Final report

Environmental credentials for Australian grassfed beef - Beef Industry Business Sustainability Scan

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Abstract

The Beef Industry Business Sustainability Scan is a subproject of the overarching 'Environmental credentials for Australian beef' project. The Scan documents the general Triple Bottom Line (TBL) sustainability issues identified by members of the Australian beef supply chain and was undertaken in order to provide the overall sustainability context from a business perspective that underpins the overarching project which focuses on the 5 main environmental themes of sustainability within the broader project (carbon balance, tree cover, ground cover, biodiversity stewardship and drought resilience). This Final Report on the Business Scan documents the processes undertaken in the project, discusses the findings and the benefits of engaging with the project to beef producers and other industry members.

The Business Scan subproject was undertaken in two stages: Stage 1 – a 'Preliminary Scan' involving semi-structured interviews with key value chain stakeholders and Stage 2 – a 'Deep Dive' involving in-depth interviews with individual beef producers. In Stage 1, a total of 22 participants from the beef value chain representing stakeholders with a wide range of roles in the industry were interviewed. In Stage 2, a total of 20 interviews were conducted with beef producers.

Findings from this subproject indicate that participants generally hold a positive and proactive view of sustainability in general with strong support being shown for the 5 environmental themes of the project. Further, the participants indicated that in their opinion there is significant potential value of demonstrating environmental sustainability credentials to the market in both the domestic and overseas markets. Market demand issue for these credentials was discussed but in general, participants indicated that this market demand was only in the early stages of development. Further, validated credentialling is important so there is a level playing field for all actors in the supply chain to address and, as yet, there was little reward (e.g. in form of additional value/competitive pricing) associated with being credentialled).

Overarchingly, participants highlighted that sustainability initiatives in the beef industry need to be holistic in approach and should not be divorced from economics or social issues. Participants emphasised that the proposed online platform (a required outcome from the overarching project) should be user-friendly provide practical learning tools and resources on the project's 5 environmental themes.

The information derived from the Business Scan provided valuable perspectives from the stakeholders in the whole beef value chain into the overarching project's co-design workshops for each theme.

Executive Summary

Background

The Beef Industry Business Scan documents the general TBL (Economic, Environmental and Social) sustainability context for the overall 'Environmental credentials for Australian beef' Smart Farms project (L.SFP.1000). By exploring the TBL business aspects across the value chain, this subproject sought to determine and provide evidence of the value proposition for producers in developing sustainability principles and processes, their customers' requirements for such strategies, and whether the proposed outcome of the 'Environmental credentials for Australian beef' Smart Farms project (an online platform for monitoring the environmental aspects of sustainability on farm) would address their need. Further discussions with participants in the Business Scan attempted to identify where the proposed technology platform and approach fitted within their business model.

The work has established that while the interviewees regarded the 5 environmental themes of the overarching project as being non-negotiable there was also a strong, positive understanding and proactive establishment of an underpinning TBL approach as being important from the general sustainability context. Additionally, the work also established the minimum requirements for developing the overarching project's online platform from the perspective of the producer and their customers (including actors further along in the supply chain).

The Business Scan findings also informed the co-design process of the overarching project. They were delivered to the participants in the co-design workshops via written documents for prereading and a formal presentation made at the commencement of each theme's co-design process.

Objectives

The Business Scan aimed to:

1. understand and provide detail on the current sustainability context of actors across the whole Australian beef value chain emerging around the current and growing need for verified sustainability credentials in the agri-food industry.
2. provide insights into the motivations and interests of the different stakeholders across the whole beef industry value chain, including producers, on their sustainability credential needs.
3. demonstrate a) the general TBL sustainability and b) more specifically, the environmental sustainability value proposition to producers.
4. provide evidence of the value proposition for the overarching 'Environmental credentials for Australian beef' project's proposed online platform and how it should inform the emerging sustainable business ecology of the industry.
5. provide input into the co-design process in relation to requirements for the proposed platform.

Methodology

The Business Scan subproject was undertaken in two stages using a qualitative approach:

Stage 1 – A 'Preliminary Scan' involving semi-structured interviews with key value chain stakeholders. A total of 22 participants from the beef value chain representing stakeholders with a wide range of roles in the industry were interviewed.

Stage 2 – A 'Deep Dive' involving in-depth interviews with individual beef producers. A total of 20 interviews were conducted with beef producers.

Results/Key findings

The findings from this project indicate that participants generally hold positive and proactive views of sustainability with strong support being shown for the 5 environmental themes of the project.

Further, the participants indicated that in their opinion there is significant potential value of demonstrating environmental sustainability credentials to the market in both the domestic and overseas markets. Market demand issue for these credentials were discussed but in general, participants indicated that market demand is only in the early stages of development. Validated credentialling was important so there was a level playing field for all actors in the supply chain to address, and as yet, there was little reward (e.g. in form of additional value/competitive pricing) associated with being credentialled.

Overarchingly, participants highlighted that sustainability initiatives in the beef industry need to be holistic in approach and should not be divorced from the economic or social issues associated with running a business.

Participants emphasized that the proposed online platform (a required outcome from the overarching project) should be user friendly and provide practical learning tools and resources on the project's 5 environmental themes.

Findings from both stages were delivered as they were obtained to the co-design workshops for the project's 5 themes.

Benefits to industry

The Business Scan provided insights from industry stakeholders and producers on a TBL approach to business sustainability in the beef value chain

The Scan also provided insights on the specific environmental themes of the overarching project to the co-design process to aid in the development and design of the overarching Project's beef producer-focused online platform.

Future research and recommendations

Opportunities for future research are in developing specific verifiable sustainability indices, templates, guides and scorecards for TBL sustainability based data collection, data management and market driven sustainability verification strategies that can easily be incorporated into a company's business and operational plans.

Opportunity also exists for the findings to be further investigated and developed for linking with the relevant market initiatives (e.g. carbon market, biodiversity stewardship) to educate producers in what the markets are demanding in this sustainability space.

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1. Background

Sustainability, Triple Bottom Line and Australian Beef Sustainability Framework

Sustainability has always been difficult to define (Lélé, 1991) and as a result has many different meanings to many different people - in fact so much so that McKenzie (2004:1) said: 'sustainability' is now a broad multi-focal agenda, and terms such as 'TBL' and 'sustainable development' are being used interchangeably. As a result, 'sustainability' is in danger of carrying so many implications and nuances that in order for it to be properly understood it must be defined whenever it is used' – and so we do this below.

At face value, the word 'sustainability' as a noun, means 'a process or state [that has] the ability to continue or be continued for a long time' (Oxford Dictionary, 2020). In an effort to be more precise, variants on this definition have been developed and argued over for many years for example:

- Environmentalists see sustainability as a way that uses natural products and energy without harming the environment, especially by replacing what has been used (Morelli, 2011);
- Businesses see sustainability primarily from a financial perspective, namely a business's financial ability to continue to make a profit and provide services over time with minimum risk (Zabolotnyy & Wasilewski, 2019);
- Social scientists regard sustainability as primarily about human-based activities - it is the least clearly defined of the sustainability definitions and includes a mix of human well-being and equity, access to basic needs, fair distribution of income, good working conditions and decent wages, equality of rights, inter-and intra-generational justice, access to social and health services and to education, social cohesion and inclusion, empowerment, and participation in policy-making (Dainiene & Dagliene , 2015; European Union (EU), 2020).

As well as these baseline definitions, there are a number of recognised approaches to sustainability – one of which is the TBL approach. The TBL is an accounting system that includes three components of organisational performance: social, environmental and financial, or, people, planet and profits (Elkington, 1994; Elkington, 1997). Savitz (2014:8) expands on this definition as follows: '[TBL] captures the essence of sustainability by measuring the impact of an organisation's activities on the world - including both its profitability and shareholders' values and its social, human and environmental capital'.

The problem, however, is not simply in defining TBL and thus sustainability but in measuring it - the more complex the situation the less useful it is to assess it across the different domains of economics, ecology, politics and culture (Magee, James & Scerri, 2012). Interestingly Elkington in 2018 discusses how TBL has been used (and abused) over the years since he coined the phrase and requested a 'recall' of the concept to do some 'fine tuning' to bring it up to what he had intended – a more whole-of-system approach rather than simply an accounting tool (see Figure 1) From an agriculture and food production perspective, the main approach to sustainability has been to look at sustainable, inclusive food systems through the lens of a complex system approach (Ingham 2011; Gamboa, 2016; Tai, 2018), which in medium to large modern organisations tends to lead to an emphasis being placed on corporate metrics that may or may not adequately describe sustainability, rather more addressing corporate social responsibility goals (Garriga, & Mele, 2004; McGuire, Sundgren & Schneeweis, 1988; Bryceson & Ross, 2020).

