Animal Welfare

Bridging the gap from producer to consumer

A report for

By Thomas Green

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Executive Summary

Globally, livestock producers show a high level of care and skill when raising animals. This skill in combination with new technologies have seen rapid increases in production efficiencies in developed countries. This has resulted in the non-agricultural public now questioning the ethics of the livestock production industry.

This report explores the complexity of animal welfare in livestock production with a focus on the beef feedlot industry. Animal welfare is an emotive and subjective topic, and it is hoped this report can inform the reader and give confidence to be part of the conversation that is currently surrounding livestock production and animal welfare.

It was discovered that there are vast differences globally regarding animal welfare standards, with main drivers being government legislation, wealth, culture, and religion. Animal welfare is largely misunderstood with many accompanying misconceptions. An example of this is the association of large-scale livestock production with poor animal welfare standards. This was not found to be the case as part of this research.

Livestock producers in developed countries are increasingly removed from the end consumer due to complex supply chains. These supply chains are designed to extract as much financial value as possible and allows little room for transparency between producer and consumer. These livestock producers and peak bodies have recently been seen to be defensive and reactive to claims of poor animal welfare. This is making agricultural sector appear that they have something to hide.

Livestock production is crucial globally and should be celebrated as producing nutrient dense protein with micronutrients essential to human health. Livestock production also plays a critical and underestimated role on soil health and carbon sequestration. Given their importance, livestock producers have a responsibility to care for animals in a transparent and sustainable manner, in line with stakeholder shared values.

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Foreword

From a young age, growing up on cattle breeding properties has resulted in my strong connection to animals and the livestock production industry. Following studying in New South Wales and working abroad I began a career in the Australian feedlot industry. I continue my career in the feedlot industry in my current role as General Manager of Thomas Foods International Feedlot, located in South Australia.

The nature of the feedlot industry can be demanding as there is no slow seasons or lazy weekends, but it is a challenge I enjoy. Another reason that I like being a part of the industry is the broad range of skills required to be considered capable and proficient.

Over the past five years there has been growing commentary and concern regarding animal welfare in intensive agriculture. I am respectful of other opinions and understand the difficulties in telling the story of intensive agriculture. In recent years I found myself being challenged by the intensity and personal nature of groups against livestock production.

The Nuffield journey has given me a global understanding of how important animal production is for many reasons, including environmental sustainability, combating human malnutrition, and maintaining religion and culture. As well as this, it has shown me that Australia has strong animal welfare standards but certainly has room to improve in practice and principle.

This report is not written to justify intensive agriculture but is designed to empower the reader with some insight regarding animal welfare in livestock production and the feedlot industry.

Finally, we as livestock producers should be proud of what we do but not ignorant to changing expectations and preferences of consumers. We must be open to change, while still striving to produce a quality product in an efficient manner.

Acknowledgments

I have been very fortunate to firstly be awarded a Nuffield Scholarship, and secondly have a support network to make it a reality.

To Rabobank my Investor, thank you for your generous support and positive influence. Throughout my global travels Rabobank has had a consistent presence in agricultural settings and their focus on sustainability and community is to be highly commended.

Thank you to the 2019 Nuffield Scholars and wider Nuffield community. The bonds built over a short period of time are lifelong and incredible, and I am better for meeting each one of you. A special mention to my Global Focus Program mates. Thank you for what was a truly unforgettable experience.

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Thank you to the Thomas Family. Without Chris and Darren's support this experience would not have been possible. To the entire team that managed the business with skill and ease in my absence, particularly Jeff, Kelly and Martin, thank you.

Thank you to my parents Andrew and Leanne for caring for Charlotte, Harry and Georgie, allowing Justine to experience some of the Nuffield journey alongside me.

Finally, to my wife Justine. I am forever thankful for your continued support and encouraging me on this journey. A privileged opportunity.

Abbreviations

ALFA – Australian Lot Feeders' Association

FAO – Food and Agriculture Organization

ISC - Integrity Systems Company

LPA – Livestock Production Assurance

MLA – Meat and Livestock Australia

NFAS – National Feedlot Accreditation Scheme

OIE – World Organisation for Animal Health

RMAC – Red Meat Advisory Council

SDGs – Sustainable Development Goals

USDA – United States Department of Agriculture

WHO – World Health Organisation

Objectives

The main objective of this report is to allow the reader to gain a higher level of understanding and gather some perspective concerning animal welfare in Australian agriculture. Current conjecture surrounding livestock production and animal welfare has made some producers feel uncertain and nervous about their own businesses and livelihoods. It is hoped that this report can assist stakeholders feel more confident to enter conversation with other interested parties and give direction of a way forward.

This objective will be achieved through the following:

- Defining animal welfare and discussing methods of assessing it.
- Use the authors travels and experiences to explain global animal welfare, consumer perceptions and consumption trends.
- Access animal welfare in the Australian feedlot industry and suggest potential improvements or considerations.
- Provide insight into the Australian red meat industry regarding peak body structures and quality assurance programs.
- Explore the importance of the triple bottom line and shared values between producer, processor, retailer, and consumer.

Figure 1. De Dafallah Abdelghani Elhassan (left), Author (right), assessing exported Australian sheep, Widam Foods, Qatar (Source: Author)

Introduction

The Australian red meat industry has played an integral role in the development and growth of the Australian nation since beef cattle arrived on the mainland in 1788 (Condon, 2014). The industry continues to strengthen and is the most common and widely dispersed agricultural activity in Australia (Martin, 2015). The red meat industry is also a hugely significant contributor to the Australian economy, shown by the following national 2019 statistics:

- There are 80,300 red meat businesses, from paddock to plate in Australia
- 404,800 people are employed directly and indirectly by the industry
- Red meat exports are valued at over $13.5 billion in 2018, making Australia the world's largest red meat exporter by value (RMAC, 2019).

Lot feeding or grain finishing is the process of confining cattle to yard area with watering and feeding facilities, where cattle are supplied a specially formulated feed for the purpose of beef production (MLA, 2012). The feedlot industry in Australia can be traced back to the 1940s. It was established due to the desire of industry innovators looking to increase profitability and produce a more consistent product. Commercial feeding of cattle began in the 1960s to ensure year-round production and the ability for the Australian herd to expand with cows grazing on land that was previously used for finishing cattle for market.

The Australian feedlot industry is following a similar trend to the entire red meat industry by seeing growth in several key areas. Record levels of cattle on feed in 2019, as shown in Figure 2 could be used as an indication that the grain fed industry should be confident and strengthening.

In contrast to the industries' strong growth and demand over the past two decades there are also several threats that the red meat and feedlot industries must acknowledge. Rising competition from global competitors, exposure to adverse climate conditions and volatile input costs are challenges that the red meat supply chain has faced for some time. These factors affect all streams of Australian agriculture, but there is a new challenge that the livestock industry faces, namely consumer and community support.

Cattle numbers on feed over time
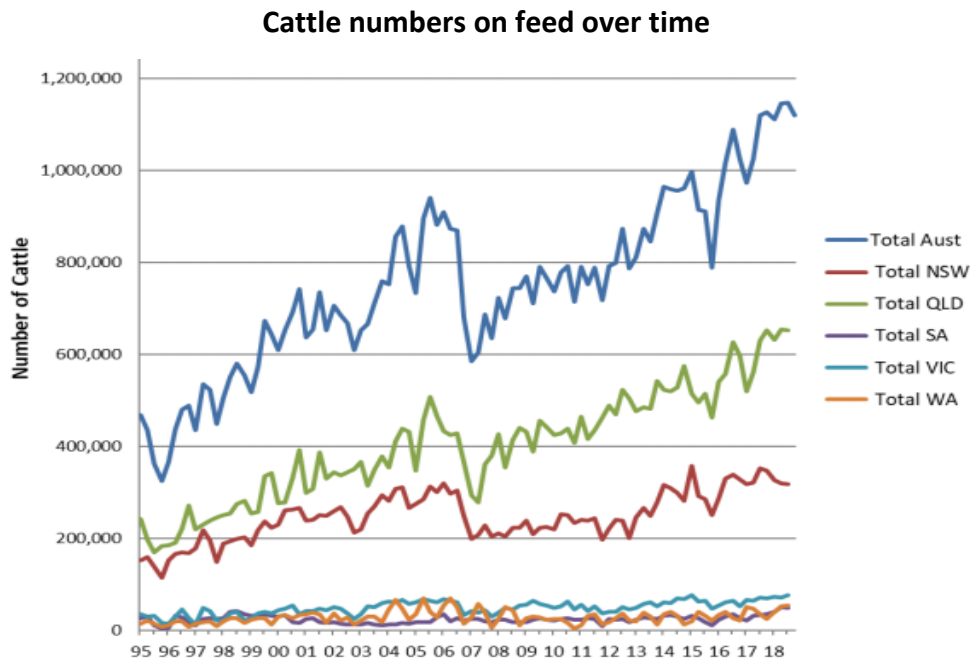
Figure 2. Historical Australian cattle on feed numbers (ALFA, 2019)

