

# Benchmarking to drive improvements in extensive beef cattle welfare: a perspective on developing an Australian producer-driven system

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## ABSTRACT

There are increasing calls by stakeholders to raise the standards of animal welfare across the livestock sector. The beef industry needs a way to demonstrate improvements in animal welfare over time. The enforcement of minimum standards can be effective in preventing poor welfare, but the ability to recognise, exemplify and reward those at the top end of the welfare continuum is currently lacking. Our perspective article outlines the benefits and challenges of taking a voluntary, producer-driven benchmarking approach to recording and improving animal welfare in Australian pasture-based beef cattle. We discuss considerations when selecting measures for use in this benchmarking approach, including their validity, reliability, feasibility and value. The assessment of the human–animal relationship is discussed as a worked example of balancing these considerations in a way that suits the extensive Australian beef cattle production environment. We propose that careful consideration at the development stage is required to produce a benchmarking system that is robust and fit for purpose. This will also facilitate the collection of clear, meaningful data to allow for transparency and accountability throughout the industry. Demonstration of successful welfare benchmarking of extensive beef cattle may enable the approach to be expanded across the supply chain and to other sectors of livestock production.

**Keywords:** assessment, Australia, bovine, cow, extensive, pasture, quality of life, stockpeople.

## Introduction

Animal welfare is one of the most topical issues currently facing livestock production. Ethical debate around the acceptable use of animals is complex and opinions vary throughout society (Palmer and Sandøe 2011), but livestock industries face considerable risk if they fail to address society's concerns around animal welfare. The 2020 Meat Industry Strategic Plan projected a A\$3.9 billion downside risk to the red meat industry if consumer and community support was lost (Red Meat Advisory Council Ltd. 2015). Despite an increasing call by stakeholders to raise the standards of animal welfare in industry, there are few existing mechanisms for producers to demonstrate high levels of care (Buddle *et al.* 2021).

Two key approaches can be used to raise the standards of welfare. These include enforcing compliance to a minimum standard through legislation or market requirements, or incentivising performance above and beyond those minimum standards *via* first- and second-party industry assurance programs and third-party audit systems. In Australia, as in many developed countries, legislation mandates the minimum requirements for the treatment of production animals to prevent animal cruelty. In addition, a minimum level of welfare competence is required for accreditation to sell livestock in Australia (Livestock Production Assurance (LPA) Animal welfare module, <https://www.integritysystems.com.au/on-farm-assurance/animal-welfare/#welfare-certificate>). Producers may face prosecution if they fail to comply, however gaps in the enforcement of welfare laws in Australia have been identified (Morton *et al.* 2020).

Although it is vital to identify and address instances of poor animal welfare, focusing on enforcement has the potential to foster defensiveness from producers, rather than engagement. Also, it fails to distinguish or reward those who already provide a higher quality of life to their animals, or who demonstrate improvements over time. A combination of incentives and enforcement is needed to facilitate change and to meet the expectations of stakeholders when it comes to animal welfare (Knierim and Pajor 2018).

In this perspective article, we discuss the benefits and challenges of taking a voluntary, producer-driven benchmarking approach to incentivise the improvement of animal welfare in Australian pasture-based beef cattle, based on the unified field index developed by Colditz *et al.* (2014). We describe some key considerations for developing a suite of measures appropriate to this approach, including the validity, value, reliability and feasibility of each measure. The assessment of human–animal interactions is discussed as an example of balancing these often-opposing considerations based on findings from stakeholder consultation undertaken by our group. Finally, we present some considerations for the implementation of a producer-driven benchmarking system and outline its limitations and what may be required to maintain the integrity of the system.