The beef industry, which is an extremely large agrifood industry globally with the global beef market size expected to reach USD 383.5 billion by 2025 (Grandview Research, 2019), has received a lot of criticism around its production impacts on climate change and the environment (Cederberg, 2011; Gerber, et al., 2013; Ogino et al., 2016). As a result, much research has been undertaken on how to monitor and manage sustainable beef production systems (see for example BRS, 2001, Bracke, et al., 2005; van Calker, et al., 2005; Beauchemin, et al., 2011; Capper, 2011; Lebacq, Baret & Stilmant, 2012; Herrero, et al., 2013; Scholten, et al., 2013; Rotz et al., 2015, 2019; Wiedemann, et al., 2015; Greenwood et al., 2015; Maia de Souza et al., 2017; Asem-Hiablie et al., 2018). In 2012, as a more industry focused operational environment, a Global Roundtable for Sustainable Beef (GRSB) was established as an initiative of 5 main actors in the global industry supply chain: the producers and producer associations, the processing and commerce sector, retail companies, civil society (academics, non-government and non-commercial institutions), and national or regional roundtables to promote global beef sustainability initiatives (GRSB, 2017a). The core principles of producing sustainable beef that are outlined by GRSB (2017b) can be summarised under three headings that relate to the TBL approach of Planet, People, and Profits described above and which are depicted diagrammatically below (Figure 1)

1. **Environment (Planet)**
   - Manage natural resources responsibly, improve and protect environment
   - Minimise beef's carbon footprint
   - Water: Grow more with less

2. **Social/Ethics (People)**
   - Providing for the health, welfare and behavioural needs of your animals
   - Ensuring food safety and traceability
   - Respecting human and labour rights while providing a healthy workplace and fair treatment
   - Operating your business with integrity

3. **Economics (Profits)**
   - Contributing to economic sustainability
   - Ensuring efficiency within the supply chain
   - Contributing to global food security
   - Contributing to the well-being of your local community

Figure 1 illustrates the TBL approach.

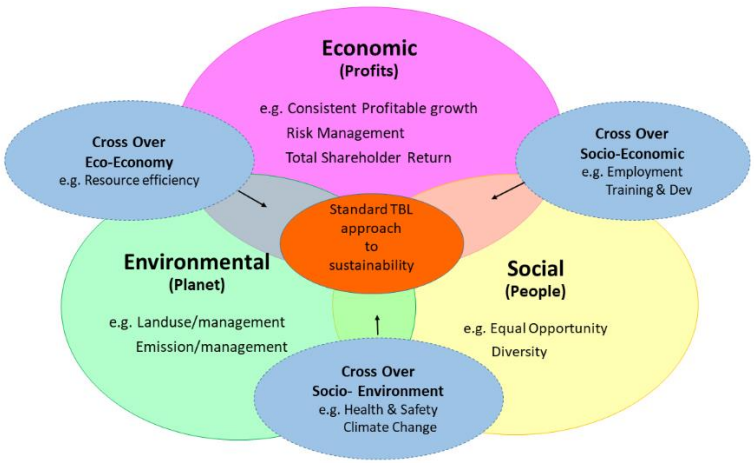

Figure 1 Triple bottom line approach to sustainability

Additionally, in a number of countries such as Australia (ABSF, 2017, Witt et al. 2020), Canada (CCSBF, 2016), USA (USBF, 2019) the nation specific industry bodies have created Beef Sustainability Frameworks which identify a practical and common sense set of criteria that can be measured in most beef production entities.

The Australian Beef Sustainability Framework is very similar to those of the Canadian and US Frameworks and they all clearly sit within the GRSB Principles which also address the 3 key principles of the TBL Approach.

Table 1 outlines the key priority areas in the ABSF.

Table 1. Outline of key priorities of Australian Beef Sustainability Framework

(Source: ABSF, 2022 www.sustainableaustralianbeef.com.au/the-framework/six-key-priorities/)

Figure 2 below shows the TBL approach combined with the Australian Beef Sustainability Framework where the three key principles of TBL (Economic, Environmental and Social issues) overlap with the ABSF identified attributes to provide a secondary set of cross over metrics that can be quantified thus enabling a quantitative measure of overall Company sustainability.

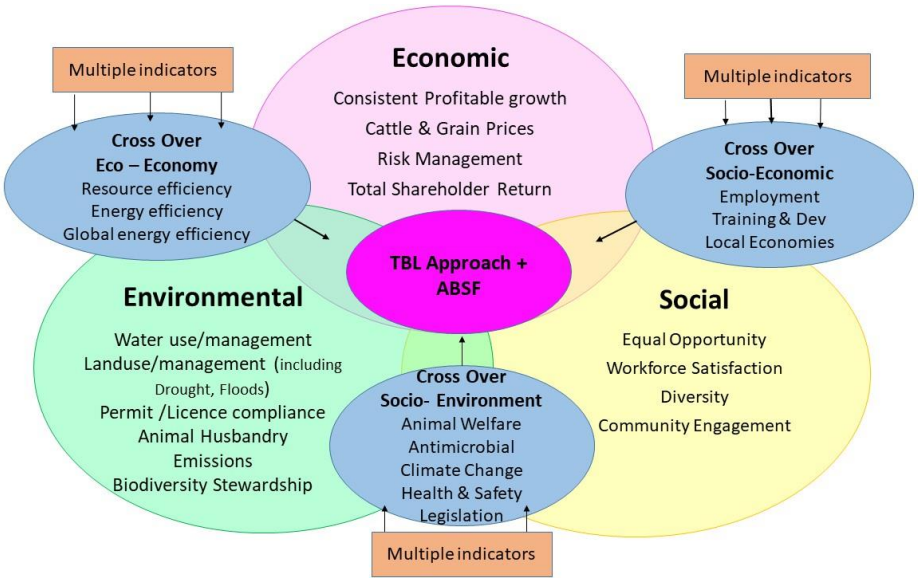

Figure 2 TBL Principles and Cross-over areas with ABSF (Bryceson et al 2021)

Environmental Credentials for Australian Beef project

The 'Environmental Credentials for Australian Beef' project was conceived to address beef industry stakeholder concerns about sustainable beef production, most especially environmentally sound beef production. The project aims to work with industry stakeholders to design and develop an online platform that can be used by producers to demonstrate on-farm environmental sustainability credentials against 5 environmental themes. These are tree cover, ground cover, biodiversity stewardship, carbon balance and drought resilience. The project is a partnership between Meat & Livestock Australia, The University of Queensland and WWF-Australia, funded through the National Landcare Program's Smart Farming Partnerships grant.

Beef Industry Sustainability Scan subproject

The Beef Industry Business Sustainability Scan is a *subproject* of the overarching 'Environmental Credentials for Australian Beef' project. The Scan was undertaken in order to provide the overall sustainability context from a business perspective that underpins the overarching environmentally focused project. It documents the general TBL sustainability issues identified by members of the Australian beef supply chain and the producers.

It aimed to evaluate the business needs and long-term sustainability goals of all stakeholders across the beef industry chain, but most particularly the producers, to establish the draw-through value of sustainability to all players. By exploring sustainability aspects of the businesses involved across the value chain, the Scan sought to determine and provide evidence of the value proposition for producers and their customers for the proposed outcome of the 'Environmental credentials for Australian beef' Smart Farms project (an online platform for monitoring the Environmental aspects of sustainability on farm), and to identify whether the online platform will address their need. Additionally, detailed discussions with participants in the Business Scan attempted to identify where the proposed technology platform and approach fitted within their business model.

The Business Scan was designed to provide progressive input into the co-design process on the 5 themes, consisting of deep intelligence and analysis on sustainability issues in the Australian Beef industry. Being concurrent with the co-design process, the findings of the Business Scan provided input to the Producers Working Groups. This activity was a key component of the project application to the National Landcare program and was described as: *Undertake studies and traceability investigations that identify, analyse and demonstrate how each of the 5 themes applies within the value chain*.

2. Objectives

The Business Scan subproject, conducted by The University of Queensland, documented the sustainability context of the Australian beef industry value chain stakeholders and producers. The objectives were to:

1. understand and provide detail on the current sustainability context of actors across the whole Australian beef value chain emerging around the current and growing need for verified sustainability credentials in the agrifood industry.
2. provide insights into the motivations and interests of the different stakeholders across the whole beef industry value chain, including producers, on their sustainability credential needs.
3. demonstrate a) the general TBL sustainability and b) more specifically, the environmental sustainability value proposition to producers.
4. provide evidence of the value proposition for the overarching 'Environmental credentials for Australian beef' project's proposed online platform and how it should inform the emerging sustainable business ecology of the industry.
5. provide input into the co-design process in relation to requirements for the proposed platform.

