learn to employ low stress handling techniques, even when there are clear benefits to cattle welfare and financial return in doing so. According to Grandin (pers. comm., 2019), she has discontinued her attempts to influence producers or processors about the ethical gains of improved facility design, but now focusses on the financial benefits of this, with much greater results. She went on to say that the biggest gain for animal welfare outcomes is to empower the least capable handlers, by building facilities for the effective throughput of cattle regardless of handling skills. The two approaches should, where possible, be adopted in unison to create a raft of benefits for animals, and the safety of those responsible for their care.

There have been many publications and scientific papers about humane livestock handling and facility design, most, if not all of which have had some input from Temple Grandin (Grandin, T., with Deesing, M. 2008., Grandin, T., 1980., Grandin, T. ed., 2014).

The author was able to visit Grandin’s facility designer Mark Deesing, at his home near Fort Collins, Colorado, where he had built a cattle handling facility as a demonstration site (Figure 3).

The structural design of these yards, and working function is congruent with the literature that has been produced and adopted by processors. Just as Grandin (2008) points out that “half the cattle in the USA are handled in equipment that I (Temple Grandin) have designed for beef plants”.



Figure 3: Mark Deesing demonstrating the design of the curved race, Fort Collins, Colorado, USA. Source: Author (2020)

Deesing (pers. comm., 2019) explained that the curved race design has been successfully adopted worldwide, however through misguided interpretation of design, not all have been built to the exacting standards for the natural flowing behaviour of cattle developed by Grandin. The reduction in effectiveness of the structure, by not adhering to the specifics of the design, cannot be masked by over-engineering or the high cost of construction, which is sometimes used as an indication of quality and suitability. The same can be said for the facility design that was instigated by Bud Williams in the ‘Bud Box’, which is equally effective as the curved race design when installed using the prescribed plan (Figure 4). The theory behind both designs is that it, in essence, captures the animal’s natural instinctual behaviour to return to the area where they just came from, using intentional layout measurements and angles.