High-level documents such as *The Meat Industry Strategic Plan 2020* have recognised the need for livestock production industry to continue to improve in several areas to maintain the trust and support of the wider community. This is clearly shown in Figure 3, expressing consumer and community support as the single biggest economic risk to the red meat industry (RMAC, 2015). Consumer and community support are based on many factors including price, food safety, environmental and animal welfare concerns. With help from this research experience in many of the key beef producing and consuming nations, this report explores animal welfare in detail and its role in the red meat industry moving forward.
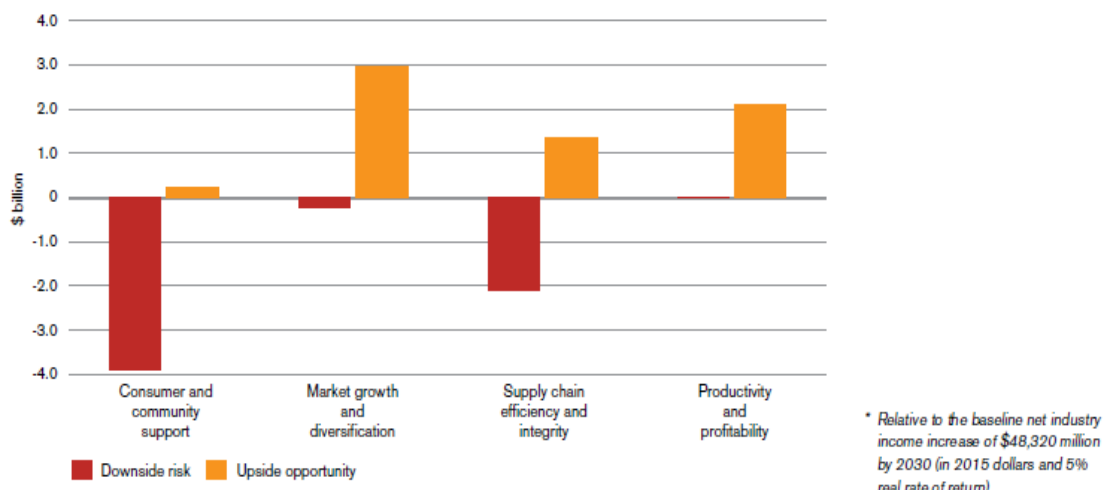
Figure 3. Forecast value of risks and opportunities (by pillar) to 2030 (RMAC, 2015)*

Chapter 1: Animal Welfare - The Basics

"The greatness of a nation and its moral progress can be judged by the way its animals are treated" (Gandhi, 1931)

1.1 What is animal welfare

The relationship between humankind and animals date back to the ancient Greeks and since that time, the treatment, purpose and welfare of animals has been a point of conjecture. The World Organisation for Animal Health (OIE) is the primary international standard-setting organisation for veterinary concerns, and it provides guidelines, codes and science-based standards. The OIE defines animal welfare as how an animal is coping with the conditions in which it lives. An animal is in a good state of welfare if (as indicated by scientific evidence) it is healthy, comfortable, well nourished, safe, able the express innate behaviour, and not suffering from unpleasant states such as pain, fear and distress (OIE, 2015). During the author's travels, it was evident that animal welfare is a largely misunderstood term. Conflicting information regarding livestock production and lack of extension services is a common occurrence throughout the food supply chain and needs addressing immediately to bridge the growing gap between producer and consumer.

Fraser (2008) explained different people have tended to emphasize different concerns regarding animal welfare and for this reason it is essential to have a method to assess and remove some of the subjective nature of animal welfare. As illustrated in Figure 4, some emphasize the basic health and functioning of animals, especially freedom from disease and injury. Others emphasize the 'affective states' of animals – states like pain, distress and pleasure that are experienced as positive or negative. Others emphasize the ability of animals to live reasonably natural lives by carrying out natural behaviour and having natural elements in their environment. All three conceptions are essential parts of animal welfare, but it is important to understand that a combination of the three leads to a true positive animal welfare outcome.
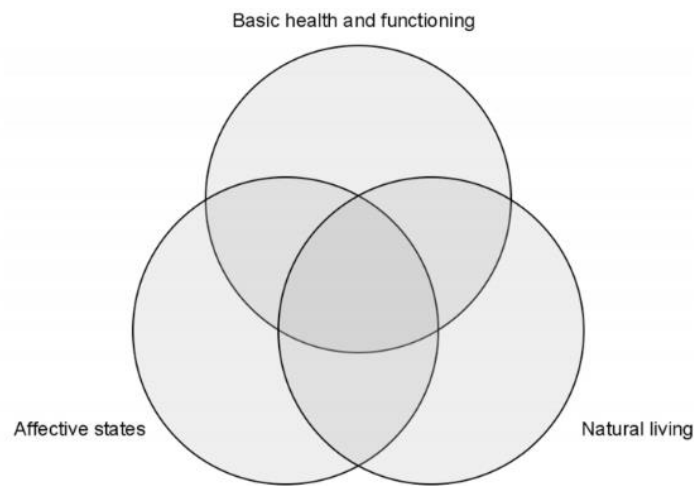
Figure 4. Three conceptions of animal welfare, (Fraser, 2008)

1.2 Assessing animal welfare

1.2.1 The five freedoms of animal welfare

The beginnings of assessing and characterising animal welfare were born in the United Kingdom in the 1960s. This action was in response to publications such as Animal Machines, written by Ruth Harrison, which highlighted what the author concluded to be mistreatment of animals kept for intensive farming. In 1965 a committee was formed, chaired by Robert Brambell which presented a report which later became known as The Brambell Report. In summary, the report stated that animals should have the freedom to stand up, lie down, turn around, groom themselves and stretch their limbs (Elischer, 2019). This was the birth of what we know today as the 'five freedoms of animal welfare', illustrated in Table 1. Since that time the five freedoms have been used as the basis in writing many animal care protocols, constructing of animal welfare audits and adopted by representative groups such as World Organisation for Animal Health.

Table 1. Five Freedoms and Five Domains- simplistic form (RSPCA, 2019)

Five Freedoms	Five Domains
1. From hunger and thirst	1. Nutrition
2. From discomfort	2. Environment
3. From pain, injury and disease	3. Health
4. To express normal behaviour	4. Behaviour
5. From fear and distress	5. Mental state

1.2.2 Five domains of animal welfare

In 1994, Professor David Mellor and Doctor Cam Reid proposed a new model as a means of systematically identifying and grading the severity of different forms of welfare. Mellor and Reid reformulated the five freedoms as the 'five domains' of nutrition, environment, health, behaviour and mental state. This approach allowed a distinction to be made between the physical and functional factors that affect an animal's welfare and the overall mental state of the animal arising from these factors. A positive mental state arising from the presence of positive experiences and sensations, with the avoidance of, or minimal, negative experiences, is important to safeguard and ensure good animal welfare can be achieved when the physical (nutritional, environmental, health and behaviour) as well as psychological needs are addressed (Blackett, 2014). Chapter three will explore each of the five domains in a feedlot situation and what the industry must do to ensure positive animal welfare outcomes.

1.3 Animal welfare vs animal rights

It is important to understand the difference between animal welfare and animal rights. As described above, animal welfare pertains to the caring to the needs of animals, while the (American Association for Laboratory Animal Science Foundation, 2020), describes animal rights as the belief that animals are entitled to the same rights as humans and that they must be included in the same system of morals applied to humans. This belief wishes to eliminate the human need for animals in any form, including food, pets and recreation. It is recognised and respected that individuals and groups do not share fundamental values on this matter and there is a minority group of people globally that believe animal products should not be used for any purpose. This report will focus on the welfare of animals rather than discussing animal rights.