## Approaches to assessing welfare

Most existing beef cattle welfare assessment schemes were developed to suit intensive production systems such as those found in Europe (e.g. Welfare Quality<sup>®</sup>; Blokhuis *et al.* 2013), the United Kingdom (Red tractor 2021) and North America (National Cattlemen's Beef Association 2019), and use second- or third-party auditing processes to assess performance. Other international assessment schemes were developed for extensive cattle production that also adopt a pass or fail audit-style methodology (Kaurivi *et al.* 2020, 2021). Often, these welfare assessment schemes (JBS farm assurance program <https://jbslivestock.com.au/jbs-farm-assurance/>) will demand a higher standard of care than is dictated by legislation, that producers must meet to maintain market access or to achieve price premiums. Like legislation, these standards can be based on science or an ethical judgement of what is deemed acceptable to society at the time (Veissier *et al.* 2011; Sandøe *et al.* 2019). These standards continue to improve over time in developed countries, but producers are typically only incentivised to meet the standard and not to exceed it. Benchmarking has the potential to both assess performance against a minimum standard and provide incentives for producers to further improve.

Benchmarking is a well-established tool used to assess business performance in several areas, compare performance across similar businesses and demonstrate improvements in

performance over time. It is already utilised by some agricultural industries, including the Australian Macadamia industry (State of Queensland 2021). Benchmarking allows the sharing of information across the industry so that others can learn from the best-practices of the top performers. This accelerates improvements by making change more efficient, rapid and widespread (Lankford 2000). Benchmarking has been identified as a potential approach for assessing the welfare of livestock (Colditz *et al.* 2014), despite usually being focused on economic or production outcomes. The Unified Field Index outlined by Colditz *et al.* (2014) suggested a number of animal, resource and management factors that could be measured as contributors to, or outcome measures of, welfare performance in livestock production. Importantly, the benchmarking approach allows welfare to be considered along a continuum. This allows peer-to-peer comparisons to incrementally drive the average performance upward along the welfare continuum from acceptable to higher welfare.

Welfare benchmarking in extensive cattle is still at the proof-of-concept stage in Australia, but there are a few examples of its use internationally. Many are focused at a business level (McLaren and Appleyard 2020; Robinson *et al.* 2020) or even a country level (Sandøe *et al.* 2020) without direct assessment of the animals themselves. However, some examples of benchmarking on-animal measures in cattle do exist (von Keyserlingk *et al.* 2012; Simon *et al.* 2016a; Sumner *et al.* 2018). Sumner *et al.* (2018) demonstrated that peer comparison through benchmarking can be used to encourage Canadian dairy producers to make changes in calf management by demonstrating to poor performers that better outcomes are achievable. The University of California (UC) Davis cow–calf health and handling assessment (<https://www.ucdcowcalfassessment.com/>) also provides producers with an option to benchmark their performance against the average performance of 30 Californian cow–calf ranches (Simon *et al.* 2016a). For the UC Davis program, producers are given free access to online resources and training that allow them to conduct self-assessments as a voluntary management tool. Benchmarking of animal measures is also starting to occur in other species such as pigs (Pandolfi *et al.* 2017) and laboratory mice (Spangenberg and Keeling 2016).

## A voluntary management tool for producers

### Benefits

The work by Colditz *et al.* (2014) proposed that benchmarking could be used as a voluntary, producer-driven system, where producers opt in and manage the collection of data tailored to their own operation. This approach places the onus on the producer, facilitating a commitment to change and allowing ownership over the process and any improvements made.

Therefore, it aligns with two key learnings from organisational change management research. The first learning is that framing change as an opportunity rather than a threat (Luecke 2003), and giving employees control over a transition, improves the adoption of change and decreases any associated stress and resistance. The second learning is that the level of commitment employees hold towards a particular outcome will drive their willingness to support change towards that outcome and the amount of effort they allocate to instigate the change (Herold *et al.* 2007). As a voluntary system, those that are most committed to the outcome of improved welfare would become early adopters of the program. These early adopters can then share any actualised benefits of the program with others to promote further adoption from within the industry.