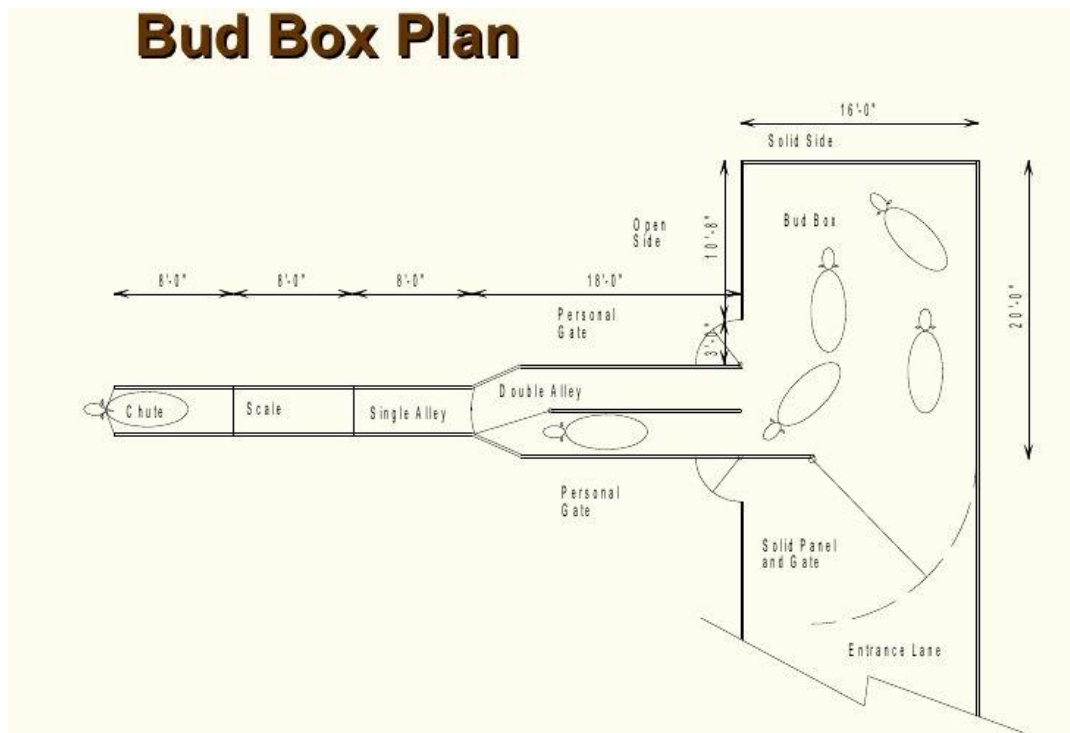


Figure 4: A Bud Box design depicting the intended layout for the CMA feedlot. Source: Wisconsin Beef Information Center (2011)

The author visited the Confinamento Monte Alegre (CMA) feedlot in Brazil where the facility design was intended to be based on the 'Bud Box', however did not adhere to the design specifics, and upon discussion with the employees, the consensus was that it was ineffective. Upon inspection it was apparent that the size of the let up yard, the foreign objects used for floor grip, and the design of the back-up gates all combined to make this yard very impractical, despite the high frequency of use in a feedlot with an annual animal turnover of 36,000 (Figure 5).



Figure 5: The alley/race that cattle load into prior to the squeeze, depicting some visual barriers for the smooth flowing of cattle. CMA feedlot Barretos, Sao Paulo Source: Author (2020)

There are differences in the smaller details of design between the two visionaries, whereby Grandin (2008) identifies that cattle “feel safe behind solid sides (chutes)”, whereas Low Stress Stockhandling Ltd (n.d.) recognises that “animals want to see what is pressuring them”. These nuances can be observed in the design comparison between Figure 3 and Figure 5.

Above all else the facility design is most effective when it used in its intended manner and by the handlers who are cognisant in how to use it. Kim Stackhouse-Lawson (pers. comm., 2019), Director of Sustainability for JBS² USA, explained that their processing plant at Greeley Colorado, slaughters approximately 5,000 head per day. As a result of this enormous throughput, the company’s focus is on having a facility design that allows for the effective handling of stock, by the numerous staff that could be facilitating their transition to slaughter, regardless of the level of handling skill and ongoing staff training. Therefore, the JBS focus at this facility was that of facility design, rather than stock handling techniques, although the latter is included in staff training protocols.

² JBS is a Brazilian company that is the world's largest processor of fresh beef and pork.

3.3 Staff training and management

There is unified consensus that for the greatest impact from improved animal welfare to be achieved, the vision must be generated from management which creates the workplace attitude to support this. Grandin (2008) wrote “I soon learned that although well engineered facilities provide the tools that make calm, low stress handling easier and safer, they do not replace management and gentle handling training.” Dr Lynn Locatelli (pers. comm., 2019) reflected on Williams’ opinion in saying that maintaining a positive attitude and focusing on the use of proper low stress handling techniques enables handlers to create successes and communicate effectively with cattle, while satisfying ideal welfare solutions.

Chapter 4: Additional Methods

4.1 Electrolyte and magnesium supplements

Time off water and dehydration play a significant role in the stress associated with long distance travel. However, adapting to new water infrastructure or water quality when it becomes available, is also a contributing factor. To assist animals to be adequately hydrated during transport, electrolytes are commercially available, although according to Rabiee A.R. and Leaneven I.J., (2011) the effects of electrolytes on carcass and meat attributes varied markedly among studies.

Whilst Australian climatic conditions are sometimes different to other countries, the possibility of animals being transported in extreme temperatures worldwide all pose travel challenges for livestock. The distance travelled for Australian livestock is also comparable in other countries, with the exception of smaller more populous areas such as the UK and Europe. With this being said, the author was not made aware of any countries that are using electrolyte supplements in the mainstream to assist with animal welfare outcomes.

