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How environmental values influence trust and beliefs about societal oversight and need for regulation of the Australian cattle industry

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Abstract

Livestock grazing covers half of Australia and vast areas of global terrestrial ecosystems. The sustainability of the beef cattle industries are being scrutinised amid ongoing environmental concerns. In response, industry discourse has identified public trust as critical to avoiding reactive environmental regulation. However, public perceptions of the cattle industry's sustainability performance and trust are largely unknown and speculative. We present the first model of public attitudes toward the Australian cattle industry ($n = 2913$). Our results reveal that societal perceptions of the industry's environmental performance strongly predict trust in the industry. However, trust only weakly predicts a perceived right for societal oversight and has only an indirect relationship on need for environmental regulation. Environmental values influence perceptions of industry performance and the perceived right for societal oversight. We conclude that effective industry governance must be values literate and recognise that strong environmental performance is critical for public trust. Public trust is high but does not translate to support for a relaxed regulatory environment.

1. Introduction

Consumer demand for cattle products, including beef and dairy products, has changed considerably in the last two decades (Lebacq *et al* 2012, Willett *et al* 2019). There is increasing demand for products that do not cause harm to the environment or to the welfare of animals (Brom 2000, Chang and Kristiansen 2006). The changing consumer demands reflect wider public concerns for the sustainability of food systems (Springmann *et al* 2018, Eker *et al* 2019). These environmental, social and economic sustainability challenges have received substantial academic interest (Gagelman and Norwood 2018, Godde *et al* 2018, Springmann *et al* 2018, Allen and Hof 2019, Eker *et al* 2019, Sachs *et al* 2019, Hayek *et al* 2021), as well as prompting public policy and industry responses (Commonwealth of Australia 2011, Craig

2013). For example, in 2017 the Australian Beef Sustainability Framework was developed and addresses the four key sustainability themes of animal welfare, economic resilience, environmental stewardship and people and the community. This framework follows global industry efforts towards sustainability such as the multi-stakeholder Global Roundtable for Sustainable Beef (https://grsbeef.org/).

The scale of cattle production globally, in terms of its economic and geographic spread, means that its operation and development is an integral part of global efforts towards sustainable food systems. While estimates vary (Godde *et al* 2018), approximately 26% of the global ice-free land area is dedicated to grazing (FAO 2018), much of which is for cattle. For Australia, commercial grazing occurs on more than half of the nation's land area (ABARES 2016) meaning that the cattle industry and its utilisation of natural resources

are critical to environmental sustainability. Although Australia produces just 3.7% of the world's beef cattle it is the second largest exporter, supplying almost 17% of all global beef imports (OECD & FAO 2020). Australian agricultural industries often promote, and rely on, a 'clean and green' image as a key competitive market advantage, particularly for export markets (Chang and Kristiansen 2006). Global demand for red meat and dairy is expected to increase (OECD & FAO 2019, 2020), especially with economic growth and emerging middle classes in developing countries (Rosegrant *et al* 2013, Willett *et al* 2019). While increasing global demand has been framed largely as an economic opportunity, the scale of Australia's contribution highlights the ongoing challenge of parallel growth in beef consumption and public concern about the environmental sustainability of food systems (Godde *et al* 2018, Clark *et al* 2019). The future of the cattle industry is therefore closely coupled with the sustainable environmental management of vast land areas of Australia.

The way in which the Australian cattle industry responds to this challenge will be shaped by a combination of industry-led practice, government policy, and regulation with prevailing community sentiment affected by and affecting all three (Anderson *et al* 2017). Policy that governs industry should not only reflect the industry's objectives and be efficient and reliable, it should also reflect and adapt to societal expectations of sustainability, working to ensure these expectations are reflected in the regulation of industry conduct. The focus on trust and community acceptance across industries has, in recent years, been positioned in the context of a social license to operate (Lacey and Lamont 2014, Gillespie *et al* 2016, Moffat *et al* 2016, Walton and McCrea 2020) including exploration of trust in agriculture broadly (Voconiq 2020). However, apart from traditional and social media coverage of key events and conflicts, to date there has been limited peer reviewed research on what drives public perceptions of the environmental performance of and trust in the Australian cattle industry.

It is necessary to understand how public perceptions are formed and the drivers of social attitudes to inform policy that is aligned with both public expectations and the challenges and opportunities of improving sustainability. Therefore, the aim of this paper is to explore how environmental values influence trust and beliefs about societal oversight and need for regulation. To address this aim, we establish and test a hypothesised model (figure 1). This model and its rationale are outlined as follows.