Chapter 2: Industry in Focus - Animal Welfare in Beef Feedlots

2.1 Feedlots' role in red meat supply chain

Commercial grain feeding has grown significantly since the 1980's. Australia now has the capacity to feed over one million cattle in feedlots at any one time (PricewaterhouseCoopers, 2011). Grain feeding cattle in Australia opened key export markets and the industry is now known globally for producing consistent, high quality meat protein. Feedlots have helped mitigate the effects of climatic variability in livestock production and compliments Australia's expansive cattle breeding regions.

In Australia, cattle are generally placed into feedlots between 380kg and 500kg and are typically 14 to 20 months of age when entering a feedlot. Before feedlot entry, cattle are typically raised on extensive grasslands throughout many regions of Australia. A large portion of this land is only suitable for livestock grazing. Cattle are usually fed for 50 to 120 days depending on body score condition and market. This equates to approximately 15% of the life of the animal spent in a feedlot (Sustainable Table, 2020). This is an important point when discussing the quality of life of a beef animal when comparing other meat protein industries.

2.2 Animal welfare in feedlots

The remainder of the chapter will explore animal welfare in Australian feedlots using the five domains model as an assessment tool. The author chose this model, shown in Figure 5, because it recognises that good animal welfare is more than just the absence of negative experiences and avoiding compromises, but also recognises that good welfare depends on the presence of positive experiences within these domains.
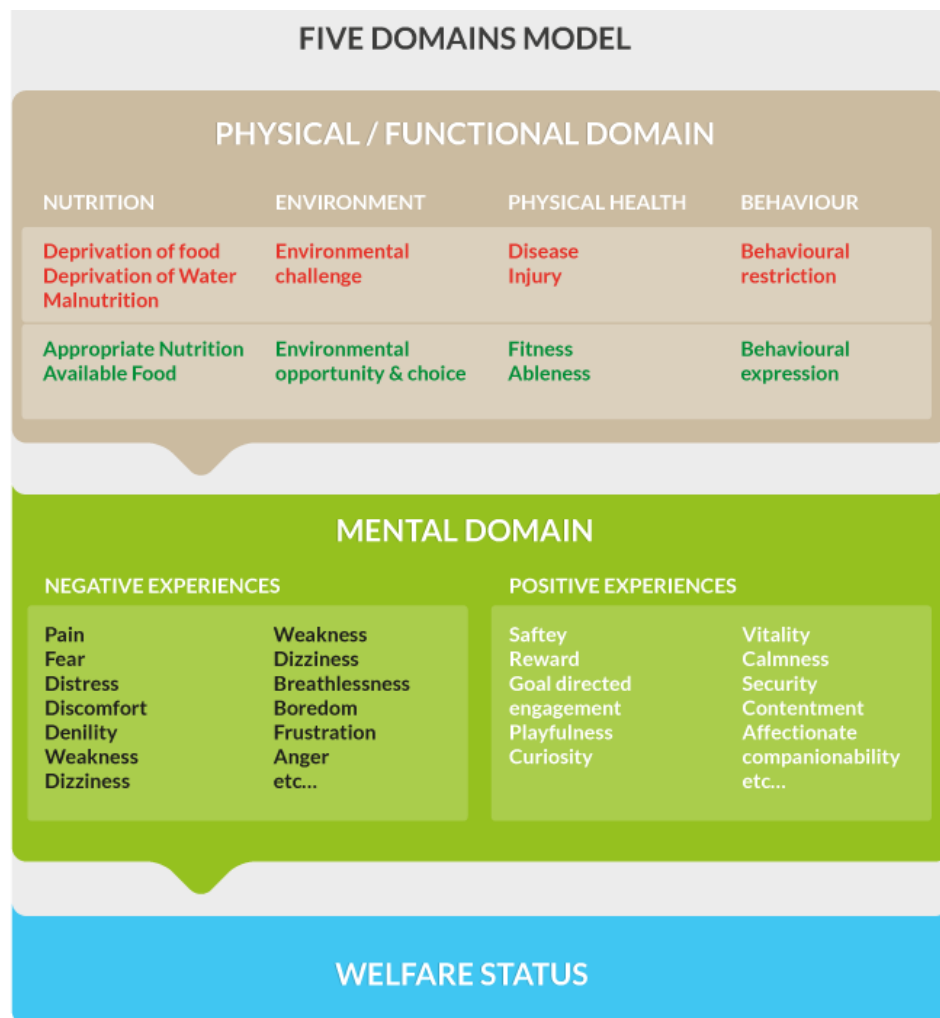
Figure 5. Five domains of animal welfare model (Wild Welfare, 2019)

2.2.1 Nutrition

Animal nutrition in all production systems is a vital component of animal welfare and production. A typical feedlot diet, as shown in Figure 6 is a specially formulated ration balancing energy, protein, fibre and essential vitamins and minerals. The main source of energy in Australian feedlot rations is wheat or barley, with the typical finisher diet containing between 60% and 80% of cereal grain. Accredited feedlots marketing grain fed beef must feed a diet with a minimum energy component of 10MJ per kilogram of dry matter (Aus-Meat, 2018). This is to ensure producers are offering an energy dense diet that will lead to animals gaining weight at an acceptable level, resulting in a consistent, quality product. Cattle should be introduced to feedlot diet carefully and gradually to maintain digestive health and not to impede future weight gain potential. Cattle are offered feed at a minimum interval of once per day and daily feed amount carefully monitored. Water is another key component to any livestock production system. Feedlots are required to provide animals with clean drinking water that is monitored daily and not have supply interruptions (Watts, 2016).

Critics of feedlot production systems argue cattle are designed to forage, and that a grain diet is unnatural and leads to serious health problems. A condition called acidosis is at the heart of this criticism. The ruminant version of heartburn, acidosis is typically sparked by eating feed high in starch or sugar, which results in a sharp drop in pH in the rumen. Low pH is acidic, and repeated bouts of acute acidosis can result in poor health outcomes such as liver abscesses and lameness (Cheater, 2015). Acidosis is generally associated with rapid introduction of high energy diet or poor diet formulation or manufacturing. These issues can be controlled by sound management practices.
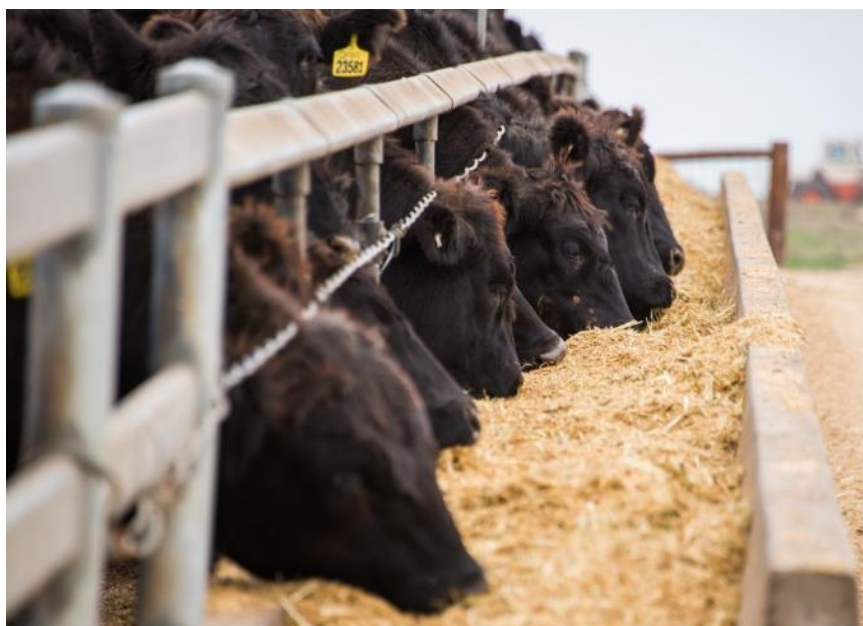
Figure 6. Example of a feedlot diet and feeding system in confinement feeding (Iranda Beef, 2017)

Other criticisms of feedlot nutrition are the inclusions of in-feed antibiotics and beta agonists in diets. There are some situations where in-feed antibiotics can be used in feedlots. In these cases where it is deemed that a group of cattle are showing high levels of acute sickness, usually respiratory illness, an antibiotic such as tetracycline can be used for a short period of time. These treatments are targeted and only used when necessary under guidance of a veterinarian.

Ionophores are additivities found in most feedlot rations globally, they are used to maintain health, increase feed efficiency and body weight gain (Global Ag Media, 2020). Although classed as an antibiotic, ionophores are not considered medically important to human medicine by the World Health Organization (WHO, 2017). They have also been recognised by fast food chain, McDonalds as an important part of animal health and welfare.