The Australian owned company Beachport Liquid Minerals offers, amongst other products, a water additive that claims to help livestock lower stress naturally and utilise the numerous natural occurring effects of electrolytes and amino acids in cattle. They advocate that their Green Cap product is a natural formulation aimed at naturally calming livestock to improve ways of coping with stress during weaning, introduction and exit from feedlots, unfamiliar surrounds of yarding and transportation in both short-haul and long-haul trips. Apart from the electrolyte additives, one of the ingredients in Green Cap that significantly contributes as a calming influence on the animal is the element Magnesium (Beachport Liquid Minerals, 2020). This is further supported by the New Zealand stockfeed manufacturer NRM (2018) by stating that Magnesium relaxes nerve impulses after transmission and can act as a sedative or calming influence for the animal making them less reactive to factors that cause stress.

Magnesium is also being used by another Australian company, Direct Injection Technologies, in a product labelled uCalm which has been successfully trialled as a supplement for live export cattle during shipping transit. In a Queensland Country Life newspaper article, Gall (2019) wrote that uCalm “had been developed to assist in reducing animal stress during handling, yarding and transportation and was made up of multiple ingredients including cobalt, copper, magnesium and manganese, the key ingredient a form of concentrated glucose”.

At the Fazenda Floresta in Brazil, Magnesium is added to the ration of the Girolando cows prior to their first calving and subsequent milking, to further reduce their responsiveness at a time of heightened stimulation, and allow them to be more accepting of the process (Barros, pers. comm., 2019). This was the only international example the author encountered where supplements were currently being used to influence the animal’s ability to cope with the stress from handling or transport.

4.2 Transport monitoring

With approximately 14 million cattle in Australia being relocated each year through marketing alone, the transport process creates one of the most visible aspects of the supply chain, and a potential area of vulnerability, both in animal welfare outcomes, and consumer trust. In a report written for a cattle transport symposium in Colorado, USA, Schwartzkopf-Genswein *et al.* (2016) wrote that “the public’s desire to understand more about their food supply makes animal care during transportation a topic that many consumers, packers, and retailers have begun to consider as a measurable point of animal welfare within the value chain”. The transport phase is such an influential period and yet, other than regular driver checks, the animals and conditions are virtually unmonitored and unrecorded, creating a potential deficit in accountability. This, however, creates an increasingly pertinent opportunity for the update of Blockchain technology.

A Canadian agtech start-up company, Transport Genie, is developing a precision monitoring system that is focused on monitoring microclimate conditions as animals are being transported. Tim Nelson (pers. comm., 2019), who is a business partner at Travel Genie, explained that the company is monitoring six different elements from inside the truck including temperature, humidity, vibration, carbon dioxide, ammonia levels and noise, as well as using video footage which is all collated and sent to both the lead stakeholder and the driver. Nelson explained to the author that there are real time alerts which will notify the driver through an in-cab device, (as well as the transport company base) if parameters are exceeded, which will allow more time sensitive decision making and action relative to animal welfare outcomes. This monitoring system is a wireless Bluetooth unit in a retrofitted, ruggedized tamper-proof capsule that uses data security measures to ensure all measurements are recorded via Blockchain technology, but also privately. It also has a gyrometer, accelerometer and GPS monitor to measure driver performance, allowing the capture of hundreds of data points per minute to fully measure all of the factors that could impact on the animals’ transport experience.

Whilst the addition of this type of monitoring equipment could potentially be viewed as unfavourable to trucking companies or operators, the chain of responsibility laws that were amended in October 2018 by Australia’s National Heavy Vehicle Regulator (NHVR), incorporate primary producers. The NHVR (2018) website states “As a primary producer, any time you send or receive goods using a heavy vehicle with a gross vehicle mass of more than 4.5 tonnes — regardless of whether the vehicle is yours or someone else’s — you become part of the supply chain. You therefore have a shared safety management responsibility to prevent breaches of the law.” Therefore having the data from the monitoring device available to clearly demonstrate circumstances surrounding the cattle transport, has the added benefit of potentially mitigating producer liability.