A key benefit of the benchmarking approach as a management tool is that welfare performance does not need to be condensed into a single score or ranking. Condensing welfare into a single score requires ethical judgements to weight the relative importance of different aspects of welfare. The weighting of welfare into a single metric has proven problematic in the past, with a risk of poor performance in some areas being masked by high performance in other areas (Sandøe *et al.* 2019). It also risks leaving producers unaware of where welfare issues lie within their production system and consequently how to address them. In contrast, benchmarking allows key aspects of welfare to be compared individually, so that the producer can clearly identify those areas that require improvement and respond accordingly.

There are further benefits of a producer-driven approach compared to an audit-style system, that are particularly relevant to the extensive Australian production environment. One benefit is that it removes the barrier of distance that may prevent an audit-based system being feasible in many areas of Australia. Additionally, the system allows a greater number of welfare factors to be assessed throughout the year, as producers aren't limited by the constraint of collecting all data in a single auditing session. This flexibility allows the complex nature of welfare to be better captured and avoids the requirement to make ethical judgements on which measures to include in an audit.

## Limitations

It is important to recognise that any producer-driven system should be seen as a management tool, which allows producers to learn from others and make incremental improvements along the welfare continuum. It cannot provide a mechanism to assure welfare without further development. The ability of such a tool to maintain the social licence of production will be dependent on the level of trust that the community has in the integrity of Australian producers. While some studies have found trust in Australian producers to be high (Henderson *et al.* 2011; Rice *et al.* 2020), there is also evidence that

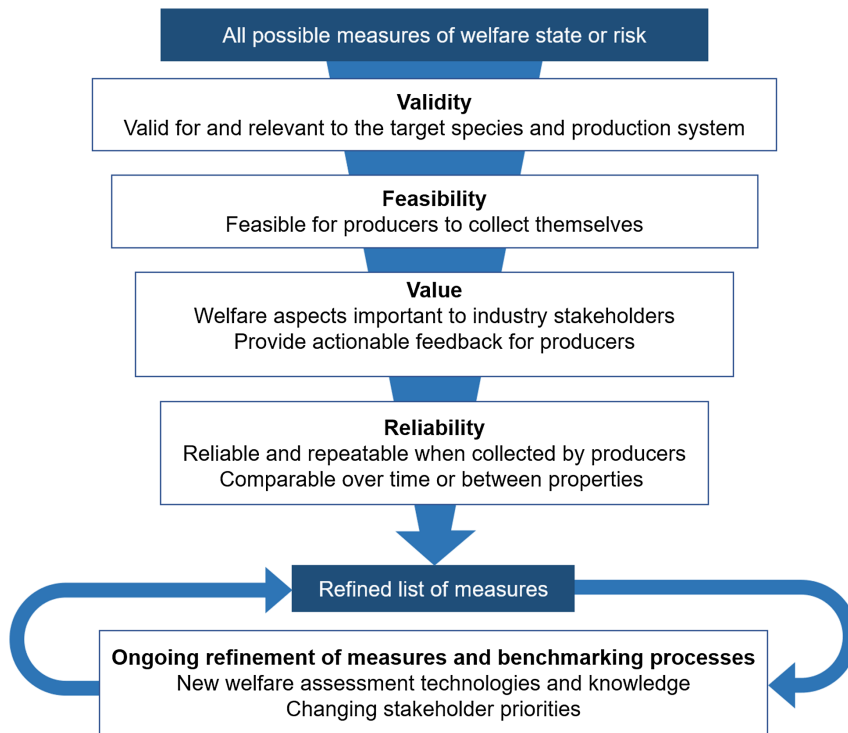
trust in the Australian livestock sector is declining (Coleman *et al.* 2019). Benchmarking may increase trust in the industry by providing transparency on farming practices (Stebner *et al.* 2015).