1.1. Hypothesised model

There is abundant literature demonstrating that underlying environmental values influence a range of attitudes and beliefs, as well as some behaviours (Grob 1995, Schultz and Zelezny 1999, Vaske and Donnelly 1999, Klöckner 2013). There is also considerable literature indicating how underlying attitudes form predispositions towards environmental issues (Ho *et al* 2008, Zaller 2012). Although there is some debate about the extent to which our attitudes and opinions are informed by external information versus internal predispositions and social norms, prior research suggests that underlying values do influence predisposition and perception of the environmental performance of industries (Ho *et al* 2008, Achterberg *et al* 2010). Drawing on environmental psychology literature, we hypothesise that a more utilitarian environmental values orientation, which views the environment in an instrumental or functional way for the benefit of humans over preservation, will be positively associated with perceptions of the Australian cattle industry's environmental performance (Worsley and Skrzypiec 1998, Vázquez and Manassero 2005, Milfont and Duckitt 2010).

In turn, we expect perceived environmental performance to influence public trust in the industry. Trust is founded on trustworthiness, which has three key components: ability (the competence, capacity, knowledge and skills to operate), integrity (in upholding commonly accepted principles and standards such as minimising environmental damage) and benevolence in caring for the communities and the environment in which the industry operates (Mayer *et al* 1995, Gillespie and Dietz 2009, Hamm 2017). Therefore, we argue that positive perceptions of the environmental performance of the cattle industry should predict higher levels of perceived trustworthiness of and trust in the industry.

The final part of this hypothesised model is built on elements of the discourse and assumptions from within the Australian cattle industry itself (Productivity Commission 2004, 2016). It is commonly implied that industry needs to maintain a level of consumer and public trust in order to ensure that policy and regulation is not arbitrary, reactive or overly burdensome (Campbell 2013, Lush 2018). Our view is that the public will perceive a greater need for environmental regulation of the industry when trust in the industry is low. This is logical, because if the industry is not perceived to be trustworthy, then this will increase the public's desire for an external party to monitor and regulate the industry's behaviour, to ensure minimum standards are upheld. Regulation acts as a deterrence mechanism (Rousseau *et al* 1998, Bachmann and Inkpen 2011), motivating industry to meet conduct expectations to avoid fines and other sanctions. We also expect the need for environmental regulation to be mediated by the perceived right for societal oversight. That is, low trust will lead to an increased perceived right for societal oversight of the industry, which will in turn drive a need for increased environmental regulation.

The Australian Government's response to ban live exports of beef cattle to Indonesia in 2011 is a highly
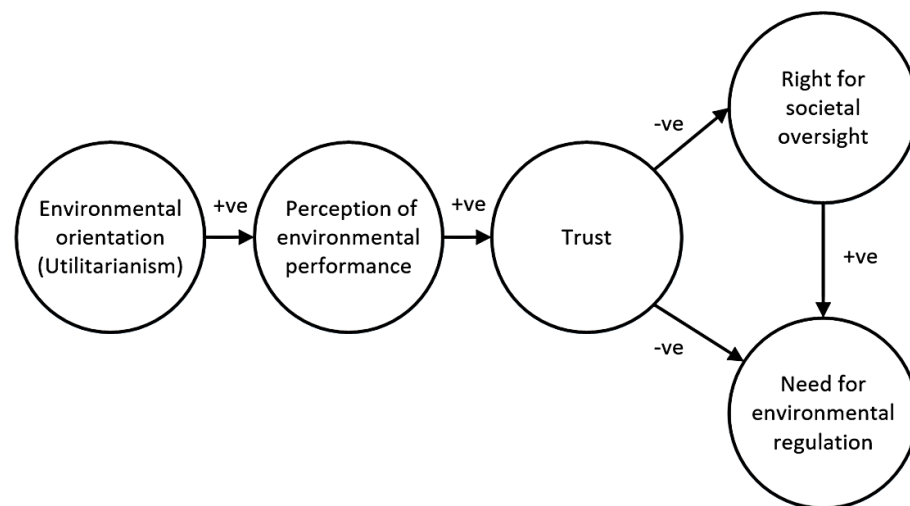
Figure 1. Hypothesised model of public values and attitudes to environmental performance, trust in, and desire for societal oversight and environmental regulation of the Australian cattle industry.