According to Sanna Mesman (pers. comm., 2019), the national contact point for animal welfare at the Ministry of Agriculture, Nature and Food Quality in the Netherlands, the Netherlands was developing animal transport guidelines in relation to climate variability and

extreme weather conditions. As part of this progression, there is significant trial work being undertaken with Transport Genie, to fully monitor the climatic conditions in transit for a variety of species. It was Mesman's expectations that there will be a mandatory requirement for on-board monitoring into the future for both animal welfare standards but also accountability and advocacy of standards to the consumer.

Similarly, Canada is also undergoing several scientific trials regarding animal transport, using Travel Genie as a data capture device (Schwartzkopf-Genswein, pers. comm., 2019). When Grandin (pers. comm., 2019) was asked about the relevance of sensor and video monitoring devices in transport, she responded that the single biggest influence in improving animal welfare at processing facilities was cameras, and potential improvements could also be achieved during transport with the use of this technology.

Chapter 5: Marketing Potential

5.1 Quality Assurance programs

The financial and ethical benefits of continually improving the high animal welfare standards for beef cattle are realised by ensuring that animals have a high quality of life and a humane death. Consumer confidence is the ancillary benefit of this, which results in the willingness of the shopper to continue to choose beef as the protein of choice, and retain market share in an increasingly competitive marketplace, not to mention the most recent market disruptor from plant based proteins.

Industry and commercial Quality Assurance (QA) programs create the backbone from which the integrity of producers demonstrates the integrity of livestock history records and on-farm practices. These programs should not be confused with the biosecurity laws and measures that ensure a country's animal health standards are not jeopardised. The difference between the industry and commercial QA programs is conceived in the standards and governance over whose protocols are being set. The Australian beef industry's on-farm assurance program is the Livestock Protection Assurance (LPA) and is considered to be a voluntary program however is a precursor to using the National Vendor Declaration (NVD) which is mandatory for any cattle movements. "Producers who choose to participate in the LPA program commit to carrying out on-farm practices that feed into and support the integrity of the entire system" (Integrity Systems, 2019). Essentially this is an approved program that allows market access based on producer declarations but is a minimum requirement for other assurance programs.

In the USA, the equivalent program is Beef Quality Assurance (BQA), whose guidelines are designed to make certain all beef consumers can "take pride in what they purchase – and can trust and have confidence in the entire beef industry" (Beef Quality Assurance, 2019). The program is funded by the US equivalent of the Australian transaction levy, the Beef Checkoff, whereby a fee is paid to the Beef Checkoff with the sale of every animal. The BQA program does provide advertising to inform the public about its role and relationship with beef producers, but also coordinates a number of industry training events. Chase DeCoite (pers. comm., 2019), director for the BQA Programs, advised the author that the BQA has amongst other training courses, *Stockmanship and Stewardship* (advocating low stress stockhandling) programs as well as a *Transportation and Certification* program.

The commercial QA programs are those developed by commercial processors to further advocate the standards for the suppliers of the animals they process, but may also include food safety assurance elements. The JBS USA Sustainability Report (2017) stated that "we believe that our third party oversight and audit results further validate that our more than 1,500 highly skilled QA team members, are doing an effective job promoting, protecting and enhancing the safety and quality standards at JBS USA".

The Vion Food Group is a European animal processing company with 15 pig and 12 cattle processing plants in The Netherlands and Germany. The company identified that the customer requirements and consumer expectations were rapidly evolving and in 2017 decided to publish its first annual Corporate Social Responsibility report, which publicly outlines the company results and major industry topics. The company has identified that consumer trust in food can only be achieved with a high level of transparency, and recognises this in the most recent report Vion Food Group (2019) by stating that; “where it concerns meat and other protein food items, the consumer sees product origin and production circumstances in the supply chain as relevant information. Being able to provide that information helps create trust”.