While increased transparency should be construed as a positive, it also comes with risks to the individual. Producers may provide data which shows they have breached a welfare standard, opening them up to potential prosecution. This could be a strong motivator for falsifying data or for non-participation by those whose welfare practices are at the lower end of the spectrum. Even for producers with high welfare standards, one-off events outside of the producer's control such as floods and bushfires may lower welfare outcomes resulting in poor public perception and market ramifications. The rise of agricultural technology and smart farming has already demonstrated that producers have concerns over the use or misuse of their data (Wiseman *et al.* 2019). Delivery of a successful welfare benchmarking system goes beyond the development of appropriate measures and must also strongly consider the privacy of participants' data. One approach to address this is the use of a secure cloud-based database to store participants' data. A balance must be struck between presenting a transparent and accountable representation of welfare in the extensive cattle industry and fostering trust amongst producers that their data is secure and will be presented fairly and appropriately.

## Considerations when designing a benchmarking system

Measures included in any welfare assessment system need to be based on science or sound ethical judgement and should be carefully considered with regards to their validity, feasibility, value and reliability (Simon *et al.* 2016a; Fig. 1). Consideration of these factors will ensure the system is fit for purpose, that is, it maintains both the welfare of the animals and trust in the industry. The system must remain flexible to incorporate new measures as technology and welfare science advance and as the priorities of industry stakeholders evolve. This is true for both the assessment of welfare and the process of analysing and benchmarking the data that is being collected.

Importantly, the scope of the system should be made explicit so that it is clear which aspects are and are not included (Tucker 2021). Ideally, the system should cover as many aspects of the production environment as possible to ensure that a comprehensive assessment of welfare is captured and that ethical judgements to exclude measures are not made early in the development process. Examples of aspects that should be considered for inclusion in a benchmarking system for extensive cattle production are provided in Table 1. This list should not be taken as comprehensive, and more measures may be required to



**Fig. 1.** Flow chart demonstrating some important considerations when designing a voluntary, producer-driven welfare benchmarking program.

**Table 1.** Aspects of production that should be covered in a benchmarking system for Australian extensive cattle production and examples of measures that might be included.

Aspect of production	Example measures
Production system	Herd and property size, stocking density, breeds
Feed and water	Access frequency, contingency periods, quality
Facilities and equipment	Presence of hazards, availability of first aid equipment
Stockpeople	Induction and training processes, stockperson care survey
Monitoring	Monitoring frequency
Death, disease and culls	Euthanasia methods, mortality and health records
Preventative health	Use of parasite control and vaccination
Identification, castration, spaying and horn removal	Age, techniques used, use of pain relief, complications
Weaning and cattle training	Age, method
Breeding management	Cattle requiring calving assistance, pre-natal loss
Cattle selection	Breeding and purchasing considerations
Social management	Frequency of mixing cattle and isolation
Contingency planning	Emergency management plans and back-up systems in place
Natural disaster outcomes	Welfare outcomes after fire, flood, drought

(Continued on next column)

**Table 1.** (Continued).

Aspect of production	Example measures
Biosecurity measures	Carcass disposal protocols
Transport	Method, distance travelled
Yarding events	Cattle displaying heat stress, herd demeanour
Animal measures	Body condition score, temperament scores

cover off each area of production. Each measure also then needs to be assessed based on the factors outlined in Fig. 1.

**Validity of measures**

All measures included in a welfare benchmarking program should be tailored to the species and production system to provide a valid measure of welfare state or risk. Measures that are applicable to more intensively managed beef cattle, such as pen features or duration of pasture access (Welfare Quality® 2009), are not likely to be applicable to extensive beef cattle production in Australia. Pasture-based beef production systems vary considerably within Australia, both in environment and operation type, and the applicability of measures will vary as a result. For example, some parasites and diseases are region specific, and measures related to cattle breeding are not relevant for trading operations. Flexibility within the benchmarking system will be required to allow

individual producers to tailor the measures collected to suit their operation.