publicised case reflecting this industry concern about reactive policy responses to public perceptions. In this case, industry actors argued that the response was excessive and that adequate government and industry measures had already been enacted in response to the public concerns for animal welfare as was indicated by the subsequent Federal Court of Australia decision in 2020 regarding the former ministerial response (Brett Cattle Company Pty Ltd v Minister for Agriculture (2020) FCA 732). This prescriptive view of how trust and regulation function in industry contexts may not be fully justified, but it is frequently implied in discourse in the public sphere. Insights from the regulation literature support this broad conceptualisation: trust is the 'expectation that people who have a specific task or responsibility will perform their duty in a way that others can count on' (Poortinga and Pidgeon 2005). Based on this, a lack of trust may lead to greater demand for control (i.e. regulation and oversight) over the actions of others.

In summary, our hypothesised model positions people's environmental values as the underlying driver of their perceptions of the environmental performance of and trust in the Australian cattle industry. In the absence of firsthand experience or knowledge of the industry, these underlying values form predispositions that influence perceptions of the industry's environmental performance, and consequently trust in the industry to undertake its activities responsibly. Trust in turn influences the degree to which people perceive they have a right for societal oversight and a need for environmental regulation of the industry.

2. Methods

2.1. The sample and survey
To examine our model, we used an online panel sample from one of the largest providers of market

Table 1. Descriptive statistics for sample.

Demographics	n	%
Gender ratio		
Female	1507	51.7
Age distribution		
18–24	271	9.3
25–34	612	21.0
35–44	513	17.6
45–54	496	17.0
55–64	470	16.1
65–74	428	14.7
75–84	113	3.9
85+	10	0.3
Remoteness category		
Major cities	2211	75.9
Inner regional	498	17.1
Outer regional	162	5.6
Remote and very remote	22	0.8

research in Australia. The sample was representative of the Australian public on age, gender and geographic location distributions (to ensure both urban and regional attitudes were accounted for). Australia has a very urbanised population and this is reflected in our sample (see table 1).

Questions in the survey instrument were based on the logic and literature outline above, and individual items drawn from the literature are shown in the supplementary materials (available online at stacks.iop.org/ERL/16/034006/mmedia). Table 2 shows example survey items for each of the factors modelled in figure 1. Each item was measured on a 5-point response scale with a mid-point of 3. Means below 3 reflected lower scores and above 3 higher scores. Standard deviations were commonly around 1, reflecting considerable diversity in views,

Table 2. Example survey items for each factor.

Factors and example survey items	Mean	S.D.	Loading
Environmental orientation (Utilitarianism)			
Agreement with:			
Protecting the environment is more important than protecting economic growth (R)	2.57	0.94	0.84
Protecting the environment is more important than protecting peoples' jobs (*R*)	2.77	0.97	0.83
Perception of environmental performance			
The Australian cattle industry:			
Actively manages environmental risks	3.38	0.96	0.91
Effectively communicates how it manages environmental impacts	3.41	0.93	0.90
Trust			
Can rely on the Australian cattle industry to:			
Provide reliable and accurate information	3.69	0.99	0.89
Openly share important information when relevant	3.61	1.00	0.87
Right for societal oversight			
Agreement with:			
The Australian public has a right to influence how cattle farmers manage the environment on their properties	2.83	1.03	0.88
I have a right to influence how cattle farmers manage the environment on their properties	2.99	1.06	0.90
Need for environmental regulation			
Agreement with:			
There needs to be strong environmental regulations of cattle farmers to protect the environment	2.42	0.94	0.67
There are too many environmental restrictions on cattle farmers already (*R*)	3.14	0.97	0.51

Notes: response scales from 1 to 5; mid-point = 3; R = reverse coded.

and the loadings reflected how correlated each item was with each factor. See the supplementary materials for a full list of items for each factor and related statistics.

Data were collected via an online survey from 24 July to 13 August 2018 ($n = 2913$ participants). The data were used to test our hypothesised model shown in figure 1 using structural equation modelling (SEM). Ethical approval was granted by The University of Queensland (#2018000376).

2.2. Structural equation modelling

We used SEM to reduce the dimensionality of scale items into factors, and explore the relationships between them. Factors and factor items were determined theoretically using scales previously identified in the literature (referenced in the supplementary material). The correlations between these factors are shown in table 3. Environmental orientation was moderately to highly correlated with right for societal oversight and need for environmental regulation, though only modestly correlated with perception of environmental performance and trust. Trust was moderately correlated with need for regulation, though not as highly as environmental orientation and perceptions of environmental performance.