5.2 Independent accreditation programs

There is an opportunity to capitalise on consumer trust and sentiment by setting high standards for animal welfare and advocating these as a marketing tool to achieve a premium price. The concept draws on an independent quality assurance and auditing structure that can be endorsed and/or administered by Non-Government Organisations (NGOs) such as Royal Society for the Prevention of Cruelty to Animals (RSPCA) in Australia or the Dutch Society for the Protection of Animals (DSPA or De Dierenbescherming) in The Netherlands, for example.

The author met with Dr. Sophie de Graaf (pers. comm., 2019), senior policy officer at the DSPA administered Beter Leven program, who revealed that the importance of assurance programs that are independent, arises from the consumer demand for non-biased standards and auditing. She reflected that the Beter Leven certification is not funded by industry levies, thereby maintaining its independence. According to de Graaf, in the Netherlands the NGOs are the third party who has the consumer trust, and this is reflected in the significant increase in retail demand across the entire range of products endorsed by the NGO backed Beter Leven brand.

There are other companies that operate independently from both NGOs and industry, however the key element in all of these programs is that they operate independently from industry developed QA guidelines. The New Zealand based company First Light Farms (Figure 6) produces grass fed wagyu and venison, and states in its company values that “our animals are raised with respect for the animal and the environment, our commercial driver is profitable and sustainable returns for everyone in the First Light value chain” (First Light, 2019). As a marketing tool for their ‘delicious meat raised right’ they adopted the Certified Humane accreditation which is an independent body endorsed by over 70 NGOs (Certified Humane, 2019).



Figure 6: First Light grass fed Wagyu. Salvesson Farms, Canterbury Plains, New Zealand.
Source: Author (2020)

It should be noted that all the industry – commercial and independent – assurance programs mentioned have acknowledged the use of independent auditors to monitor their compliance with their specific standards. The advantage of NGO input and approval for these programs, is that it adds integrity to the guidelines. For example, BQA promotes their NGO endorsements, and even the Ministry of Agriculture, Nature and Food Quality in the Netherlands invites NGO contribution and involvement in animal welfare policy.

5.3 Consumer engagement

At a time when the apparent disconnect between agricultural producers and consumers is alarmingly high, the importance of consumer engagement has never been greater. As Wendell Berry (1990) famously wrote in *What are People For*, “*eating is an agricultural act*” implying that intended or not, consumers are involved in agriculture through their retail choices, and have the ability to create change in production trends through this empowerment.

This lack of consumer engagement has been the focus of the Irish charitable trust Agri Aware (2018), whose mission is to “create a national awareness of the value of modern agriculture and farming, the stewardship of the rural environment, animal welfare and the benefits of nutritious Irish food”. The chairman of Agri Aware, Alan Jagoe (pers. comm., 2019), informed the author during a farm visit that the purpose of the independent body was to be exactly that, independent and non-biased. The founding members of the independent body have most recently been validated by the Irish Department of Health and Education, which Jagoe acknowledged as being significant support for the body. One of the focuses of Agri Aware has been to engage and provide information to school aged children so that when they, in

time become consumers they have an understanding of production systems and processes of agriculture. One of the initiatives mentioned was to engage the services of a chef/cook to demonstrate to the children the meals that can be created using totally locally grown and raised produce. Jagoe went on to explain that the language used is crucial to the effectiveness of the message or understanding, with examples such as 'Generation Y' not wanting to be 'educated' but 'informed', and that using language such as 'image' when defining industry marketing advantage is by default perceived as a fantasy. An example being the clean green image of the Irish dairy industry.