Notably, valid measures of welfare above and beyond the minimum standards are currently lacking, due to relatively limited research on measuring positive welfare, compared to a wealth of literature on negative welfare states (Mattiello *et al.* 2019). The ability to measure positive welfare beyond the basics of the five freedoms (Lawrence *et al.* 2019) is of particular relevance to the extensive beef industry, in which many provisions such as access to pasture, space to roam, social companionship and freedom of choice are inherent, to varying degrees, in the production system. Therefore, further research is needed to determine what constitutes better welfare once the basic freedoms are met, and furthermore, how to measure the level of positive welfare objectively.

### Feasibility of collection

Any measures included in a producer-driven benchmarking program will need to be feasible for producers to collect. The biggest cost in a self-driven system is likely to be time. It is crucial that measures can be recorded accurately and reliably in a time efficient manner. Where possible, the benchmarking system should incorporate data that is already routinely collected for other purposes. Also, it is important to consider that feasibility of data collection will vary between producers. Herd size, frequency of interaction with livestock and access to handling facilities may all limit the amount of data that can be collected. Allowing producers to be selective in which welfare measures they collect will help to accommodate this variability in feasibility.

Ease of data entry is also an important consideration in feasibility. Online data collection platforms using survey-style question logic, will improve time-efficiency by only requiring producers to provide data relevant to their production system. Questions can then be tailored based on previous data entered, for example, producers who select only having polled cattle can circumvent any data relating to horn removal. Questions relating to data which are not feasible for some producers to collect can also be easily skipped using a survey-style data entry process. This approach does require a stable internet connection and therefore may not be feasible for those with poor connectivity.

### Value to stakeholders

The purpose of assessing and benchmarking welfare is to maintain the welfare of the animals, and to facilitate public trust in the industry. To fulfil this second purpose, the benchmarking system must provide assurance to stakeholders that animals produced for food maintain a good quality of life. Therefore, it is important to engage with stakeholders to ensure the measures included in a benchmarking program adequately reflect the values of industry

stakeholders across a spectrum of producers, consumers and non-consumers. A balance must sometimes be struck between what stakeholders consider to be important and what the science supports as being important for cattle welfare. Discrepancies between the two should be addressed by providing consumers with information to support them in making ethical meat purchasing decisions backed by transparency and science.

Any feedback generated through benchmarking must be actionable and highlight a pathway for improvement to provide value to producers. For example, the occurrence of a natural disaster is out of the control of the producer and may not itself be a useful measure. However, risk management practices following a natural disaster may be valuable to measure as these aspects can be improved upon to safeguard cattle welfare in the future. Benchmarking then allows producers to learn from the experiences and practices of their peers and identify pathways for improvement. Further, the value of the feedback could be improved by the provision of targeted educational resources for producers based on the reported welfare outcomes.

### Reliability of data

The reliability of the recorded data is paramount to maintaining the integrity of the system but maintaining consistency of data collection across differing assessors may be challenging. Measures and assessment protocols should be made as objective as possible by providing standardised protocols with clear instructions for data collection. For subjective measures, producers should be tested on the accuracy and repeatability of their assessments. The UC Davis Cow-calf assessment (<https://www.ucdcowcalfassessment.com/test-your-repeatability.html>) provides a good example of online training material for animal-based welfare assessments, including the option for producers to assess their repeatability using photographic and video material. Additionally, calibration materials could be used to scale subjective measures as a mechanism to standardise the data being submitted. Any measures determined to have poor inter-observer reliability cannot be compared across enterprises, however these measures may still be comparable within a single enterprise over time if the intra-observer reliability of the measure is acceptable.

### Managing conflicting requirements

Each of the considerations discussed above are inter-related and often conflicting. For example, measures that are deemed important by stakeholders may not have a valid relationship with animal welfare to justify their inclusion in a benchmarking system. Further, some of the measures that are valid and valued are simply not feasible for producers to collect themselves or cannot be collected in a way that generates reliable data. The time required to collect data

cannot be considered independently to the value of the system. As a business, producers must consider the financial benefit of the time they invest in data collection. A careful balance between all these considerations must be struck when developing a welfare benchmarking system.