SEM was also used to test the model in figure 1. Model fit statistics were used to describe how well the

correlations within the dataset fitted the correlations implied by the hypothesised and modified model.
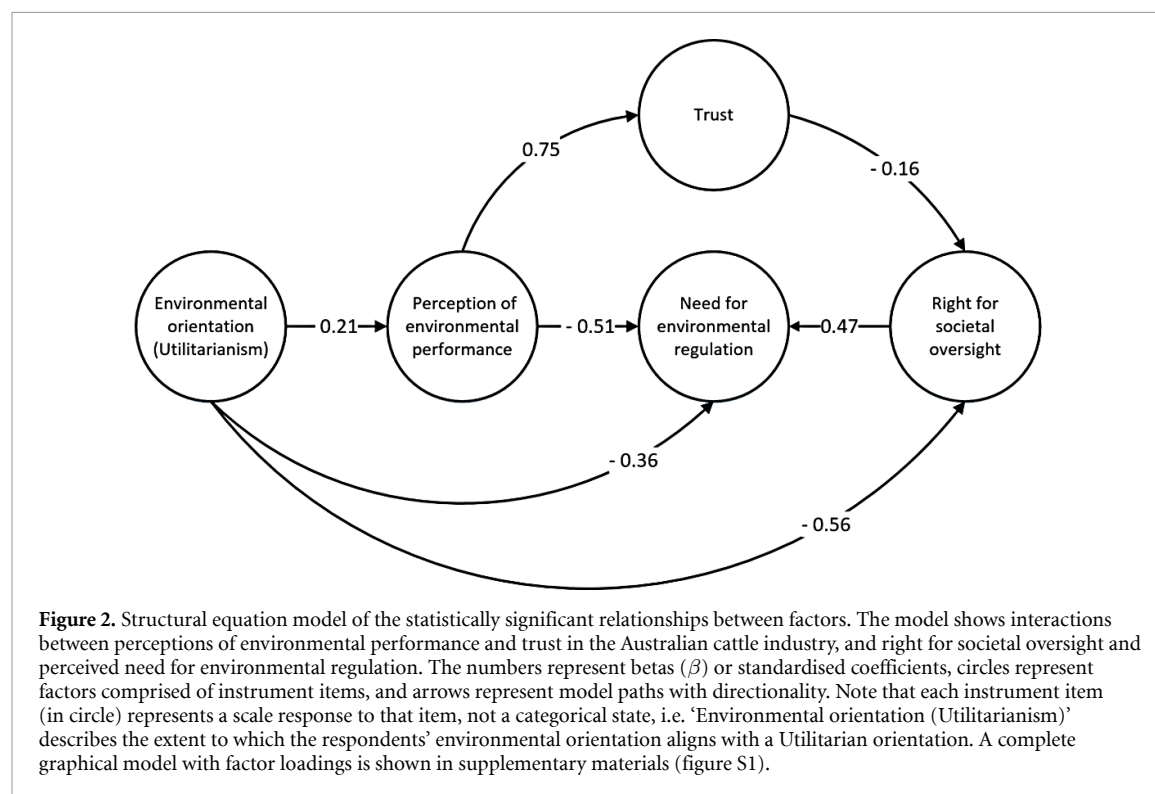
The final model was checked for goodness of fit using NNFI, TLI and RMSEA. All analyses were undertaken using the R package lavaan (Rosseel 2012, R Core Development Team 2015, Broc and Gana 2019). The R code is available upon request from the authors.

3. Results, modifications to the model and discussion

While some elements of our hypothesised model were supported the overall model was not a good fit with the data (non-normed fit index (NNFI) = 0.90; Tucker–Lewis index (TLI) = 0.90; and root mean square error of approximation (RMSEA) = 0.08). By using modification indices we developed a model which was a better fit for the data (NNFI = 0.94; TLI = 0.94; and RMSEA = 0.06). We examined the highest modification indices suggesting new paths which would significantly improve the model. Where the highest modification index suggested an additional path that significantly improved the overall model ($p < 0.05$), as well as making theoretical sense, we added that path before re-running the model. We then repeated this process until good model fit was achieved. This process yielded insights unpredicted

Table 3. Correlations between factors.