The objectives were achieved through a business environmental scan of the various approaches to sustainability across the beef industry, with in-depth information gathering on key sustainability issues as well as attitudinal stance on the subject based on iterative participation in the co-design process. The subproject was thus able to provide the context for developing a platform for grass fed beef producers to demonstrate environmental credentials to the market and inform the producer/stakeholder co-design process in designing learning modules.

3. Methodology

The Business Scan subproject was undertaken in two stages using a qualitative approach by conducting interviews with Australian beef value chain stakeholders:

Stage 1 –A 'Preliminary Scan' which involved semi-structured interviews with key value chain stakeholders**.** and investigated the motivations and interests in relation to sustainability goals of the different value chain actors across the whole beef industry, by exploring:

1. what the term 'sustainability' means from the perspective of individual beef value chain stakeholders;

2. what is the value of sustainability in terms of premium pricing/incentives;

3. what learning opportunities and pathways for producers around sustainability be of most use to the beef industry.

A total of 22 participants from the beef value chain representing stakeholders with a wide range of roles in the industry were interviewed.

Stage 2 – A 'Deep Dive' involved in-depth interviews with individual beef producers, focusing on the 5 themes of the project. It provided input to the co-design process and further drew on the experience and expertise of beef producers involved in the project themes. It evaluated:

1. how and why the project's 5 themes were important to producers from a sustainability perspective
2. issues around the likelihood of adoptability of the proposed online platform technology, challenges and potential strategies for successful adoption
3. potential issues involved in traceability of sustainability credentials across the whole chain
4. what functionalities for the online platform are required by value chain stakeholders and producers

A total of 20 interviews were conducted with the beef producers. The Deep Dive provided an update on the original value chain participants' interviews and drew on semi-structured interviews conducted with the producers, plus the iterative consultation process with key value chain stakeholders in the co-design process.

Overall, combining both the Preliminary Scan and Deep Dive stages of the Business Sustainability Scan provided useful insights for the overarching project, by eliciting long-term sustainability goals of all players in the beef industry chain.

Note: In line with the requirements of The University of Queensland's ethics approval for this research, the results presented in this report ensure complete privacy and confidentiality of participants. To ensure that the identity of participants remains confidential and anonymous, no direct quotations are used in this report.

3.1 Stage 1 – Preliminary Scan

In Stage 1, semi-structured interviews were conducted with key stakeholders across the beef industry (see Appendix 1 for the interview guide). The interviews explored the motivations and interests in relation to how the term 'sustainability' was viewed by the different actors across the whole beef industry chain. A project information sheet was shared with the research participants along with consent forms, which covered the ethical considerations of research. Under the ethical guidelines approved by The University of Queensland, project information sheet and the consent form were shared with the participants (attached as appendix 2 and 3). The project applied adhered to strict data protection practices, including separation of participants data from any information that might identify them. The data collected for this subproject is stored in UQ's Research Data Management System. Due to COVID-19 restrictions, all the interviews were conducted online using collaboration tools, including Zoom, MS Teams and Webex. The average duration of interview was around 35 minutes.

The organisations invited for participation were identified through desktop review and by snowballing through the project consortium members. A total of 22 participants from across the beef value chain were interviewed, representing stakeholders with a wide range of roles in the industry but generally

with some link to their companies' sustainability activities. The participants included 7 beef processors (both large and medium sized), 3 producers (2 pastoral companies), 3 major Australian supermarkets, 2 food companies, 2 producer/ farmers' associations, a major food service chain, a niche beef marketer, a major bank and representatives of DAFF (FutureBeef), ABSF and a Feedlotter.

3.2 Stage 2 – Deep Dive

In Stage 2 Deep Dive interviews with producers were conducted concurrent with the co-design process (see Appendix 4 for the interview guide). The interviews with individual producers focused on the environmental themes to which the producer had linked themselves to under the co-design process, but considering the strong overlap across themes, interviewees were requested to share views on other themes as appropriate.

The Deep Dive questions focused on the relevance of the 5 themes to the Australian beef industry, the key sustainability efforts of producers, any brand claim on any environmental attributes, relevance of indicators and measures for demonstrating their sustainability practices and what learning opportunities could be useful for the beef producers in the proposed online platform. The participation in the co-design process allowed iterative information delivery (as it was obtained from individual interviews) to, and information gathering from the producers taking part in the co-design process (by adding relevant questions as required).

A total of 20 producers were interviewed in the Deep Dive. The interviewees were contacted through the list of producers who originally expressed their interest in the Producer Working Groups and who had signed up as a member of the consultative producer network of the project. The Business Scan project information sheet along with Project Participation consent form, which covers the ethical considerations of the research, were sent to the participants before the interviews. The average duration of the interviews was around 18 minutes, which were conducted though Zoom, MS Teams or over the phone. All the interviews were transcribed using Microsoft Office automatic transcription and checked for accuracy.

4. Results

The results are presented in in two main sections: First the findings from Stage 1 - Preliminary Scan with value chain stakeholders. Second, findings from the Stage 2 - Deep Dive interviews with producers.

4.1 Results Stage 1 – Preliminary Scan

Figure 3 shows a word cloud to present several sustainability related issues and challenges identified by the participants in Stage 1.

Figure 3 Word cloud of key issue and challenges identified by the value chain stakeholders

Although there is a consensus amongst the participants that sustainability is important for the industry - as expected (See Background), they had diverse interpretations of the word 'sustainability'. Generally, the different chain actors identified the term 'sustainability' to have Financial, Environmental and Social components that are important in ensuring the longevity of the individual companies and therefore, the beef industry - with animal welfare being identified separately. The participants emphasized the importance of reducing the negative impact of the beef industry on the planet, while remaining economically viable. Social aspects that were brought up related to education, equality and job availability.

There is a diverse range of industry stakeholders based on the size of organization, their scope, the production region (i.e., Northern and Southern beef region), role in the value chain (e.g., producer or marketer), type of products (commodity or niche) and the target market (i.e., domestic and export). The participants' views represented this diversity identifying several issues and challenges relating to sustainability in the Australian beef industry. Additionally, the participants highlighted the commitment of the industry to sustainability and provided their inputs on how the proposed online platform would be beneficial to producers (in particular). The key points and themes relating to environmental sustainability in the beef industry, emerging from the interviews in the initial scan are discussed below.

4.1.1 Australian beef industry and environmental sustainability

Participants described the most important environmental sustainability issues to be carbon emissions/greenhouse gases, water and energy resources, ground cover and grazing management practices, drought, and deforestation, in that order. Some participants identified the emerging trend of regenerative agriculture for sustainability in the beef industry. Further, most participants highlighted that animal welfare is an important sustainability issue for the Australian beef industry, particularly for its reputation in the eyes of customers and investors.

Nearly half of the participants, mostly from stakeholders with large-scale operations, shared that their respective organisations are in the process of establishing their overall (Financial, Environmental and Social) sustainability metric baselines already. Although some participants mentioned that their organizations have made good progress in establishing indicators, most of them have not yet disclosed their sustainability commitments and specific targets publicly. Most of the organizations are planning

to have their sustainability commitments publicly available in the next 2-3 years, with the majority having a focus on net zero (carbon neutrality) and deforestation targets. Some stakeholders indicated that the investors are becoming more interested in the sustainability aspects of the beef industry, and thus companies need to align both the practical demonstration and reporting on Environmental, Social and Governance (ESG) criteria. Some organizations are setting their sustainability targets and indicators to align with ABSF.

Most participants said that the biggest challenge for the industry is being able to measure their sustainable practices and to prove their sustainability claims. As indicated above some of the larger organisations are in the process of defining indicators and metrics and in setting benchmarks and clearly defined targets for sustainability with the focus being on both the organization and their supply chain. Others are at the stage of collecting their baseline data for different environmental indicators, for example carbon emissions from the livestock and aspects of water and energy usage.

Some participants indicated that although the Australian beef industry claims to be a 'sustainable' and 'resilient' industry, it must further develop its resilience towards extreme weather events like drought as well as supply chain disruptions from pandemics like COVID19 as part of sustainability efforts.

4.1.2 Sustainability commitment and potential of Australian beef industry

Participants identified that the Australian beef industry is committed to achieving sustainability and is promoting sustainable practices. Most of the participants indicated that the issue of sustainability in the beef industry, particularly that of environmental sustainability, is being driven by their customers and consumers. Some participants highlighted that Australia has the ability to become the supplier of sustainable beef to the world. They argued that the Australian beef industry, compared to some other major beef exporting countries, is already ahead on the sustainable practices ladder.