Beta agonists are currently not permitted for use in Australia but their use in North America has recently come under criticism. Beta-agonists are a class of non-hormonal compounds fed to cattle. Their mode of action is to bind to receptors on fat cells in the animals' body and redirect and reduce the metabolism of fat. Consequently, less fat is produced, and less fat is stored in the carcass. At the same time the compounds bind to receptors on muscle cells and redirect and increase the size of muscle fibres (Comerford, 2019). In North America claims of animal welfare issues as a result of feeding a beta agonist, Zilmax were raised in 2013 (Niman, 2014). As a result, major meat processors announced they would no longer accept animals that have been fed this product. The issues were surrounding incidences of cattle suffering from stress and lameness after transportation to slaughter plants. North American lot feeders still have access to Optaflexx, a slightly less aggressive beta agonist and is reported that 60% to 80% of feedlot cattle in the US are currently fed a beta agonist (Comerford, 2019). After visiting feedlots throughout North America and Australia the author believes the use of beta agonists should not be considered in Australia due to export market access and animal welfare concerns.

In summary, cattle nutrition in a feedlot environment is designed to maintain animal health while putting on weight efficiently. Feedlots, particularly in Australia play an important role in supplying good quality feed when grass is not available. Australia is prone to droughts, and without feedlots, animals could face shortages in feed and possibly starvation. Proper management and enforced quality standards are essential in diet formulation and manufacturing to maintain feedlot animal welfare standards regarding nutrition.

2.2.2 Environment

It is important to remember that the environment can be harsh, and all forms of agriculture are extremely susceptible to weather extremes and climatic variables. The Australian feedlot industry has understood the importance of cattle comfort as a driver of animal performance and animal welfare for some time.

Exposure to heat is one of the main causes for concern in feedlot situations. The industry has invested heavily in researching the effects of heat and mitigation strategies. A number of complex interacting factors such as tropical breed content, hide colour, fat cover and health status all have major effects on an animal's susceptibility to heat while the combination of temperature, wind speed and humidity are the main weather factors (MLA, 2001). Accredited

feedlots must have a documented 'heat load plan' that is reviewed annually. To help monitor extremes in weather most modern feedlots are fitted with onsite weather stations. The best protection from environmental heat in feedlots is installing shade, as shown in Figure 7. Installation rates across Australia have increased rapidly in recent times with producers starting to understand the benefits. The other main environment welfare concern is pen surface conditions within the feedlot. Cold and wet winters in southern Australia leads to wet pen conditions for extended periods, which can lead to mud and dag build-up on animals. Comfortable animals sit and ruminate for longer periods of time which decreases when pens are poorly kept. Good feedlot practice is to clean pens every 50 days to keep a cleaner and more comfortable environment and a form of clean bedding, such as straw or woodchip can be used in certain situations, shown in Figure 7.

Figure 7. Feedlot in southern Australia, shade and straw being used to increase cattle comfort (Source: Author, 2019)

In a pasture situation, animals can also face heat and cold stress, so it is important that producers provide shade and protection. In almost all scenarios, animals raised in pasture systems can seek shade and have enough space to stay comfortable.

In summary the feedlot industry must continue to be aggressive in improving the feedlot environment for cattle. Steps forward have been taken with many practices now a minimum standard in line with the National Feedlot Accreditation Scheme (NFAS), which has several standards regarding cattle environment and comfort.

2.2.3 Health

Good animal health is essential in all livestock keeping. Intensive animal production can lead to both challenges and opportunities regarding animal health. Confining cattle and feeding a high starch diet can increase risk of digestive issues such as acidosis and bloat. When introducing cattle to feedlot diets it is important to do it gradually to minimise these risks. The Australian Lot Feeders Association (ALFA) continues to monitor responsible use of antibiotics and has released guidelines to assist in arming feedlot managers with practical information on antimicrobial resistance and provide a framework to ensure appropriate use of antimicrobials, thereby reducing the risk of antimicrobial resistance and safeguarding the use of these important animal health tools well into the future (MLA, 2020). Good management practices such as preconditioning cattle before feedlot entry are the best way to minimise antibiotic usage.

Intensive livestock industries should recognise that the intensity and efficiency of production can push animals to and past their metabolic limit. Trying to push for extra feed conversion or weight gain with low-fibre diets can lead to both acute and sub clinical illness caused by disruptions to physiological mechanisms (American Association For The Advancement Of Science, 2011). Sub clinical illnesses can show as liver and lung lesions or poor feedlot performance and should be monitored and recorded to help improve practices. Trained livestock attendants check for acute illness daily in feedlots. This rapid detection of sickness is key in maintaining positive animal welfare outcomes in feedlots and sees that only animals that require antibiotics receive them and given the consistent feed supply, malnutrition is typically not an issue.

Extensive or grass-based production also has its challenges such as problems identifying illness and having timely access to treatment options. Another area of concern is health issues associated with malnutrition in times of feed shortages.

2.2.4 Behaviour

The behaviour domain has been a strong point of conjecture and conversation since the rise of intensive livestock industries. It has been stated that the intensification of cattle production contributes to behavioural problems not seen in grazing animals (Moran, 2015).

Before debating the positive and negatives of this domain in intensive production it is important to first attempt to understand what 'normal' behaviour is. Cattle have an extensive

repertoire of behaviour, comprising 40 identifiable categories and that, of all of the behaviours in their repertoire, grazing is the most common behaviour followed generally, by ruminating and resting (Kilgour, 2012). To also add to the complexity of this question, cattle, like people, differ widely in temperament. Some are always gentle; others are quite active, alert, and somewhat nervous under normal conditions and very excitable under stress. The behaviour of cattle is determined by instinct, sensory perception and experience. Instinctual behaviours refer to those that the cow is naturally motivated to perform. Sensory behaviours are those that are the result of something heard/ seen/ smelt/ felt in the environment (Moran, 2015).

In a feedlot scenario cattle are put into a group and placed into a confined environment. They are provided with a complete diet and the normal behaviour of grazing is replaced with feeding. Rumination and resting rates are also good measures of animal comfort and high levels of both are common in well managed feedlots. Large particle fibre is essential for rumination to occur and pen surface condition is key for animals to rest comfortably. Cattle are inherently prey animals and prefer to be in a herd situation to reduce fear (Moran, 2015). Both intensive and extensive production can provide animals with an environment that provides safety in a herd environment. The behaviour of the animal handler has an enormous impact on cattle behaviour, welfare and performance. Negative behaviours produce more fearful animals while positive behaviour will lead to a relaxed herd of cows that are easier to handle (Moran, 2015). This again shows the importance of quality staff and training as a driver of overall animal welfare. ALFA have recognised this and now host several workshops to train and accredit people as animal welfare officers. There is no doubting in certain situations animals can show abnormal behaviour patterns in intensive production systems. These behaviours can include bullying, tongue rolling and bar biting, which can be used as indicators or boredom or frustration. This is due to animals no longer needing to perform long amounts of grazing, typically nine hours per day in a grazing system.

The conversation will be ongoing, debating whether beef feedlots can provide conditions that allows animals to exhibit normal behaviour. The confinement of cattle is common throughout the world for different reasons. In regions with severe, wet winters, animals can be place in confined shelter to protect animals and the fragile environment (Figure 8) before returning to graze pastures during warmer months. This practice has been taking place for several centuries with sustainable success. The feedlot industry needs to continue researching

methods to enrich the experience for animals in a feedlot. This may include daily exercise or objects in pens to amuse animals. If animals in confinement are kept in a group situation, always handled with care, fed an appropriate diet, can move freely, ruminate and rest, this could be classed as normal behaviour.

Figure 8. Winter confinement of cows and calves, France (Source: Author, 2019)

2.2.5 Mental

The four physical domains described above are contributors to the mental domain. The mental domain recognises that animals, and in this case, cattle, are sentient and conscious beings. This means cattle are aware and have a brain of sufficient functional sophistication to transduce sensory inputs into cognitive or emotional experiences it can interpret as good, neutral or bad (Mellor, 2017). Traditionally assessing animal welfare has been about recognising negative outcomes, while this model and domain allows to replace negative experiences with positive, to create a good animal welfare outcome. An example of this is removing negative experiences such as frustration and boredom by using enrichment techniques that would result in an animal being calm, playful, and fulfilled.

If the red meat industry continues a path on continual improvement it will hold it in good stead moving forward. In the past most agricultural industries have believed that good production outcomes equate to good practice. This is not the case and all producers need to recognise and share this sentiment. There has been a slow uptake of this view that has caused the societal pressure seen today.