## Measuring the human–animal relationship – a worked example

Here, we provide an example of a welfare measure, the human–animal relationship, to illustrate the proposed process to consider in developing a producer-driven benchmarking system. The example given here is specific to quantifying the human–animal relationship, but the same process should be applied to all aspects of welfare assessment included in any benchmarking system.

### Validity

The stockperson is the cornerstone of any animal production system and their attitude towards their job and how they treat the animals under their care is instrumental to achieving good animal welfare outcomes (Losada-Espinosa *et al.* 2020). Hemsworth *et al.* (2009) stressed the importance of including the human–animal relationship in animal welfare assessment programs but finding valid measures suitable for the extensive Australian production environment is a challenge. For an in-depth review of existing measures of the human–animal relationship, see Waiblinger *et al.* (2006). Briefly, current assessments of the human–animal relationship include directly measuring animal handling quality through an external auditor (Barnhardt *et al.* 2014), or measuring the fear towards humans on an individual (Welfare Quality® 2009) or herd level as a proxy of handling quality (Petherick *et al.* 2009). Research has also shown it is possible to address the human psychological side of animal welfare. The ways that humans interact with and care for animals is influenced by both genetic factors and life experience (Phillips 2009). It is likely driven by key personality traits, attitudes towards animals, industry role, job satisfaction, skill and commercialisation of production (Coleman *et al.* 1998; Wilkie 2005; Hemsworth and Coleman 2011; Munoz *et al.* 2019; Leon *et al.* 2020; Willis *et al.* 2021). Assessing these aspects of human psychology may provide a valid indicator of handling quality and animal care more broadly.

### Feasibility

Direct assessment of handling is difficult under a producer-driven system, without the assistance of an external auditor. Mustering and yarding are occasions when stock handlers need to focus on the task at hand for safety reasons. Similarly, it would be counterproductive if the measurement of welfare contributed to the duration or intensity of stress

experienced by the cattle by slowing down the handling process. Online, stakeholder consultation conducted by our group in 2020 indicated that, on average, only 58% of 280 producers surveyed were confident they could collect or estimate handling measures, such as physical contact, falls and dog control, during mustering and yarding, compared with an average of 82% for other on-animal measures (Salvin *et al.* unpubl. data). This would then prevent almost half of producers participating in this important aspect of the benchmarking system. Therefore, we determined it was not feasible to collect these measures in a producer-driven system, despite their validity and value for welfare assessment. Tests of avoidance distance as used in Europe are also less suited to Australian production where cattle are generally not habituated to close human presence. Similarly, fear-of-human tests may be influenced by temperament and prior experience and may not fully reflect recent human handling quality, especially when cattle have been purchased and sold on multiple occasions. In contrast, assessing stockperson attitudes and care is likely to be more feasible. As part of the online stakeholder consultation conducted in 2020, we surveyed 253 producers who handled their own cattle, and 93% said they would be willing to complete a stockperson attitudes survey themselves. Additionally, 84% of those who had other people handle their cattle ( $n = 229$ ) would be willing to ask them to complete an attitude survey (Salvin *et al.* unpubl. data). Thus, surveys may provide a more feasible alternative to direct handling assessments for measuring the human–animal relationship.

### Value to stakeholders

In the previous consultation conducted by our group in producer, consumer and industry stakeholders, 90% of survey participants ( $n = 597$ ) indicated that ‘the attitudes of stockpeople towards cattle’ should be assessed when determining the quality of life of cattle (Salvin *et al.* unpubl. data). This broader aspect of stockperson attitudes and skill was also raised in free-text comments.

‘It would be hard to measure, but people who genuinely care about the cattle and animals under their care, rather than just viewing them as a business venture, are going to, I believe, intrinsically provide their cattle with a higher quality of life.’