It was noted that the Australian beef industry has made serious efforts around sustainability and environmental reporting. Particularly, the introduction of the Australian Beef Sustainability Framework in the last decade has been an important step in this direction. The ABSF tracks the beef industry's performance across selected indicators on an annual basis. The framework aims to address the expectations of community, consumers, customers, investors and other stakeholders regarding the sustainability practices in Australian beef industry.

Participants indicated that although the ABSF is helpful in addressing sustainability issues in the beef industry, they emphasized that beyond the ABSF, the beef industry needs to define and declare clear national targets similar to that of Carbon Neutral 2030 for other areas of sustainability such as water usage and animal welfare in order for the industry as a whole to be evaluated. It was noted that creating individual organisational metrics/indicators is a good place to start although it can be difficult due to data constraints, but inevitably this does not allow like-for-like evaluation across the industry. Participants emphasized that the creation of metrics and indicators needs to be based on scientific principles, and the data collected should be accurate and verifiable.

Participants considered the ABSF to be successful in making sustainability a mainstream topic in the industry and engaging key stakeholders in setting key priorities and targets which will contribute towards building confidence and trust in the industry within the wider community.

4.1.3 Perceptions and importance of communication

The majority of participants highlighted the importance of sustainability as part of the 'social licence to operate', by building and maintaining trust to satisfy the ever-increasing public expectations of

sustainable practice. Sustainability is important from a social standpoint with a focus on health and wellbeing for both beef producers and the livestock. Additionally, certain businesses need to demonstrate their sustainability performance to their investors to secure and grow access to future investments, including sustainably managing natural resources and appropriate handling of livestock.

The biggest challenge for the industry is misinformation around beef production and processing in terms of an apparent lack of sustainability credentials. Some of the participants emphasized the need to 'tell the story', arguing that the facts and figures supporting a positive narrative on the Australian beef industry's sustainability do exist, but they are not highlighted adequately. In effect, we were told that the industry needs to showcase its current performance and do better at articulating and communicating it. A MLA publication 'Red Meat, Green Facts' is a good example, but we were told something more visible was necessary perhaps using social media.

This lack of trust in the industry to 'do the right thing sustainability-wise' highlights the need for objective and reliable data to prove the industry is doing the right thing with verifiable facts. Most participants were strongly against the activism currently ongoing against the beef industry which in their opinion focuses on exaggerating issues with a small number of businesses that are outliers to the mainstream beef industry. Some participants emphasized that the industry needed to be careful when adopting definitions and indicators for a sustainability framework, complaining that sustainability programs and indicators used in the beef industry can be heavily influenced by certain NGOs.

4.1.4 Value of sustainability practices and credentials

Most participants indicated that the appetite for products that make environmental claims is growing, albeit with customers and consumers moving at a different pace on their sustainability journey. Most participants indicated that although there is a value associated with verifiable sustainability practices for certain branded products and that in that category, a potential price premium may exist for certain sustainability credentials. The major challenges generally are:

1. It is difficult to quantify the value of 'sustainability' or individual sustainability traits and then link the premium to a particular trait;
2. The premium may not reflect the cost and complexity associated with a particular sustainability claim;
3. Non-branded product may not generate enough income to justify the cost of being verified as sustainable; and
4. Some participants argued that a product may not attract price premiums if only based on self-assessment schemes, as they may lack credibility not being third-party audited or verifiable.

Most of the participants viewed the value of sustainability activities as difficult to quantify and even more difficult to relate to a dollar value. They highlighted that the value of sustainability is sometimes tangible, (e.g., changing a standard), but mostly it is intangible (e.g., by bringing efficiencies and resilience across businesses when adopting sustainable practices). Some participants, particularly the small operators, highlighted that beef producers are not currently getting any direct market signals around sustainability credentials.

Some participants acknowledged that although there are additional costs for businesses to engage in sustainability practices, these short-term investments will bring long-term benefits, and the costs will eventually be mitigated through improved efficiencies and better access to market etc. However, the producers are generally not able to pass on the additional costs of sustainability practices or

verification to the downstream participants of the chain. One participant indicated that it would be fairer if sustainability costs were equally weighted out and distributed fairly across the supply chain.

4.1.5 An online platform for beef producers

The participants indicated that an online platform will be a helpful tool to connect beef producers with both general sustainability and specific environmental theme information. Additionally, by developing a system to demonstrate their individual performance in different areas of environmental sustainability, the online platform will help in establishing a link between beef producers and what is demanded by the market. Some participants indicated that the demand for sustainability credentials may vary for the customers (i.e., wholesalers, retailers and the beef consumers – and the market (particularly the export market). So, the online platform should consider including some market intelligence on sustainability requirements from different markets, as well as product insights from a consumers' perspective.

Some participants viewed the importance of an online platform to link the market demand for sustainability with beef production systems. By adopting and demonstrating sustainable practices, the platform could help producers in achieving competitive advantage. Other participants indicated that the platform may also highlight the long-term risks and disadvantages of not demonstrating sustainable practices, for example the risk of people transitioning to more plant-based diets.

It was pointed out that a one-size-fits-all approach to developing content for the online platform will not work. The differing size of production units and the regions they are in requires very different sets of credentials and criteria. This is challenging for the online platform developers. Ideally, the online platform should have flexibility to address any prior learning and thus have 'light', 'medium' and 'heavy' training material as per the needs of differing producers. Further, the online platform should be user friendly, the information presented should recognise what producers are already doing and should comprise training presented in modules aligned to different knowledge levels, so producers can learn according to their need. In particular, the online platform 'should be useful' and links to existing material should be easily visible e.g., National Livestock Identification System (NLIS), Livestock Production Assurance (LPA), National Vendor Declarations (NVDs), On-Farm Quality Assurance (LPA QA) programs like CattleCare, any other accreditations and the trainings completed by beef producers.

The participants emphasized the online platform should make relevant information easily accessible for producers by making it available at one place. In particular, it should help beef producers understand the link between sustainable production and financial outcomes. Some participants argued that the learning opportunities should focus on principles vs practice, with a focus on agreed sustainability outcomes. It should help producers in implementing practical changes that would have the most impact on-farm with the least cost and time input – and it should help with what can be done practically at farm level to reduce the carbon footprint of individual beef producers and therefore the overall footprint of the industry.

Finally, the idea of an online platform elicited comments as to the fact that there will be some challenges in remote regions for internet connectivity and this should be considered in the design phase of the platform. For example, it was highlighted that some producers in remote locations are still doing everything paper based because of lack of connectivity and some producers with limited access to the internet may not be able to use the online platform. NB: It was suggested that provision for on ground support/extension services for the remote communities would be beneficial.

4.2 Results Stage 2 – Deep Dive

The results for the Stage 2 - Deep Dive are presented in three sections addressing the 5 Environmental Credential themes:

1. Carbon balance,
2. Drought resilience,
3. Tree cover, ground cover and biodiversity stewardship (as there was substantial overlap in the findings in these three themes)

Figure 4 is a word cloud of terms used by interviewees.

Figure 4 Word cloud of key issue and challenges identified by the producers

4.2.1 Carbon balance theme

Several producers identified that, considering the spotlight on the environmental impact of beef production, carbon balance is the most important theme. The participants emphasized that productivity and sustainability are not antagonistic with each other and there are opportunities to improve them together. However, as the Australian beef industry has set to be carbon neutral by 2030 (CN30) target, the producers need a better understanding to achieve a good carbon balance on their farms. Many producers highlighted that the target is good for the overall industry, and this project may help them through measures and indicators at farm level.

Most producers recognised that carbon balance not only has environmental and production benefits, but it has co-benefits for drought resilience with improved water holding capacity with more soil carbon. Some believed that soil with more carbon and organic matter improves the structure of soil so it can hold more water thus helping in becoming more drought resilient.
Several participants mentioned their sustainability efforts for carbon balance by reducing carbon emissions and increasing carbon sequestration. The majority of participants recognized the opportunity to sequester carbon by using better grazing management systems to manage pasture health. Furthermore, the producers who changed their grazing management practices based on the concept of regenerative agriculture claimed it to be helpful in becoming carbon neutral. Many producers practising regenerative agriculture shared the belief that increasing soil carbon not only improved soil fertility but also increased their farm's biodiversity and drought resilience through improved water retention.