Case Study: May's Burehof, Switzerland

The May family raise cattle and pigs on 33 hectares, which in Switzerland is an above average holding of land. Supported by strong government legislation, the May's have a strong emphasis on whole life animal welfare and environmental sustainability. Produce is slaughtered locally and marketed directly to local restaurants and catering businesses.

Figure 9. Lukas May (back), Author (front), discussing importance of excellent temperament of herd sires (Source: J Green, 2019)

Mr May (2019) explained that throughout summer, cows and calves roam the alp and graze lush pasture before being confined through the winter months to protect the countryside and animals from exposure to the elements. While in confinement all of cattle needs are met by well-designed facilities and high levels of care from animal attendants. The author has again used the five domains to expand on this.

- **Nutrition** – Cattle are fed with the philosophy 'Feed-no-Food'. This means no feed is offered to cattle that could be used for human consumption. Therefore, products such as whole grains are not offered, instead a ration based mainly on corn silage and hay is fed. Although cattle were not putting on weight as quickly as or efficiently as commercial feedlot cattle, they were still healthy and happy. Cattle were still ready for slaughter at approximately 18 months of age due to being on adequate nutrition for their entire life.

- **Environment** – As described above cattle are confined and sheltered during the cold winter months. They also have access to clean bedding and open-air exercise yards.

The cattle were noticeably calm and relaxed. Although the summers are mild, there was also fans installed for any cattle that are in the fattening phase and in confinement over the summer months.

- **Health** – There are many factors that contribute to sound animal health status at the May's. High levels of hygiene, attention to detail, and the smaller scale of production all contribute strongly to this.

- **Behaviour** – As stated, the behaviour domain can be challenging for animals in confinement. The May family do a fantastic job enriching the lives of their confined animals. Brushes and scratching posts are used throughout to help with boredom and anxiety (Figure 10). Visual inspection of the animals showed animals being comfortable and relaxed.

- **Mental** – With the four physical domains being met, the mental state of the animals is very good. Care is taken from conception to slaughter, which shows in the consistent high-quality protein being produced.

Figure 10. Examples of enrichment tools used at Mey's Burehof, Switzerland (Source: J Green, 2019)

May's Burehof is a great example of high animal welfare outcomes in a confinement situation. The business, like all agricultural businesses in Switzerland are supported by policy, focused on environmental outcomes, underpinned by direct payments as compensation for communal and environmental services provided by famers. For a 33-hectare animal production business to support two generations is unique globally. This business model can be replicated but is important to consider why it is successful. Access to supply chain services such as local slaughter and proximity to end users is a key consideration. The May's have direct contact with their produce all the way to the consumer, allowing them to capture the maximum margin for each animal raised. This is extremely important when working on a smaller scale.

2.3 Technology and research

Research into animal behaviour and welfare has increased greatly in recent times. This research and advancement in technology is concentrating on measuring animal behaviour and objectifying animal behaviour and welfare. This has proved to be a difficult task because one cannot simply ask an animal how it feels. Even if we know all the objective facts regarding an animal's physiology it is still impossible to know what it is and feels like to be an animal. The consequence of this is that all arguments about animal welfare are based on a subjective assessment of what the animal would and would not like. With these limitations known it is still essential that research continues into animal wellbeing. Objectively measuring the following in combination with general value judgements is the most accurate measure of animal welfare:

- **Productivity measures** – Include things like growth rate and reproduction rate - the idea being that high productivity shows a high state of wellbeing.
- **Veterinary measures** – A healthier group of animals is probably a happier group of animals, so levels of disease, injury and mortality can be used to measure wellbeing.
- **Physiological measures** – The stress a creature is suffering can be shown by certain physiological measures such as suppression of the immune system, raised heart rate, increased catecholamine secretion and so on.
- **Observing behaviour** – Careful observation of behaviour can help us assess animal wellbeing. But to come to useful conclusions we need to have considerable information about the normal behaviour patterns of the species concerned.
- **Preference testing** – The closest human beings have so far got to asking animals what they like is preference testing. This lets animals choose between various alternatives. This sort of research enables to keep animals in the conditions that they prefer, and thus enhance their wellbeing (BBC, 2019).

These measures and tests all have major limitation flaws if used to measure welfare in isolation, though a combination can lead to a strong objective measure of welfare.

The industry continues to invest in new and better technology concentrating on objective data capturing. Wearable technology advances have been significant of late with global growth of this sector in the next ten years predicted to soar from $0.91 billion to $2.6 billion USD

(Neethirajan, 2016). Sensors and wearable technologies can be implanted on animals to detect their sweat constituents, measure body temperature, observe behaviour and movement, detect stress, analyse sound, detect pH, prevent disease, detect analytes and detect presence of viruses and pathogens. These sensors are at various stages of commercialisation and have made their way into practical applications in precision livestock farming. Other areas of focus for technology and research for the feedlot industry include:

- Environmental monitoring to better predict, forecast and measure effects of heat and chill weather events, ventilation, and air quality.
- Closed circuit television monitoring to better understand the effects of human and animal interaction.
- Improved data capture to better understand things such as whole supply chain wastage. An example of this is monitoring production animals that never reach target market, such as culls or rejects or foetal losses, which is a poorly measured statistic within all production livestock systems.

Case Study: Cactus Feeders, Texas and Kansas, USA

Cactus Feeders, established in 1975, is a large commercial agricultural business and typifies what would be considered industrial agriculture. The employee owned company operates ten feedlots in Texas and Kansas, marketing over one million grain fed cattle annually. During the authors visit to Cactus Feeders facilities it was evident that the company focuses on utilising new technologies to produce protein in a more sustainable and efficient manner.

Being an industry leader, Cactus Feeders are regularly asked to represent and at times defend the American commercial beef industry. They host chefs, students, industry executives, politicians, and journalists to give them an opportunity to see how the beef industry works. During the authors visit Dr Ben Holland, Director of Research and Operations Analysis, stated: "*These individuals, especially those who have never been to a feedlot before, leave with a better perception of cattle production and feedlots. We believe it is important to allow people to visit, engage with them in conversation, and present facts that help explain why a given practice is done*".

Figure 11. One of ten commercial feedlots operated by Cactus Feeders, USA (Source: Beef Magazine, 2018)

Cactus Feeders believes research and technology is the key to beef remaining an affordable and accessible form of protein. Dr Holland (2019) stated that the US beef industry produces nearly twice as much beef today it did in the early 1950's with the same number of cattle. This improvement in efficiency was achieved through the use and adoption of technology and innovation.

The time spent at Cactus Feeders was extremely valued as it showed the author the perspective and vision of one of the largest beef growers in the world. When discussing the challenges of producing more beef, more efficiently, and in a more socially acceptable manner, Dr Holland (2020) explained there is a tremendous opportunity to communicate the roll of ruminate agriculture in feeding people today and into the future.

Points supporting this include:

- Ruminates are fantastic at upcycling nutrients that are inedible to humans and the utilise many acres of marginal lands that are unsuitable for producing human edible crops.
- Concentrate finishing of cattle allows the upcycling of by-products that would be otherwise not be included as part of the food production system. The world is awash in calories, but high-quality proteins such as beef are less abundant.

- Methane produced by ruminants is part of a cycle and without significant increases in the number of ruminant livestock, ruminant methane cannot be a significant contributor to climate change.