This all ties in with the MLA's Strategic Plan 2016-2020, that there is an opportunity and a need for industry to improve the level and consistency of its engagement with the community. Lone Star Farms CEO, Boyd McDonald (pers. comm., 2019), in New Zealand provided the author with the best example of this when he defined the company motto as "Farming like everyone is watching."

Conclusion

In any animal or meat industry, the topic of animal welfare is most commonly associated with negative connotations and vulnerability to significant liability and losses. However, the opportunity for potential gains from high welfare standards is undeniable.

Although farm profitability is the key to maintaining welfare standards, the focus of production needs to be mindful of consumer expectations and trends, and through continual improvements in animal welfare, consumer needs can be satisfied and farm profitability increased. This profitability is not just achieved through demonstrating standards at the retail level, but also at the production level, through reduction in productivity losses and commodity discounting.

Having an understanding of the causes of stress and an animal's reaction to this, any time the animal is handled and transported, provides the opportunity for a positive influence. Although the variation of each individual animal's response to the same stressor is enormous, even under identical circumstances, the effects of stress are generally consistent on average. By attempting to influence the bulk average, significant gains can be achieved, without being prescriptive in approach, although those willing to focus on the finer details can be rewarded in doing so. If the reaction to how well animal welfare standards were being met in beef cattle were as measureable as the milk yield response to the wellbeing of a Girolando cow, producers could more easily quantify their influence.

The adoption of Low Stress Stockhandling and improved facility design, have proven to be used with great effect worldwide, although the biggest barrier to realising these improvements is a reluctance to change. The paradigms and traditions that can be inherent in producers are usually the drivers that resist a change in protocols or procedures. Although understanding *why* is important, understanding *how* is more critical in developing new methods or using improved facilities. Arguably Brazil's greatest advocate for animal welfare through his work within the beef industry, Professor Mateus J.R. Paranhos Da Costa (pers. comm., 2019) acknowledged to the author that there are plenty of welfare guidelines detailing what to do, but very few are advising how to do it. There is a myriad of detail and experiences throughout the world that identifies these welfare improvement strategies as being effective, however Grandin has identified the greatest driver for change as the financial gains possible by adopting these practices. The overarching determinate of success however, is staff training and management, which coordinates understanding and skill improvement to uphold the policies and protocols that will ensure that animal welfare is paramount.

The use of electrolyte supplements is not a new concept in attempting to buffer cattle from the effects of transport and handling. However, the results from doing so appear to be difficult to quantify, with scientific studies divided. The calming effect of magnesium is more widely recognised and yet other than the Girolando milking cows, it was not discovered to

be widely used. The Australian products mentioned (Green Cap, UCalm) can provide both electrolyte properties as well as magnesium, with further research being conducted into the measurable benefits of use, as well as anecdotal accounts.

The transport monitoring component provides an attribute to animal welfare that has not yet been adopted on a broad scale internationally or here in Australia. The raft of benefits for all parties involved in the transport of cattle identifies this as providing the greatest feedback on the influences of travel on cattle. By understanding these influences improvements can be made if necessary to multiple aspects of the travel component. The data obtained would be invaluable as evidence that every effort is being made to provide the cattle with a high standard of transport.

The evolution of the farm is driven by the consumer who ultimately decides the difference between historical standards and future expectations. While the topical debate remains over the definition and interpretation of welfare standards the marketing potential of these standards and their transparency allows market share and product premiums to be achieved. The baseline QA programs instigated by industry and commercial companies provide the standards to retain market share and maintain integrity. Retail premiums are being achieved by those companies who are providing well-advertised standards, and consumer perceived credible independent auditing.

Consumer engagement and advocacy does attempt to bring the culture back into agriculture, by providing information to develop the public's understanding of food and its relationship with agriculture. The language used in this process has been demonstrated as being integral in the effectiveness of communication and the influence on trends shaping consumption.

Finally, it should be noted that of the countries visited, and the understanding gained of their respective beef industries, the Australian beef industry generally rates highly in terms of animal welfare standards achieved.