Small and medium producers particularly shared that they do not have a great understanding of applied aspects of carbon neutrality on their farms, and wanted practical information to enable them to explore options for improving their carbon balance by reducing carbon emissions and increasing carbon sequestration. Most small and medium producers emphasized that the project can help them by providing a practical and efficient online calculator for measuring the carbon emissions and sequestration of their farm. Most participants were aware of carbon calculators available online, but several identified the need to have a simpler online tool for calculating their carbon emissions and sequestrations which is easier to use and gives precise output on carbon balance.

Participants were asked if they get any regular questions from their customers regarding carbon balance and sustainability. Most of the small and medium producers stated that no questions on carbon balance are asked at the markets where they sell their cattle i.e., to the saleyards. However, most of the producers mentioned that there has recently been much greater awareness around carbon neutrality but specific questions on carbon balance are not being asked by the market as yet. Further, the participants mentioned that they do not get any premium on price for carbon neutral beef although since the carbon space is rapidly evolving as the environmental markets are established and Carbon Neutral certified beef is being introduced in Australian supermarkets this is a possibility.

Most of participants stated that they are not aware of requirement differences between domestic and overseas markets in terms of carbon balance, although most of the participants interviewed indicated that they are not directly exposed to the international market. In particular, the small and medium producers who sell their cattle to local saleyards seem to remain disconnected from potential demand for carbon neutral beef in the overseas markets. A few participants were aware that certain overseas markets (e.g., the EU) have a potential demand for environmentally sustainable beef products including carbon neutral beef. Similarly, most of the participants mentioned that they do not make a brand claim on any environmental attributes related to carbon balance. However, some big beef producers have recently started branding carbon neutral beef, with verified and accredited carbon neutral claims. Additionally, there are some niche marketers and a big supermarket chain have started offering a carbon-neutral beef product line. Most participants indicated their awareness of these developments with regard to increasing demand from consumers for sustainable beef products.

Participants suggested that the proposed online platform should first have some learning modules on awareness regarding carbon balance and what data needs to be collected. Next, it should enable producers to calculate their carbon emissions and sequestrations to determine the carbon balance of their operations. It should then provide them with learning on opportunities to improve carbon balance of their beef production system and then in tracking the progress. For example, the producers are interested in getting latest research on feed alternatives/ additives for reducing carbon emissions in the grassfed cattle. The platform should provide practical learning resources and make it simple and easy for the producers by compiling the latest on key learning topics. It should provide linkages to the existing resources of interest or generate learning resources on topics which are not available elsewhere, particularly specific for different regions. Finally, most participants identified for better understanding and better adoption, the learning resources should include case studies on reducing carbon footprint with real-world examples of fellow producers to demonstrate its benefits.

4.2.2 Drought resilience theme

The participants considered drought resilience to be an important aspect of sustainability in the beef industry. Most participants considered drought to be a critical driver in beef production and the role of resilience to be important for the sustainability of the Australian beef industry. However, a small number of participants were unclear as to what ‘drought resilience’ means as a sustainability credential, and how drought resilience matters from a market perspective. Drought resilience is

different to the other four themes of the project as there would appear to be no market demand for drought resilient beef as a sustainability credential. Participants indicated that aspects of tree cover, ground cover and biodiversity are integrated and are imperative to drought resilience in the beef production system.

Participants reflected on how the recent long spell of drought has been a wakeup call for producers, as it had impact even in those areas which were not considered prone to water shortages. Some participants discussed that the recent recurring and extended droughts have highlighted the importance of drought resilience for the Australian beef industry, and that many producers indicated that they were not prepared and resilient in times of drought. Most producers feel that managing financial and social impacts of prolonged droughts are critical from the perspective of the long-term sustainability of Australian beef industry.

The key sustainability efforts in a drought situation shared by the participants included environmental sustainability through pasture management and accessing finance in drought for business sustainability. Producers also emphasised that the dimensions of better land management and social resilience are interlinked for drought resilience. Participants in the northern regions particularly emphasized that managing stocking rate is critical to prepare for and respond to droughts. The producers also identified the need to run fairly conservative stock numbers, having a timely destock in low rainfall years and readjusting the stocking rate to match the available feed. Not surprisingly, several participants highlighted that maintaining moderate stocking rates and making a timely decision to destock helped maintain good ground cover. Most producers had a belief that being more resilient requires the producers to be proactive and get prepared for drought when in good times.

The majority of participants interviewed were aware of the various tools and resources related to drought, but not on drought resilience so there is potential for a comprehensive tool for drought resilience specific to beef production. The participants discussed pasture and land management as critical for drought resilience, and relevant tools and calculators are needed for grazing management and feed budgeting. These participants emphasized that the producers can be more resilient by matching their stocking rate to the carrying capacity of the land (feed availability and pasture growth) to manage during droughts. Further, some participants mentioned that critical decision dates vary across regions and specific calculators and tools to help them decide to prepare before and during droughts would be useful. Hence, most participants had a strong focus on land management practices, by assessing the current situation of fodder and water availability.

Most participants reflected that to be financially resilient, it is critical to destock in a timely fashion and that the costs of supplementary feeding are kept to a minimum. Further, a small number of participants mentioned the role of access to finance to be important for sustainability of business during dry times. Some producers mentioned that they have improved resilience to drought through income diversification i.e., income from non-farm sources, while some already had other on-farm agricultural enterprises e.g., sheep for meat and wool. Further, a few producers emphasized that the banks are becoming increasingly interested in environmental credentials of their agricultural clients. Particularly being more drought resilient contribute to the financial viability of beef businesses.

Some producers emphasized that adopting regenerative agricultural practices is the key to becoming resilient in droughts by being better prepared to adjust stocking rates. These participants shared their experience that regenerative grazing helps build resilience against drought by improvements in pasture, general topsoil health, water infiltration, better water retention in soils and even in carbon sequestration. Hence, they held the view that regenerative beef production practices contribute to economic and environmental sustainability.

4.2.3 Biodiversity stewardship, tree cover and ground cover

Participants viewed tree cover, ground cover and biodiversity stewardship to be important environmental credentials for Australian beef production. Participants generally held a positive view towards these environmental credentials for sustainability of their farms as well for the overall industry. Several participants highlighted that most of the things the producers do around sustainability are because they consider them the right things to do. Also, there is increasing demand from the consumers for these issues to be addressed meaning that they actually need to demonstrate that they are doing the right thing. As many participants said, tree cover, ground cover and biodiversity stewardship overlap and are strongly interlinked, and thus will be discussed together in this section.

The participants were asked if they get any regular questions on the environmental credentials of tree cover, ground cover and biodiversity stewardship from their customers. Most participants responded that beef producers consider themselves to be remote/removed from the customers. Further, some participants commented that, like carbon credits, there needs to be some market reward for these sustainability credentials which flow back the entire supply chain to the producers. Most participants discussed that the premium on price is not there yet and they are unable to make any brand claim on these environmental attributes of tree cover, ground cover and biodiversity stewardship. However, some participants argued that although an identifiable price premium is not obvious, these credentials certainly have benefits and potential for market differentiation down the track. The small-scale producers highlighted that they miss out on the government schemes and incentive programs due to economies of scale.

Participants shared the view that beef grazing systems, compared to cropping and the horticultural sector, have potential and capacity to demonstrate environmental credentials. Also, they emphasized taking a proactive approach now would set them up well for future societal/customer demands. Participants highlighted that there may not be direct financial incentives for initiatives to demonstrate their sustainability commitments, but there are non-economic benefits for adopting those environmental credentials particularly around the issue of a social licence to operate. Interest in these sustainability credentials is just emerging and there are different incentives and government schemes being launched, particularly on carbon and biodiversity. Further, some participants indicated that the level of difficulty in measuring or quantifying certain indicators is a challenge in order to communicate the improvements in sustainability efforts.

Biodiversity stewardship theme - most participants shared that as producers they do not consider it standalone, but as an integrated part of their business. They mentioned that biodiversity stewardship has co-benefits for vegetation on-farm, such as shelter and shade, biological pest management etc., hence the producers consider it to be integral in terms to having a social licence to operate. Several participants discussed the need to package biodiversity benefits in with a range of co-benefits. Relatedly, many participants emphasised that balancing tree and grass cover for beef production and environmental benefits and biodiversity is critical for sustainability. Hence, biodiversity stewardship needs to be packaged with these other environmental credentials to provide producers with reasonable economic incentive for adopting sustainability practices.