Figure 12. Author (left) and Dr Ben Holland (right) discussing the role of by-product feedstuffs (source: L Fatchen, 2019)

Chapter 3: Australian Red Meat Industry Supply Chain – The Good and Bad

3.1 Australian red meat industry

To understand in what direction the red meat industry must move, it is first important to appreciate the current industry structure. As shown in Figures 13 and 14, with the number of peak bodies, strategic plans, annual reports, roundtables, green and white papers, the red meat industry is a confusing space for both the producer and consumer. In addition to this complex structure, the red meat supply chain has a history of disconnect and distrust between producer, processor and retailer with issues including price transparency, subjective grading, and profit sharing. Is it any wonder that producers and consumers have a poor understanding of each other?
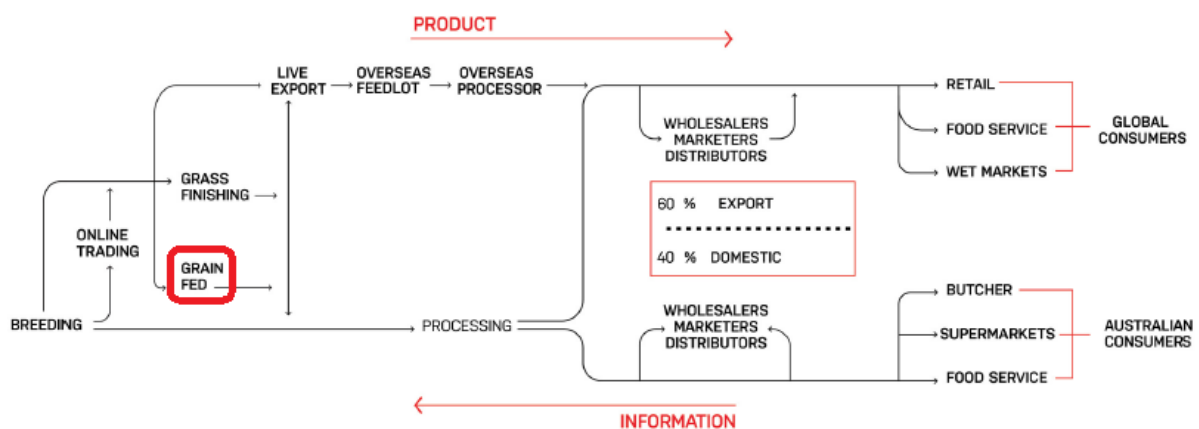

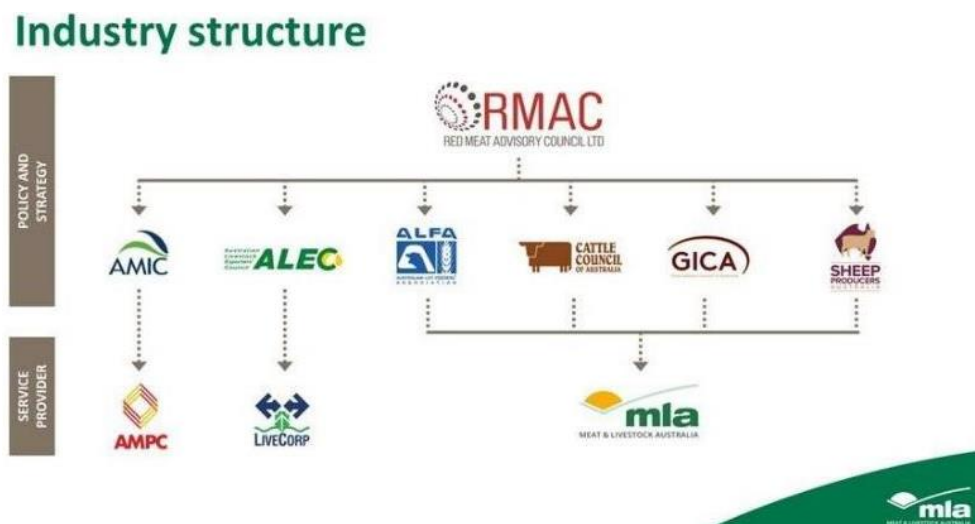*Figure 13. Australian beef industry supply chain (RMAC, 2019)*

Figure 14. Industry Structure of Australian red meat industry (MLA, 2019)

This chapter discusses quality assurance programs that underpin the red meat sector and their role into the future and the importance of supply chain collaboration. Currently the Australian red meat industry is facing reform with the red meat white paper being released. This has resulted in a recommendation that red meat industry needs streamlining and simplifying. Due to the large number and varied nature of its stakeholders this is a very complex reform. Work is ongoing and industries and peak bodies must understand consensus is difficult and all stakeholders must take part in the discussion otherwise change will happen without them.

3.2 Feedlot industry structure and quality assurance

Australian Lot Feeders' Association (ALFA) is the peak national body and has been representing the Australian cattle feedlot industry since 1970. ALFA seeks to improve the profitability, professionalism and community standing of the cattle feedlot industry via representation, strategic levy investment, industry development activities and member assistance (ALFA, 2019). To its credit ALFA, since its beginning has been proactive in developing standards defining grain fed cattle and creating the quality assurance program, National Feedlot Accreditation Scheme (NFAS). NFAS, when established was the first quality assurance program implemented in Australian agriculture. It is an independently audited quality assurance program for the industry and managed by AUS-MEAT. For an animal or carcase in Australia to be marketed as grain fed it must be from a NFAS accredited feedlot and processed at an AUS-MEAT accredited facility, thus underpinning the product integrity, quality, and market acceptability.

The NFAS program has developed over time to assure accredited feedlots maintain standards in several key areas including quality management, food safety, livestock management and environmental management. Feedlots are audited annually on site and must have procedures in place and show evidence that standards are being maintained. The program has evolved over time with additions to the scheme frequent. Although NFAS has been an extremely successful and fit for purpose it must continue to evolve to maintain relevance and standing in the supply chain. Areas of potential change and focus for NFAS in the future are considered here.

3.2.1 Auditing processes and frequency

The current process of one on-site audit per year is traditional in its process and critics could claim that one audit per year is not enough to prove ongoing standards of production and practice. A potential addition to current auditing process could be quarterly desktop audits or ongoing data submission via web-based applications. It is important to consider the scale differences between lot feeding operations, and the time and cost involved with auditing can be a challenge for smaller family businesses.

3.2.2 Key focus areas

NFAS needs to continue to focus on environmental sustainability and animal welfare as priorities. To add to this the industry needs to respect and understand the speed in which expectations on supply chain customers are changing. Potential examples that could be included are methane emissions recording and land clearing. Although the feedlot industry is not directly or entirely associated with increasing global emissions and land clearing, it is implicated though supply chain association. Therefore, the industry must take the opportunity to do their bit regarding these sort of sector issues before it is forced upon them.

3.2.3 Social responsibility addition

NFAS core modules maintain good coverage of the industry. Social responsibility is touched on through the current model, but it should be covered in more detail to reflect current relevance to industry.

3.2.4 Embrace technology

The Australian feedlot industry has an advantage in the fact that all cattle are already measured and recorded individually through the National Livestock Identification System. Building upon that platform there is a potential to use blockchain technology to further enhance traceability and transparency throughout the supply chain.

The Australian NFAS program is unique globally and should be celebrated due to it being a requirement rather than a opt in program. Programs such as America's Beef Quality Assurance program cover a portion of the supply chain but is optional. It has been slow to be adopted and only now showing signs of strong uptake from the beef industry due to consumer and retail pressure. The main limitation of the NFAS program is the fact that it covers the feedlot industry only. Although recognised by processors to gain 'grain fed' status it has little standing at retail or consumer level.

3.3 Red Meat Integrity System

The Red Meat Integrity System is a system of food safety measures, quality assurance, and traceability from paddock to plate, which protects the disease-free status of Australian red meat and underpins the marketing of our product as clean, safe and natural (MLA, 2020). Integrity Systems Company (ISC) does this by managing and delivering the Australian red meat industry's three key on-farm assurance and through-chain traceability programs as illustrated in Figure 15.
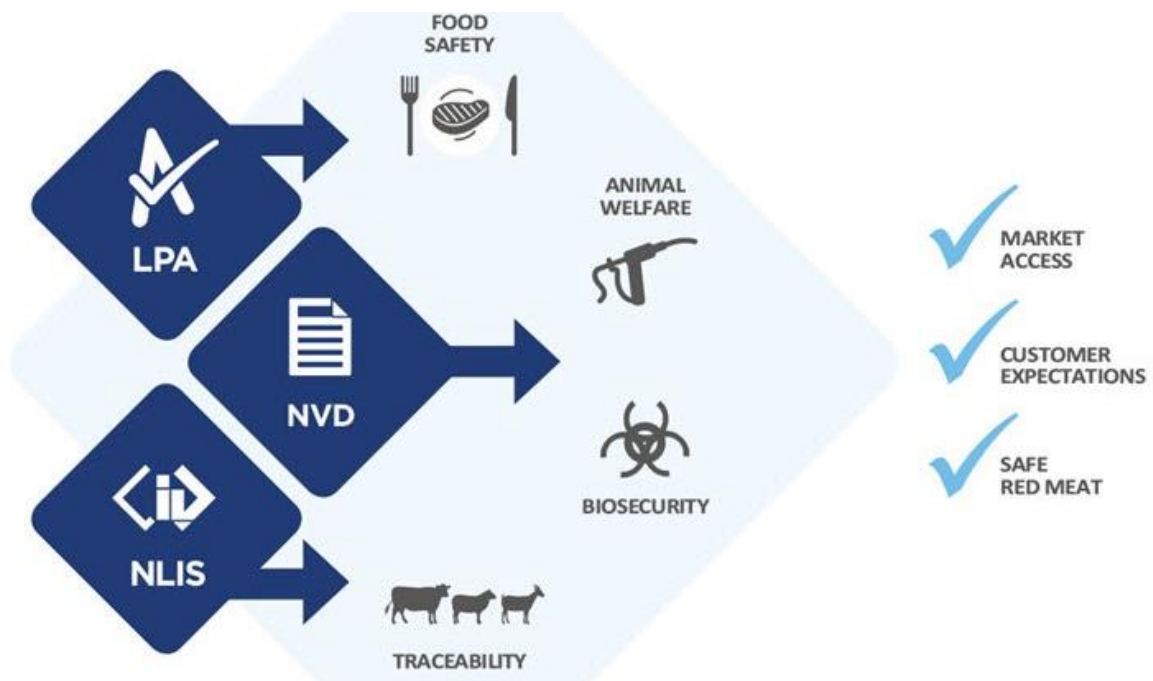
Figure 15. Australian red meat integrity system (MLA, 2020). Livestock Production Assurance (LPA) – an on-farm assurance program. National Vendor Declarations (NVD) – a food safety statute between properties, sale yards and processors. National livestock Identification and traceability