	(1)	(2)	(3)	(4)	(5)
(1) Environmental orientation (Utilitarianism)	1.00				
(2) Perception of environmental performance	0.21	1.00			
(3) Trust	0.16	0.75	1.00		
(4) Right for societal oversight	−0.58	−0.23	−0.25	1.00	
(5) Need for environmental regulation	−0.72	−0.59	−0.41	0.77	1.00

Figure 2. Structural equation model of the statistically significant relationships between factors. The model shows interactions between perceptions of environmental performance and trust in the Australian cattle industry, and right for societal oversight and perceived need for environmental regulation. The numbers represent betas (β) or standardised coefficients, circles represent factors comprised of instrument items, and arrows represent model paths with directionality. Note that each instrument item (in circle) represents a scale response to that item, not a categorical state, i.e. 'Environmental orientation (Utilitarianism)' describes the extent to which the respondents' environmental orientation aligns with a Utilitarian orientation. A complete graphical model with factor loadings is shown in supplementary materials (figure S1).

by our hypothesised model. Particularly, we discovered relationships between public attitudes toward the Australian cattle industry that departed from the expected model (see modified model in figure 2). We added two direct paths from environmental orientation to need for environmental regulation and right for societal oversight to the model, and found that the hypothesised path from trust to need for environmental regulation was not significant.

As predicted, environmental values were linked to perceptions of environmental performance ($\beta = 0.21$), and perceptions of environmental performance in turn strongly predicted the level of trust in the industry ($\beta = 0.75$), explaining 57% of the variance in trust (i.e. R-squared = 0.57). However, higher trust did not *directly* predict need for environmental regulations, as expected. While trust was moderately correlated with the need for environmental regulation ($r = -0.41$), it *indirectly* influenced a perceived need for environmental regulation via a right for societal oversight. Total effect of trust on need for environmental regulation via right for societal oversight was $\beta = -0.08$ or the paths from trust and oversight multiplied (i.e. -0.16×0.47).

The perceived right of societal oversight predicted need for environmental regulation quite strongly ($\beta = 0.47$) and we found, contrary to our hypotheses, that this was *directly* influenced by underlying environmental orientation ($\beta = -0.56$), and more specifically the extent of one's utilitarian environmental orientation. Overall, the model explained 36% of the public's right for societal oversight and 87% of their perceived need for environmental regulation. The public's need for environmental regulation was also directly influenced by their environmental orientation.

Our modified model of the drivers of public attitudes to the Australian cattle industry identified two key relationships between constructs. First is that the level of public trust of the industry does not directly affect the perceived need for regulatory control, though it has a small indirect effect via societal oversight of the industry. In other words, high trust does not reduce public expectations for environmental regulation aside from a small indirect effect. This runs in contrast to the rationale developed in section 1.1. and highlights trust is more as an outcome of perceived environmental performance rather than

being an instrumental way to reduce environmental regulation. Second, while attitudes toward the environmental performance of the industry are partially influenced by one's environmental orientation, this orientation is particularly important in predicting the public's perceived need for environmental regulation. These are discussed in turn below.

An increasing body of empirical research demonstrates that trust is not a substitute for regulation but rather that trust and regulatory oversight can complement and reinforce each other (Six 2013). However, a prominent counter narrative is that (a) regulatory measures can be relaxed in high trust environments and (b) regulations should be tightened when 'something goes wrong' in an effort to restore trust (Bachmann *et al* 2015). This counter narrative is dominant (Six 2013) and endures in the debates about public expectations of the Australian cattle industry. However, simply because people trust the industry does not mean their expectations around being informed, involved and having a voice in how the industry operates are in any way diminished. This has implications for the Australian cattle industry. Critically, the industry should remain open and transparent about their operations and actively engage with the general public to communicate their values and goals in terms of shared sustainability objectives. For example, evidence of public demand for increased transparency and accountability through regulatory controls should not be viewed as a sign of low trust, nor does it necessarily reflect poor industry–society relationships. In this research, on average, respondents trusted the industry and had favourable perceptions of its environmental performance (see descriptive statistics in the supplementary materials). This indicates that the Australian cattle industry has an opportunity to use environmental regulation and societal oversight as an opportunity to demonstrate good environmental performance and to engage with the (majority urban) public on a diverse range of community expectations (Weary and von Keyserlingk 2017).