Participants shared that the consumers are demanding that beef producers look after biodiversity. However, several participants discussed that there is no incentive to protect or enhance biodiversity and their efforts on biodiversity stewardship are not generally valued by markets. Producers had limited information on the value of any biodiversity improvements they make as well as the potential demand for biodiversity stewardship outcomes. A few beef producers were aware of the incentives for maintaining and enhancing biodiversity through Australian government grants. Some participants

shared their concern that sometimes the producers who have already made progress miss out the incentives and recognition of improvements they have already made prior to grant offerings or schemes. For example, the beef producers who have implemented certain positive changes for protecting or improving biodiversity before using the platform should not be disadvantaged and any prior efforts should be considered retrospectively by using technologies like remote sensing, where possible.

Tree cover theme - participants believed that tree cover has many environmental and production benefits. The producers discussed that tree cover is critical for carbon sequestration, soil health and for the protection or restoration of biodiversity. It is not only important for environmental sustainability and the benefits of shade and shelter for livestock, but also has potential for beef producers from the perspective of carbon neutrality. Tree planting contributes towards carbon offsets on farm and the beef producers do not need to buy offsets off farm. Further, there are opportunities for agroforestry alongside beef production, resulting in improved shelterbelts for livestock, and income potential. The participants shared that maintaining tree cover and protecting the remnant vegetation is important for habitat protection and biodiversity. Overall, all participants highlighted that maintaining tree cover has benefits in terms of biodiversity and animal welfare for shading, water sources and riparian buffer zones.

Ground cover theme - most participants said that maintaining healthy ground cover is a key indicator of land condition and is critical for maintaining and improving biodiversity. Further, sufficient ground cover is important for healthy livestock and grazing productivity. Some producers considered ground cover as not an outcome but an indicator improving the sustainability in beef production. Many participants shared the view that the stocking rate should be matched to a sustainable carrying capacity for their property. Several participants highlighted that grazing pressure has to be managed, especially during droughts. Further, some participants shared their frustration regarding continual grazing pressure from feral animals, which is an issue affecting ground cover in many places.

Participants reflected on their aspirations from the online platform to help them communicate to their customers and chain stakeholders about their sustainability efforts. They feel it will not only help beef producers to understand the benefits and economic advantages of sustainability practices but also help them improve their productivity. Further, the platform could bridge the information gap in terms of what is being demanded by certain markets, for example tree cover and deforestation-free beef is important for the European Union. Some participants held a view that the online platform would be useful if it could provide a basis for certification and help producers to progress towards satisfying various certification schemes, which could result in financial incentive.

Some participants shared the view that the time and effort and paperwork required to measure the credentials is a barrier for adoption, as most producers are time constrained. Producers will participate only if they can see biodiversity stewardship, ground cover and tree cover provide a strong business case and that spending time and effort doing those interventions can provide a monetary or business benefit. Some participants argued that to support their environmental claims in certain markets, self-assessment through an online platform may not be sufficient and would need externally verified certification. Many participants thus felt that as the online platform being proposed is not being third-party validated, there should be some means to ensure its integrity for wider acceptability e.g., combining remote sensing data with on-farm measurement methods.

Most producers think that, in contrast to carbon, there are practical constraints in measuring and monitoring biodiversity stewardship, tree cover and ground cover. Many participants shared that benchmarking is useful, and the producers would like to see the benefits of an intervention by comparing with other individual farms as well as the generalised averages for their regions. Some participants shared that certain indicators being measured in the Australian Beef Sustainability Framework for balance of tree and grass cover are useful.

The producers were asked if they would like to see a utility be provided in the platform to allow markets to reach out to new producers who meet their environmental sustainability credential thresholds. The participants indicated that most producers would be interested in such ability, if provided with choice to opt-in for this to occur, and the producer's credentials would be visible to the market automatically. Most participants thought it to be a great idea, as the producers would be interested in pursuing it further and being contacted by the market.

A list of key findings from both stages can be found in the following Section 5 – Conclusions.

5. Conclusions

The Business Scan provided insights into, and a context for, the overarching 'Environmental credentials for Australian beef' project to inform the co-design process. The subproject identified the business needs and long-term sustainability goals to establish the draw-through value of sustainability to the beef industry chain stakeholders, but most particularly the producers. It also explored the issues around the likelihood of adoptability of the proposed technology, the challenges and potential strategies for successful adoption.

The findings in Stage 1 are based on 22 semi-structured interviews with stakeholders from a wide range of roles across the beef industry. The preliminary scan was successful in engaging a wide range of industry stakeholders across the beef value chain, including producers, major processors and retailers, among others. Stage 2 of data gathering - the Deep Dive involved 20 interviews focusing on producers to capture their diverse perspectives on the project's 5 themes with a view to understanding sustainability and the adoptability issues of the project's 5 themes from the perspective of beef producers. Further, progressive input and feedback to the codesign working groups provided opportunity for iterative engagement with the producers.

5.1 Key findings

5.1.1 Key findings from Stage 1

In the Stage 1 - Preliminary scan a total of 22 participants from the beef value chain have been interviewed, representing stakeholders with a wide range of roles in the industry. The response rate was low initially, and the team faced some difficulty in engaging participants for the interviews for the preliminary scan. However, the scan was ultimately successful in engaging a wide range of industry stakeholders across the beef value chain, including producers, major processors and retailers, among others.

Listed below are the key findings of the preliminary scan based on the responses from across the Australian beef industry chain. Points i to viii identify the most important sustainability issues, while ix - xii focus on the online platform.

i. The word 'Sustainability' means different things to different people – in general the different chain actors identified the term 'sustainability' to have Financial, Environmental and Social components that are important in ensuring the longevity of their business/the beef industry. Animal welfare was identified specifically by almost all participants.
ii. Although there is a value associated with verifiable sustainability practices, sustainability activities are not easy to quantify and even more difficult to relate to a dollar value. Currently, producers are not getting direct market signals around sustainability credentials.
iii. Larger organisations interviewed are in the process of creating and defining their own detailed indicators and measurements although these are yet not publicly available. Smaller organisations are not undertaking this process currently.
iv. Sustainability standards will become the norm over time and those not engaging in sustainability practices will face market access constraints, e.g. lose their market share or business with major customers.
v. Without being able to prove some form of sustainability credentials, stakeholders in the chain will have difficulty in accessing markets. This is not just a business issue but will also impact on the social licence to operate.
vi. Overall, the ever-increasing community expectations around sustainability credentials in the beef industry call for a clear demonstration of verifiable sustainability credentials particularly environmental credentials. However, these may not attract a premium price rather, they will be required as a 'ticket to entry' of a market.
vii. Most participants highlighted that the biggest barrier in demonstrating sustainability is lack of baseline data and indicators to show sustainable beef production. National metrics need to be developed to create a baseline dataset.
viii. Frameworks like ABSF are a step in the right direction for the stakeholders in the chain - having specific guidelines and indicators are helpful for promoting sustainability in the beef industry.

Some insights from the value chain participants regarding the online platform include:

ix. The proposed online platform should be smart and automatically populate any current and data from existing industry databases and technologies such as remote sensing. It should also make information accessible and easy-to-use for the producers to input their information.
x. The proposed online platform should help producers in establishing their own baseline dataset and in setting targets around sustainability credentials. It could also be useful in connecting producers with the demand for certain sustainability credentials.
xi. The idea of an online platform elicited comments as to the fact that there will be some challenges in remote regions for internet connectivity and this should be considered in the design phase.
xii. The beef industry needs to communicate effectively about its sustainability efforts and the achievements gained as the facts and figures supporting the narrative about the sustainability of Australian beef industry are not well highlighted in the public arena.

5.1.2 Key findings from Stage 2

This section documents Stage 2 of the Beef Industry Business Scan subproject, in which Deep Dive interviews were conducted with beef producers, and provides an update on the research which draws on semi-structured interviews. The Deep Dive builds on the findings of the Stage – 1 Preliminary Scan and provided progressive input to the producer co-design working groups on the 5 themes.