Recommendations

1. **Cattle transport symposium.** The BQA identified cattle transport in the USA as a significant and influential process in producing beef and orchestrated a 'Cattle Transportation Symposium' in Colorado in 2015. It presented information and scientific papers as well as collaboration to identify current and future areas of focus and research. Chase Decoite (pers. comm., 2019) identified that the symposium was the launching pad for the BQA transportation quality assurance. An equivalent symposium in Australia, with major stakeholders, has not historically been organised, but offers potential for information sharing and improvements in the sector.
2. **Clear communication.** Both stock handling techniques and facility design have been implemented with training courses and technical expertise available upon request. Endorse these methods and demonstrate their impact through a cattle transport forum with industry professionals. Similarly, this can occur for electrolyte and magnesium supplement potential to be further explained and results conveyed.
3. **Transport monitoring devices.** The implementation of these has huge potential for understanding cattle transport conditions, and how these can be manipulated to achieve greater results. There are some experimental trials in Australia at present, however Tim Nelson (pers. comm., 2019) from Travel Genie anticipates that retail beef outlets will dictate the requirement for these to be installed as a mandatory animal welfare standard. This would offer incredible feedback for all parties as well as accountability for those responsible and an objective basis for demonstrating adherence to welfare standard policy.
4. **Transparency and marketing.** International examples cited in this report of both the JBS and the Vion sustainability reports and corporate social responsibility report, has, for example, been mirrored in Australia by Teys Australia (2018) in their own corporate social responsibility report. Transparency is one of the strongest drivers of marketability and this should continue to be promoted to inform consumers and allow them to make purchasing decisions based on fact.
5. **Consumer engagement.** This is an area that is an evolving focus, especially given the complex nature of technology trends and the growth drivers for food. To retain market share for beef and constructively challenge any disrupters to the industry, trust must be gained. It would seem that trust is the precursor to knowledge and understanding. This is achieved through informing the consumers of the production processes of all agriculture products, with transparency and accountability as being the highest priority.

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Plain English Compendium Summary

Project Title:	The Collateral Benefits of Cattle Welfare during Handling and Transport. Realising the potential of animal welfare for the Australian beef industry
Nuffield Australia Project No.:	1915
Scholar:	Alistair Corr
Organisation:	“Wirranda” Rhydding Road Moura Qld 4718
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Objectives	<ul style="list-style-type: none"> • Outline the impact that stress can have on cattle during handling and transport. • Detail the direct influences that can be manipulated to minimise this stress. • Highlight the effectiveness of other indirect tools. • Discuss the opportunities for the industry through setting and maintaining high standards of animal welfare policy and their advocacy
Background	To establish the potential benefits for the Australian beef industry from focusing on animal welfare, through production increases and improved animal and commodity value through the chain, as well as highlighting the resulting marketing advantages in a competitive protein market.
Research	In any animal or meat industry, the topic of animal welfare is most commonly associated with negative connotations and vulnerability to significant liability and losses. However, the opportunity for potential gains from high welfare standards is undeniable. Whilst travelling through the US, the Netherlands, Ireland, New Zealand and Brazil, there was numerous producer visits, as well as processors, industry bodies, universities, private researchers and government authorities.
Outcomes	Farm profitability is the key to maintaining animal welfare standards, and whilst the focus of production needs to be mindful of market trends, through the continual improvement of animal welfare, consumer needs will be appeased and farm profitability increased. This profitability is not just achieved through demonstrating standards at the retail level, but also at the production level, through reduction in productivity losses and commodity discounting. Having an understanding of the causes of stress and an animal’s reaction to this, any time the animal is handled and transported, provides the opportunity for a positive influence.
Implications	To highlight the changes that can be made in animal handling and transport in the production system that will bring improved animal welfare outcomes and result in inevitable financial and ethical benefits.