This integrity system is the closest program to a whole supply chain quality assurance system for our red meat industry. Australia's true competitive advantage lies in the quality and integrity of its products and systems throughout the whole supply chain. Australia has led the world in traceability and is known globally as a producer of high quality, consistent and safe meat. To maintain and protect this, Australia must continue to be at the forefront of meeting consumer requirements. Substantial development beyond the existing Livestock Production Assurance (LPA) base standard will be demanded by supply chain partners (Integrity Systems, 2018). The issue has not been identifying these trends for future requirements but has been reacting as an industry in a timely manner.

3.4 Supply chain collaboration

The Australian agricultural industry covers such a wide range of activities that it makes cross industry collaboration very difficult on several levels. The National Farmers' Federation represents the interests of Australian farmers across a broad range of public policy. It is difficult for NFF to take a position on many issues due to representing so many different industries. An example of this is that the Australian meat protein industries all need to be proactive and improve their supply chains, but at the same time it needs to be recognised that they are also in direct competition with each other. The red meat industry must take it upon themselves to collaborate, while continuing to work with the wider agricultural community.

Compared to other industries such as chicken meat production, red meat has large variances in scale and style of production. Trying to set standards for industry that covers northern pastoral breeders, small scale southern breeders, dairy farming, feedlots, transport, and processing industries has proven to be difficult. Individual sectors have strongly protected their producers with little regard for the others. This was evident in the endorsement of the Australian Animal Welfare Standards and Guidelines for Cattle, released by Animal Health Australia in 2016. There was a general lack of support from most red meat sectors for the suggestions and the result could be seen by detractors as lacking substance and not showing the change expected by end consumers.

There is a balance to be struck so that the supply chain is proactively developing to meet expectations of all stakeholders whilst maintaining the ability for flexibility within individual businesses allowing them to be profitable and sustainable. For this to occur collaboration and understanding between red meat industry stakeholders must improve. It is positive that the feedlot industry has a strong program such as NFAS to underpin it, but it loses its importance if other parts of the supply chain are not to the same standard. The red meat industry will always be judged by its lowest performer, not its highest. Government and industry must work together to set standards across the entire industry that would guarantee a beef supply chain that is equally committed to environmental and animal welfare concerns before consumers force reactive decisions that have been seen in the past. If a consumer, domestic or international, picks up a piece of Australian beef they should take comfort in the fact that it has been cared for respectfully and to a high standard from point of conception to slaughter.

Some reform of the red meat industry is essential in strengthening and protecting the industry. Reform would allow for rapid and proactive changes across the industry with a more streamline structure and governance. Australian cattle producers are some of the best in the world and generally great stewards of the land they keep, but does that mean they cannot be better? Improvements need to be made to increase the knowledge and understanding of stakeholders in the red meat industry.

Chapter 4: Shared Values – Relationships between Producer and Consumer

4.1 Understanding the consumer

The relationship between farmer and consumer has become increasingly disconnected in modern times and the agricultural industry faces unprecedented pressures environmentally, economically, and socially. It is a difficult time for food producers to navigate with global competition increasing and margins in agriculture being squeezed by a hungry supply chain with each stage taking their cut. Along with price pressure, food producers are seeing market signals with social concerns on the rise such as environment and animal welfare issues. So, farmers are being asked to produce more food, cheaper food in a more sustainable and socially acceptable manner. Not an easy undertaking.

Most consumers, particularly younger consumers, have little sense of where their food comes from (Ikerd, 2008). Until recently, nearly everyone either farmed, had farmed, knew a farmer, or at least knew someone who had farmed for a living. As recently as the 1950s and 1960s, most urban dwellers had either grown up on a farm or knew someone who had. It is only within the last couple of decades that farmers and their customers have become total strangers. Today, models of working farms are set up as tourist attractions, but tourist attractions will not reconnect consumers with farming any more effectively than zoos connect people with the jungle. Connectedness arises from meaningful relationships (Ikerd, 2001). If food producers and agricultural industries continue simply to dismiss consumer views and values as uneducated and not science based, they will find themselves facing forced, unnecessary regulation bought on by social pressure.

4.2 Triple bottom line

Sustainability is an often overused and misunderstood term with many referring to the environmental aspect of sustainability only. Truly sustainable agriculture is the efficient production of safe, high quality products in a way that protects and improves the natural environment, the social and economic conditions of farmers and their local communities, whilst safeguarding the health and welfare of all farmed species (Sustainable Agriculture Initiative Platform, 2020). Figure 16 outlines this as the triple bottom line of agriculture. For a business or industry to be successful long term they must sustain social, environmental, and

economic viability. Industrial agriculture, including beef feedlots, can be highly profitable and environmentally friendly, but without societal support they will never be truly sustainable. This societal issue, driven by population urbanisation and the rise of industrialisation and science-based agriculture is going to take time and strategy to correct.

Figure 16. The triple bottom line approach to agriculture (Food Future WA, 2019)

4.3 Shared values and trust

The landscape surrounding shared values and trust between food producers and consumers is complicated. Like food producers, consumers have different levels of trust, and values are subjective and individual. Traditionally the agricultural industry has believed the way to build consumer trust is to impart science-based facts and data onto the consumer. This approach has consistently proven not to resinate with the non-farming public, with building trust and sharing values being key to societal support. Before social licence and freedom to operate can be attainted, trust must first be considered (Figure 17). Building trust is not a simple task and must start with first understanding the consumer and their values. If food producers and consumers have vastly differing values, there is little to be accomplished by communicating the science and efficiency of modern agriculture. Most of the population, differing from extreme animal rights advocates, have simple values. If it can be demonstrated that producers share values that consumers care most about, such as food safety, quality nutrition, outstanding animal care and environmental stewardship, that will build trust.
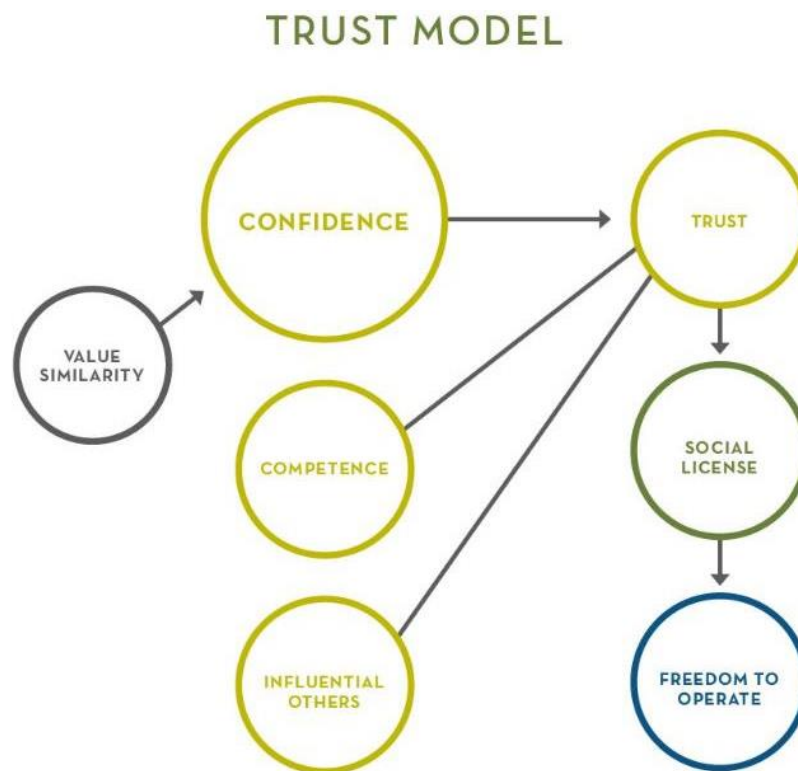
TRUST MODEL