Some key findings from the Deep Dive interviews are:

i. Most participants in this research acknowledged that community and consumers have expectations regarding sustainability in the beef industry. They considered sustainability as integral for 'social licence to operate', and that demonstrating sustainable practices is critical to satisfy expectations from their customers and the consumers. The producers are making efforts across most the themes of the project, with sustainability activities at their individual business level.

ii. Carbon balance and biodiversity stewardship were considered to be important environmental credentials by the producers for the sustainability of their beef business. The participants acknowledged the industry's strong focus on carbon emissions under CN30. Others discussed the relevance of land management, tree cover and ground cover for drought resilience.

iii. The Government is providing incentives for biodiversity protection and restoration, but the producers felt that such incentives are generally missing for ground cover and tree cover.

iv. Drought Resilience is an important theme to be included in an environmental credentialling, as it requires understanding and management of the other 4 themes of the project. Producers also indicated that general business sustainability includes financial and personal resilience aspects that need to be included. i.e. it is a very holistic theme.

v. Many participants noted that the project/ platform does not include animal welfare, although it is considered essential for the industry's sustainability and to meet community expectations around animal welfare.

vi. The participants mentioned that so far there is no direct price premium on environmental credentials, except for carbon. Some participants shared that they are getting market signals for certain sustainability credentials, particularly for biodiversity which comes next to carbon. However, there is not yet an identifiable premium for other environmental credentials. Interest is increasing from the high-end customers in the Australian domestic market as well as the international markets.

vii. The participants emphasized that the platform should be user friendly and practical for the beef producers, their customers and other stakeholders in the beef value chain. The online platform should help producers with practical tools at farm level to demonstrate their progress in sustainability credentials. For example, if more producers can demonstrate their sustainability performance on carbon balance through the proposed platform, it will contribute to achieve the industry CN30 target.

viii. Similarly, the producers are generally not making any brand claims on sustainably credentials, however the awareness and market for environmental credentials is just emerging.

ix. The producers emphasized that if there are data input requirements, they should be simple and should not add paperwork burden on the producers. Where possible the platform should extract information from existing databases and remote sensing. Further, design of the proposed online tool should be provided at an appropriate property level with data automatically populated where possible.

x. Some participants said that the platform should also help the producers connect with what is being demanded by the market and on how to market beef with those sustainability credentials. Others mentioned that the producers sometimes do not know where to start, so the learning opportunities on platform may provide practical examples, case studies and guidance on best practices.

xi. Some participants highlighted that accessibility may be an issue considering the remoteness of many cattle production farms. Further, some other producers mentioned that being online in itself is a limitation, as the adoption of the platform may have limited uptake by the producers for learning as they are used to more hands-on and peer to peer learning. So, instead of starting with hard facts and figures, the content should be engaging and inspirational.

xii. The participants mentioned that most producers would like to see a utility provided in the platform to allow markets to reach out to those producers who meet their environmental sustainability credential thresholds. However, the producers should have the ability to opt-in for this to occur, and it should not be automatic that producer's credentials would be visible to the market.

Overarchingly, participants highlighted that sustainability initiatives need to have a holistic sense and cannot be divorced from economics or social issues. Importantly, the information derived from the Deep Dive provided valuable input from producers' perspective.

Stakeholders had diverse views around sustainability, which can be attributed to the inherent diversity in Australian beef production systems, large scale operations and the specific target market of different businesses. Additionally, most participants regard the term 'Sustainability' to encompass economics and social material as well as environmental criteria. However, almost all participants considered environmental sustainability to be very important for long-term viability and survival of the Australian beef industry. A complex and ongoing challenge for the industry is to counter the misinformation and trust deficit around the industry's sustainability practices. There was much discussion about the importance of changing community perceptions and the need to promote the industry's narrative for building a positive image and trust. Many participants emphasized the importance of better communication strategies for countering the negative perceptions about the industry and proactively highlighting a 'clean and green' image. Additionally, many participants highlighted the importance of sustainability as underpinning the 'social licence to operate' and considered sustainability as the 'right thing to do' and as being important for the industry's global reputation.

Most of the participants viewed that there is value associated with sustainability credentials, but these are complex to quantify currently until more work is undertaken on these (Bryceson et al 2021) and thus it is difficult to attribute premiums to particular sustainability credentials. The participants believe that sustainability standards will become a norm over time, and any current price premiums (currently rare) may diminish in future. However, those not engaging in sustainability practices may lose their market share or even market access if they are unable to demonstrate sustainability credentials in the future.

The participants expressed wide-ranging views on what are the current learning opportunities available to beef producers and what the proposed online platform might include to serve as a practical tool to demonstrate environmental sustainability credentials. Most participants indicated that the information may exist on different aspects of sustainability, but resources are scattered and thus not easy to access. The proposed online platform would be helpful in bringing together the learning resources on sustainability credentials in general and environmental credentials more specifically, on one platform. The participants also emphasized that the producers should see a benefit from using the online platform, so it is not just that they are inputting information and not getting anything back from it – this is particularly so for smaller producers to help them identify any gaps in their processes and to link them with best practice information and pathways to demonstrate their on-farm environmental sustainability credentials. (NB This is an already articulated guideline in the online platform design brief).

The biggest barrier in demonstrating quantified sustainability credentials is lack of baseline data around indicators across the spectrum of a TBL approach that show sustainable beef production, as documented in Bryceson et al (2021). The online platform should be able to help producers in establishing their baseline and setting their own targets around sustainability credentials as well as enabling them to compare themselves with other producers to get a true comparison across different farms.

The participants highlighted that there is substantial effort involved in monitoring sustainability and emphasized that the online platform should be designed in a way that it requires minimum cost and effort for participation. The participants highlighted that any arduous paperwork or administrative burden may be a constraint for beef producers and hence the proposed online platform needs to be 'smart' and be able to automatically populate any existing data for their property. Some participants indicated that considering the existing strong traceability systems in the Australian beef industry, there is scope for linking traceability with sustainability, where possible. Hence, the online platform could link the data on traceability already being collected by the industry and have the capacity to integrate data generated through technologies like remote sensing. For example, the existing systems for the identification and traceability of cattle (e.g., NLIS, NVDs) may be used to link deforestation free beef or other climate change improvement practices at farm level, which could encourage beef producers to engage in other programs to demonstrate their sustainable practices with minimum administrative burden.

For the design phase of the proposed platform, the 'What, Why, How?' Framework could work well as an overarching design framework for the online platform. For each theme:

- WHAT – the User needs to be able to access both basic information and more complex information on the theme
- WHY – the User needs to see a clear definition of the need to address each theme with more detailed information
- HOW – the User needs to be able see how to link the data and information they are accessing through the online platform to provide validation for their business.

From an economic point of view, most of the participants emphasized that there needs to be an financial imperative for the wider uptake of such online platform, and it must provide producers with those learning opportunities which enhance their knowledge on sustainability practices and credentials.

Our interviews with stakeholders revealed that there is a perception that beef is not produced in a sustainable manner to meet what a customer wants in terms of sustainability. Hence, a majority of stakeholders considered that the proposed online platform could be useful in connecting producers with the existing and potential market demand for certain sustainability credentials. The ever-increasing community expectations around environmental sustainability issues in the beef industry call for clear demonstration of environmental sustainability credentials. Some participants indicated that producers are not currently getting direct market signals around sustainability credentials. However, demonstrating environmental sustainability is increasingly becoming an issue of market access and a 'ticket to entry'.

In conclusion, the Business Scan was successful in providing insights into and establishing context for the overarching project. The Scan provided clarity on the business environment around the need for verified sustainability credentials within the beef value chain and demonstrated value proposition to producers. It provided insights into the motivations and interests of the different stakeholders across

the whole beef industry value chain, established the business case for the proposed platform, and informed the co-design process across the 5 themes. Further, the findings inform the producer/stakeholder co-design process in designing learning modules. The Project is complete although further work has been identified as being necessary to create practically-based sustainability indicators that are verifiable and recognised.

5.2 Benefits to industry

The Business Scan provided insights from industry stakeholders and producers on the emergence of the TBL approach to business sustainability in the beef value chain that combines TBL and ABSF guidelines for sustainability indices creation (Bryceson et al., 2021). The Australian beef industry as a whole is committed to sustainability and the development of the Australian Beef Sustainability Framework is evidence of the industry's commitment. However, it was clear from the interviews that stakeholders believe that it will be critical to be able to demonstrate verifiable environmental sustainability credentials in order to build confidence among the customers, the wider community and other stakeholders. In order to show its commitment, the industry needs to have clear national sustainability metrics with specific targets.

The Scan also provided insights on the emerging issues for specific environmental themes of the overarching project to the co-design working groups, to aid in the development and design of the overarching Project's beef producer-focused Online Platform.

The findings of the Business Scan, in conjunction with the co-design process, explored the value proposition of the 5 sustainability credentials for the red meat industry. By providing insights into the interests of the different stakeholders across the whole beef industry value chain on their sustainability needs, the Scan provided evidence of the value proposition for the producers to demonstrate their credentials. Hence the outcome of this overarching project, i.e., the online platform, will benefit the producers by demonstrating their sustainability credentials to the wider industry chain stakeholders and consumers.

6. Future research and recommendations

Opportunities for future research are in developing specific, verifiable sustainability indices, templates, guides and scorecards for TBL sustainability based data collection, data management and market driven sustainability verification strategies that can easily be incorporated into a company's business and operational plans.

Opportunity also exists for the findings to be further investigated and developed for linking with the relevant market initiatives (e.g. carbon market, biodiversity stewardship) to educate producers in what the markets are demanding in this sustainability space.