- Feedback from stakeholder consultation on benchmarking welfare

Therefore, it is the way producers handle their cattle as well as their attitudes, training and decisions around herd management that is valued by stakeholders and needs to be considered. We have termed this stockperson care. Importantly, research has demonstrated that people’s

attitudes and handling styles are not static and can be modified (Coleman and Hemsworth 2014; Simon *et al.* 2016b; Ceballos *et al.* 2018). This finding means any feedback provided on the human side of the human–animal relationship should be actionable and therefore valuable for producers to benchmark. Additionally, peer comparison through benchmarking may help to foster social acceptability of improving animal welfare.

### Measuring stockperson care through questionnaires

The human–animal relationship is a complex, multifaceted construct (Losada-Espinosa *et al.* 2020) and no single questionnaire currently exists to capture the range of factors that contribute to stockperson care. Research in other disciplines and species offers some questionnaire measures that may be useful although their reliability as a proxy of the human–animal relationship for beef cattle in the Australian production environment remains unknown.

We propose to trial the use of a suite of questionnaires adapted from other research as a proxy measure to assess stockperson care. The questionnaires will incorporate the assessment of trait sympathy (Lee 2009), attitudes towards cattle and job satisfaction (Munoz *et al.* 2019; Leon *et al.* 2020), pain assessment (Kielland *et al.* 2010), disease awareness, treatment urgency and acceptability of a common welfare intervention (low stress stock handling; Nielsen 1994). Such a broad suite of questionnaires has the potential to address an aspect of welfare that is valued by consumer and community stakeholders in a way that is feasible for producers, if they are shown to be valid and reliable proxies for livestock welfare outcomes. The validation of questionnaires against assessments of handling and other key health and welfare indicators is currently underway.

### Implementation and adoption

The successful implementation and adoption of a benchmarking system will ultimately depend on the value of the entire system. During our previous consultation with stakeholders (Salvin *et al.* unpubl. data), 280 producers were asked to indicate the reason(s) they would participate in a welfare benchmarking scheme. Access to price premiums was the most common reason producers said they would participate (66%), followed by meeting consumer expectations (59%), comparing performance with other producers (46%) and accessing niche markets (46%).

For a self-assessment system to function reliably, producers will need to gain value from the system by providing accurate data and must not be otherwise incentivised to submit false data to improve their welfare status. This will rely on the premise that accurate feedback on their welfare performance is itself the incentive to participate. Producers

who can provide accurate data will simply receive better feedback on which to base future management decisions. Benefits to be gained from accurate feedback may include an improved ability to meet criteria for welfare assurance schemes, fostering public trust and demonstrating a commitment to improving animal welfare. Further research would be required to identify potential production improvements from benchmarking welfare, and a cost–benefit analysis to determine whether such improvements provide a net financial benefit (Fernandes *et al.* 2021). A purely self-collected data system may not be appropriate if benchmarking is eventually used to develop welfare assurance schemes that offer price premiums or provide access to niche markets. In this case, some form of checks and balances will be required to maintain the integrity and reliability of the system.

### Conclusions

A voluntary welfare benchmarking system driven by producers has the potential to foster wider adoption of enhanced welfare practices across the industry, by promoting accountability, transparency, industry ownership and benefit to business. Then, producers can be supported in taking ownership of improving welfare and in demonstrating the progress they can make in this area. Such a system should be developed with consideration of the validity, feasibility, reliability and value of incorporated measures to assess and benchmark welfare, as well as the sensitivity and privacy of participants' data. Understanding the benefits and limitations of available options and the potential development of proxy measures can help to overcome any issues when these aspects are in conflict. Careful consideration of these aspects during the development stage will ensure the benchmarking system is robust and fit for purpose. That is, the benchmarking system improves animal welfare by collecting data on clear, meaningful welfare measures and helps to maintain trust in the industry through transparency and accountability. If these goals can be achieved for extensive beef cattle, welfare benchmarking has the potential to be expanded to other areas of the supply chain or livestock production systems.

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