Environmental orientation and perceived environmental performance were both found to *directly* influence the perceived need for environmental regulation. Environmental orientation also has small *indirect* effects on the right for societal oversight and need for environmental regulation, with those holding utilitarian environmental orientations more likely to have positive views on environmental performance of, and trust in, the industry. Considering their total effects (i.e. direct plus indirect effects), utilitarianism and perceived environmental performance have a similar overall influence on the public's perceived need for environmental regulations of the industry, though utilitarian orientation has more influence on the right for societal oversight (see direct, indirect and total effects in supplementary materials).

In the participant sample for this research, self-reported knowledge of the cattle industry was variable but generally quite low (with 57% having limited or very limited knowledge). This was much lower than their self-reported knowledge of environmental issues more generally (21% having limited or very limited knowledge) (see descriptive statistics in supplementary materials).

Given that underlying environmental values are known to be relatively stable concepts and not specific to circumstance (Dietz *et al* 2005), it is likely that the same underlying values would influence perceptions of any industry, particularly those that interact with or are dependent on the environment and natural resources. However, the findings also demonstrate that this effect was not as strong as anticipated. This highlights the importance of future research identifying the most important drivers of perceived industry performance, especially given most respondents in this research knew very little about the cattle industry. Equally important are studies that seek to understand underlying human values and their influence on the perceived need for industry regulation and the development of policy and regulations, since environmental orientation and perceived industry performance were equally important in predicting desire for environmental regulation of the industry. Demonstrating and reporting on environmental performance, particularly in relation to responsiveness to issues as they arise and a trajectory of continuous improvement, remains a critical component of trust and public perceptions. Communication of changing practices needs to acknowledge and engage with underlying values, including those that hold negative perceptions of environmental performance.

4. Conclusions

In conclusion, in this paper we have drawn on the environmental psychology literature to understand how underlying environmental values may influence trust in and perceptions of the Australian cattle industry. We focused on perceptions of environmental performance of the industry, as much of the public debate about the sustainability of and trust in the industry has targeted environmental issues such as greenhouse gas emissions, deforestation, the condition of rangelands and inland waters, and downstream impacts on marine environments, particularly the Great Barrier Reef (Godde *et al* 2018). We acknowledge that other aspects of industry sustainability are also highly relevant and further work should explore other values such as animal welfare, differences between city and regional perspectives, and social license aspects such as the distribution of economic and social benefits from industry (Moffat *et al* 2020, Walton and McCrea 2020). Our research

provides a useful springboard for future research along these lines.

We have argued that the Australian cattle industry needs to demonstrate responsiveness to the drivers of public attitudes identified in this study. It is necessary to understand and accept that there will always be a range of environmental values among its stakeholders and community perceptions about its environmental performance. However, being responsive is not just about improving industry practices, it also requires engagement and communication between industry, consumers, community and other stakeholders (Pidgeon *et al* 2005, Weary and von Keyserlingk 2017, Witt *et al* 2020). This can better inform the development of engagement and communication strategies targeted towards different stakeholder groups with different environmental values and concerns. Effective communication which underpins constructive industry–society relationships informs both industry practice and public understandings of the industry while insulating against reactive policy that may have perverse environmental outcomes, not to mention wider social, economic, and animal welfare outcomes.

This nationally representative sample of the Australian population has enabled the development of a model which identified perceptions of the cattle industry's environmental performance as a major driver of trust in the industry and the perceived need for environmental regulation. Trust in the industry, however, was only weakly related to societal oversight of the industry, with no direct relationship to a desire for environmental regulation. However, public trust in the industry was quite positive, which commonly predicts overall social acceptance (Moffat *et al* 2020). Furthermore, a positive perception of environmental performance strongly predicts trust in the cattle industry. Overall, the study finds reasonably high levels of public trust in the Australian cattle industry, though views on environmental performance were more moderately positive.

Providing insight into both public expectations of the Australian cattle industry and the underlying drivers of these expectations supports the development of government and industry policy that is responsive to, and representative of, public interest and expectations. Recent public and media interest in the environmental performance of the cattle industry, including issues of sustainability and livestock production and consumption, has tended to focus on problems, or specific cases of 'things going wrong' and the ensuing public outrage provides a skewed lens of community sentiment towards the industry. Our study provides representative and informative insights into public attitudes and their underlying drivers which can inform more effective policy and practice for shared sustainability outcomes.

Data availability statement

The data that support the findings of this study are available upon reasonable request from the authors.

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