Further work/research is recommended with industry actors to create practically based TBL and ABSF Sustainability indicators that are verifiable and recognised (elaborated in Figure 2).

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Appendices

Appendix 1 – Interview guide for Stage 1 – Preliminary scan with value chain stakeholders

These questions investigate what sustainability means to a participant in respect to their organisation and in their value chain. (The follow up questions in brackets were used to probe deeper).

1. What does the word 'Sustainable' or 'Sustainability' really mean to you (your organization)? What sustainability commitments exist currently in your organization?

2. How is sustainability measured in your organization (indicators / metrics)?

3. Do you know how others in your supply chain view the issue of sustainability? (Could you give us an example of how others in your chain measure sustainability? Is one larger company/customer driving the issue of sustainability along the chain? What are the problems of other stakeholders for compliance to standards)?

4. What do you think are the current most important sustainability issues in the beef industry as a whole?

5. In your view, have the programs that promote sustainability in the beef industry - like ABSF, GrazingBMP - been successful?

6. What are the challenges and issues affecting 'adoptability' of such sustainability schemes?

7. Do you think that sustainability of the beef industry contributes to a positive social licence to operate?

8. What do you think are key social issues for you in implementing sustainability approaches in your business? – The chain? (For example: Education, Demographics of people working in the industry, welfare)

9. From a sustainability perspective, what are the markets interested in? (Do your customers consider sustainability to be important? Reasons for demand of sustainability).

10. In your opinion, will the market give a better price for a product that has verifiable sustainability practices employed? (Is there a value associated with sustainability? Do you feel you get adequate/appropriate compensation for your sustainability efforts?)

11. Are there any problems or additional costs to engage in sustainability? (Are you able to pass on the additional costs of sustainability to the other stakeholders in the chain upstream and downstream?)

12. Do you get any specific demands from your customers for sustainability credentials/ metrics?

13. What digital technologies (e.g., remote sensing, RFID/barcode, energy monitoring etc) are currently being used to measure sustainability issues in your business operations?

14. Do you currently use any formal auditing tools to verify (keep track of = traceability) sustainable practices that you have adopted in your business?

15. In your opinion, what are the main barriers that you can think of in adopting technologies to verify sustainable practices?

16. What technologies are needed, or would be most useful, to serve your needs in documenting traceability information in your organization and between actors in your chain around sustainability?

17. In your opinion, what would be the most efficient and cost-effective verification scheme for validating sustainable practice?

18. What are the current learning opportunities and pathways for producers around sustainability in terms of the project's themes (ref information sheet) in serving their chains?

19. What would you like to see presented in the Online Platform?

20. How should it be developed to be of most use to the industry? What learning opportunities could be useful in the proposed system?

21. What would you like the producers to learn (or be helped with) regarding sustainability practices from the market perspective?

Appendix 2 – Participant information sheet

Project background

Beef customers and other industry stakeholders are increasingly looking for evidence of sustainable production practices, e.g. to compete in certain export and domestic markets. A challenge for beef producers is how to demonstrate their sustainability credentials and achieve recognition in the market-place. This project will develop an on-line platform to enable producers to demonstrate their sustainability credentials, and also offer information and learning opportunities. Strong industry involvement is essential to ensure the system provides benefit and value to beef producers and their value chains.

The objectives of the project are to:

1. Develop a national online platform for grass-fed beef producers that enables them to access emerging markets by demonstrating their sustainability credentials.
2. Motivate grass-fed beef producers to implement sustainability practice change through self-directed learning.
3. Provide a baseline for aggregated national trends data for the beef industry across sustainability areas that can be used for monitoring, directing adoption and industry wide reporting.

The platform aims to use tools such as satellite imagery – where relevant - for verification of sustainability credentials and provide an option for producers to demonstrate sustainability performance to various markets against 5 areas:

1. Tree cover
2. Ground cover
3. Biodiversity stewardship
4. Carbon balance
5. Drought resilience.

The project is funded for three years (until June 2023) through the Australian Government's Smart Farming Partnerships program. It is being delivered by a consortium led by Meat & Livestock Australia, with WWF-Australia and University of Queensland as partners, and Pinion Advisory engaged as project coordinators.

Invitation to participate

You are being contacted due to signing up as a member of the consultative producer network for the Environmental credentials for Australian beef project. If you are interested in being part of the Business Scan subproject which we believe is important to enable the project to deliver useable outcomes from a market perspective, we invite you to participate in an interview. This information collection will contribute towards building an industry perspective on the relevance of the type of online platform proposed, and how it can be made most useful.

The interview will take 15 to 20 minutes with focus on either carbon balance or drought resilience theme, you are requested to share your preference for one of these two themes. We will ask you questions with focus on relevance of carbon balance (or drought resilience) as project theme, your key sustainability efforts, brand claim on any environmental attributes, relevant indicators and

measures for demonstrating their sustainability practices and what learning opportunities could be useful for the beef producers in the proposed online platform.

Participation is completely voluntary. You may if you wish withdraw at any point, even after interview, in which case the data you contributed will be omitted from the analysis, and destroyed. Your individual comments will be completely confidential; all reports and further use of the data will be in summary form that does not identify any contributor.

We will apply very high standards of data protection, including separation of your information from any information that might identify you, and storage at locked premises and on password-protected computers. We will destroy recordings and notes after the minimum retention period of 5 years.

With your permission, we would like to record your interview, to assist in taking an accurate record. If you are unhappy with this, feel free to decline recording.

If you agree with these arrangements, we ask you to sign the attached document to confirm your consent to interview.

Project ethics

This study adheres to the Guidelines of the ethical review process of The University of Queensland and the *National Statement on Ethical Conduct in Human Research*. Whilst you are free to discuss your participation in this study with the project team (contact details below), if you would like to speak with an officer of the University of Queensland not involved in the study, you may contact the Ethics Coordinator on +61-7-3365 3924 or by email at human.ethics@research.uq.edu.au

Appendix 3 – Consent form

Research Title: Beef Industry Business Sustainability Scan – Environmental credentials for Australian beef project

Name of the participant: _____

I consent to participate in this research project. It has been explained to me that the purpose of this research is to explore sustainability from the business perspective of stakeholders in the beef value chain for developing an on-line platform where producers will be able to demonstrate their sustainability performance. I have also been provided with a written project information sheet.

The possible risks of participating in this research have been explained to my satisfaction. I understand that in this research I will be required to participate in an interview. I understand that my interviews will be audio recorded and I have been informed that I have the option to cease audio-recording at any point of time, and in such circumstances written notes will be taken.

I understand that my participation is voluntary, and I am free to withdraw from this research anytime without needing to provide any explanation, and I would not receive any penalty or bias as a result of my withdrawal. Should I decide to withdraw, I understand that my data will be destroyed and will not be used in the research.

I understand that data collected for this research will be stored in Research Data Management System managed by UQ. High standards of data protection, including separation of your information from any information that might identify you will be applied and only research team will have access to the data.

I understand that this research adheres to the Guidelines of the ethical review process of The University of Queensland and the National Statement on Ethical Conduct in Human Research. I have been provided with contact details of the researcher, as well as UQ Ethics Coordinator.

I have received and read the information sheet pertaining to this project and agree to participate in an interview according to the arrangements described to protect participants' interests.

Participant Signature: _____

Date: _____

Ethics ID number: HR03179

Appendix 4 – Interview guide for Stage 2 – Deep dive with producers

1. Why do you consider <Theme name> to be important for sustainability in your beef business? Is your business, is <Theme name> something you have considered in relation to sustainability? If so, why?
2. For <Theme name>, what would be your key sustainability efforts?
3. In regard to environmental sustainability and beef do you get any regular questions from your customers or other stakeholders regarding <Theme name>?
4. Do you make a brand claim on any environmental attributes related to <Theme name>? If so, what value does <Theme name> create as a sustainability credential, and for whom?
5. What are the requirement differences between domestic and overseas markets?
6. Which indicators could be developed for <Theme name>, considering data availability so that it is useful for the demonstrating what the producers are doing for sustainability?
7. Would producers like to see utility be provided in the platform to allow markets to reach out to new producers who meet their environmental sustainability credential thresholds? [*Emphasize: Producers would have the ability to opt-in for this to occur, it would not be automatic that producer's credentials would be visible to the market*.]
8. What would you like to learn, or be helped with learning, regarding sustainability practices related to <Theme name> from a market perspective?

***NB**: Questions in the Deep Dive interview guide are in addition to the questions asked in the Stage 1 - Preliminary Scan. They have been kept to maximum of 8 questions to address the producers time constraints.*