Figure 17. Consumer trust model (CFI, 2019)

Australian livestock producers generally care for their animals in a way they believe to be best for the animal in the conditions they are faced with. Management practices such as mulesing, spaying, dehorning and castration have all come under the spotlight in recent times, with the RSPCA stating that it is unacceptable to continue to breed sheep that are susceptible to flystrike and therefore require an ongoing need for mulesing or other breech modification procedures to manage flystrike risk, (RSPCA, 2020). These have all been common management practices helping producers maintain production levels and in some aspects control animal welfare issues such as fly strike in Merino sheep. These practises are among many other management techniques that need to be questioned and challenged. Industry peak bodies and individual producers need to be proactive in their approach to these challenges and each issue needs to be assessed on its own merits. If industry can have a clear and logical direction on these contentious issues, it will serve them well in retaining their freedom to operate. Is mulesing or dehorning truly necessary? It should already be decided by industry that it is not, so producers can start taking steps through genetic section and embracement of technology so their business can remain sustainable into the next generation.

In contrast to this, the agricultural sector must be wary of solely basing industry and business decisions around consumer perceptions and what can be an easy marketing option for

retailers. There is no denying that the market signals are there for meat being produced in a way that is more in line with consumer values, but who is going to pay for this change in production? The increase of branding and raising claims in the red meat sector has seen the industry competing with itself. Grass fed, organic, and hormone free are all used as a marketing advantage to claim that a product is superior to another. Consumers do deserve to choose food that they feel comfortable with, but industry needs to maintain a base standard that gives the consumer confidence in the entire supply chain rather than just a brand.

There are several strategies globally that are striving to maintain the farmers freedom to operate. Australia, in general has been lagging behind other countries when it comes to building consumer trust, and in recent times has found itself defending current practice rather than proactive promoting its industry. As explained in the previous chapter it is crucial that the entire supply chain works together to engage consumers and present a product that is in line with their values and produced in transparent and ethical manner.

Conclusion

Defining animal welfare can be difficult with it being a subjective and emotive topic. When entering conversation regarding livestock production and animal welfare standards it is important to acknowledge that due to several factors including religion, politics, tradition, socioeconomics and general demographics, there are vastly differing opinions that need to be respected.

As with all industries, the agricultural sector will always be governed and judged by its consumers. In general, the non-agricultural public is more concerned than ever with how their food is grown and can access this information rapidly. The red meat sector has recognised this with increasing consumer support through positive animal welfare outcomes and environmental sustainability being at the heart of industry direction and strategy. Even with these good intentions, the industry has struggled to keep abreast of public concern and has been consistently forced to defend current practice rather than spending resources on industry improvements and positive messaging to the consumer base.

The feedlot industry has been recognised for being a leader among Australian agriculture regarding proactive quality assurance programs and producer engagement, but it needs to recognise that the industry is only as sustainable as the entire supply chain. Traditionally each section of the red meat industry has been primarily been concerned with protecting itself rather than understanding the role they play in the bigger picture of maintaining a sustainable supply chain. Whether it be a dairy farmer, northern pastoralist, grain feeder or processor there is a need for compromise and an understanding that full consensus is difficult to achieve.

Are producers too proud and stubborn not to recognise that it is a changing world and change is needed with that?

Throughout the author's travels it was clear that there are knowledge gaps on each end of the supply chain and generally there was a lack of understanding and respect between producer and consumer. Farmers have long dealt with challenges and adversity but now, with the strong leadership from peak industry bodies they must become educated and connected with their supply chain and end consumer.

The global demand for nutrient dense meat protein will continue to grow driven by an increasing middle class and global population growth. The Australian red meat industry is well positioned to flourish with the general population's support if it takes action to work with consumers instead of attempting to educate with facts and figures. Australian meat is already known for its quality and consistency and can build on this platform to have a supply chain all stakeholders can be confident in.

Recommendations

Producer

- Have a voice – It can be daunting as an individual to think individual producers can make a difference, but peak industry bodies are calling for people to become engaged with industry and supply chain. An individual's opinion matters.

- Educate – Farmers have a broad range of knowledge when it comes to operating a farm but generally lack understanding of factors outside their immediate business. The broader supply chain knowledge, legislation affecting their business and consumer treads are all important areas producers should understand.

- Is your business sustainable? Not only economically but also environmentally and socially.

- Values – Consider your values regarding animal welfare. Are the current management practices of the business and industry in line with the general population? Understand a healthy animal is not always a happy one and performance alone is a poor indictor of animal welfare.

Feedlot Industry

- Continue to maintain proactive approach – The industry has done a good job to date regarding animal welfare but must understand that unless the entire industry works together it will be to no avail.

- Build on quality assurance programs – NFAS has been a cornerstone of the industry but should be consistently improved. Considerations surrounding audit frequency and content as well as ongoing compulsory data collection should be considered.

- Be proud and transparent – It can be confronting for industry to open their doors, particularly intensive agriculture. This needs to be done in a considered way, meaning the industry will be seen not to be hiding what they do. There is no denying what feedlots do, so it is about showing the interested public that the industry cares about the animals they farm.

Red Meat Sector

- Collaboration – Move forward with responsible industry reform to help streamline the sector. Peak industry bodies need to stand for their producers but also must consider the bigger picture. A central voice for the red meat industry helps provide a clear direction to all stakeholders.

- Whole supply chain quality assurance – Integrity Systems (LPA) is a foundation for what could be recognised as a global leader of supply chain quality assurance from producer to consumer. Stronger on farm quality assurance systems are required to match feedlot and processor regulations.

- National animal welfare standards – There is extensive red tape in this space, but industry must drive politics to endorse compulsory adoption of national standards. Animal welfare laws currently fall under state and territory governments and use national codes as a voluntary guide. It reflects poorly on a modern developed country that this cannot be achieved.

- FAO's SDGs – All businesses and industries should have the Sustainable Development Goals at the heart of their ethos.

- Knowledge sharing – Support individuals to better understand the industry they work in. There is currently no formal education for livestock owners. Can individuals raise livestock without formal training?

Consumers

- Seek out true information – Find credible sources of information and make your own judgement.

- Meet a farmer – Make an effort to meet people that produce food for a living.

- Be willing to share the cost – Purchase food that is produced in a way that match consumer values. This may come at a financial cost for longer term sustainability.

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Plain English Compendium Summary

Project Title:	**Animal Welfare. Bridging the gap between producer and consumer**
Nuffield Australia Project No.: Scholar: Organisation:	1902 Thomas Green Thomas Foods International Level 2, 162 Fullarton Road, Rose Park SA 5067
Phone: Email:	+61447160238 thomas@thomasfoods.com
Objectives	• Define animal welfare and discuss methods of assessing it. • Use the author's travels and experiences to explain global animal welfare, consumer perceptions and consumption trends. • Access animal welfare in the Australian feedlot industry and suggest potential improvements or considerations. • Provide insight into the Australian red meat industry regarding peak body structures and quality assurance programs. • Explore the importance of the triple bottom line and shared values between producer, processor, retailer and consumer.
Background	This report explores the complexity of animal welfare in livestock production with a focus on the beef feedlot industry. Animal welfare in intensive livestock production is an emotive and subjective topic. It is hoped this report can inform the reader and give confidence to be part of the conversation that is currently surrounding livestock production.
Research	Global travel spanning 16 weeks across North and South America, Europe and Africa. Visits and interviews included leading and respected individuals, universities, research institutions, individual enterprises, corporate agricultural businesses and industry service providers.
Outcomes	The global demand for nutrient dense meat protein will continue to grow driven by an increasing middle class and global population growth. The Australian red meat industry is well positioned to flourish with the general population's support if it takes action to work with consumers instead of attempting to educate with facts and figures. Australian meat is already known for its quality and consistency and can build on this platform to have a supply chain all stakeholders can be confident in.
Implications	It is hoped this report can inform the reader and give confidence to be part of the conversation that is currently surrounding livestock production and animal welfare.