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New South Wales Cattle Producers Sceptical About Reducing Methane Emissions From Their Cattle¹

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Abstract

Participants at 20 beef industry forums in New South Wales were surveyed in the spring of 2013, the summer of 2013/14 and the spring of 2014, to gauge their attitudes to cattle enteric methane emissions and their contribution to Australia's national greenhouse gas (GHG) emissions, and their awareness and knowledge of the opportunity to reduce GHG emissions through animal breeding. A total of 452 participants responded to the survey, with most (75%) identifying themselves as involved in commercial beef cattle production, 6% as being specialist bull breeders and sellers, 11% as being involved in a combination of both, and 8% in other roles, such as private or government advisor. When asked about the importance of trying to reduce methane emissions from beef cattle most respondents were neutral about its importance (47%) or thought it not important (32%) but the proportion of respondents believing it important increased ($P < 0.01$) in each survey period (9% v. 13% v. 20% across the three periods). On the question of whether it was possible to breed cattle for lower methane emissions, 17% of respondents thought that it was not possible. Most respondents were neutral (38%) or did not know (21%) whether breeding for lower methane emissions was likely to compromise productivity. However, only 10% of those identifying as "managers" answered "don't know" to whether productivity would be compromised, compared to 27% of "owners", suggesting that a higher proportion of managers have considered this issue. Although a growing proportion of participants across the survey period thought reducing enteric methane emissions to be important, overall more than three-quarters did not, indicating that at the time of the surveys most cattle producers in NSW would be unlikely to adopt changes in their enterprise solely to reduce enteric methane GHG emissions.

Key words: greenhouse gas, survey, cattle breeding.

Introduction

Methane is a potent greenhouse-gas (GHG) produced by cattle and sheep when plant material is fermented mainly in the rumen by microbes. The Australian Commonwealth government provided

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funding for a major program of cattle and sheep research into reducing enteric methane emissions under the Australian Government's "Filling the Research Gap" program for the period from July 2012 to June 2017 (Department of Agriculture and Water Resources, 2017). A change in federal government in September 2013 saw much public debate on GHGs and climate change. Knowledge of cattle and sheep producers' views on the importance of, and the opportunity for, reduction of methane emissions from their livestock is needed to design effective future research, extension and education campaigns that clearly describe the opportunity and benefits.

Genetic improvement of livestock for productivity and profitability is a traditional and familiar practice to livestock producers. Internationally, there is considerable research effort into delivering breeding technologies for lower livestock methane emissions (Pickering *et al.*, 2015). Breeding cattle for lower methane emissions is an attractive possibility in extensive livestock production systems that are common in Australia. Cattle are often infrequently mustered or supplementary fed making other mitigation options difficult to implement. Recent Australian research has shown that there is substantial phenotypic and genetic variation in enteric methane emissions in Australian beef cattle (Donoghue *et al.*, 2016). In a major survey in 2011 of Victorian farmers' attitudes to climate change, Schwarz *et al.* (2012) reported that, of the 55% of livestock farmers who stated they intended to make a change in their farming operation to reduce GHG emissions, only 17% planned to use improved livestock or grazing management, compared to 63% who planned to plant trees. For bull breeders and commercial cattle producers to make decisions about choosing sires that are genetically superior for lower methane emissions, they need to be sure the selection process is effective, be aware of any antagonisms that might affect the improvement of other traits, and know that reductions in methane emissions are valued by the market.

The purpose of this study was to gauge attitudes of participants in the beef cattle industry in New South Wales (NSW), Australia, on the contribution of cattle enteric methane emissions to Australia's national GHG emissions, and their awareness of the opportunity to reduce these emissions through animal breeding.

Materials and Methods

The study was conducted over three consecutive 6-month periods coincident with major beef cattle and sheep methane-abatement research projects conducted under the Australian Government's "Filling the Research Gap" program that commenced in July 2012.

Survey audiences

Although specialist bull breeders are largely responsible for producing the next generation of young bulls for genetic improvement in the beef cattle industry, it is their clients - commercial cattle producers, and the private and government consultants who help guide purchasing decisions by the latter - who together need to be aware of the opportunity and benefits of purchasing sires superior for lower methane emissions. This project therefore sought to conduct surveys in a range of cattle industry forums attended by these beef industry participants.

The survey was voluntary and asked four short background questions about the participant and three simple questions on their attitudes to reducing cattle methane GHG emissions.

The questions were:

Background Information

- a. What is the postcode for your major beef production operation?
- b. What title best describes your beef operation?
 - Bull breeder and seller

- Commercial cattle production
 - Combination of both
 - Other, (please specify)
- c. What role best describes your position in the operation?
- Owner
 - Manager
 - Other (please specify)
- d. What age group do you belong to?
- Less than 35 years old
 - 35-55 years old
 - More than 55 years old.

Survey Questions

1. In your opinion, how important is trying to reduce methane emissions from beef cattle?
2. In your opinion, is breeding cattle for lower methane emissions possible?
3. In your opinion, is breeding cattle for lower methane emissions likely to compromise the productivity and/or profitability of your business?

Participants were asked to answer the survey questions by circling or drawing a line on a horizontal scale from -1 to 10, where -1 = don't know, 0 = not important/not possible/not likely, and 10 = very important/very possible/highly likely.

In total 20 forums of cattle industry participants were surveyed in three periods, being the spring of 2013, the summer of 2013/14 and the spring of 2014. The sources of survey respondents are described in Table 1. At all forums except the Ag Quip National Farming Field Days all participants were individually handed a survey to complete. Each day many thousands of visitors attended the Ag Quip National Farming Field Days and only those who viewed the NSW Department of Primary Industries beef cattle display were offered a survey. Across all forums well over 90% of surveys handed out were completed and returned.

For the analysis of answers to the three survey questions, the responses were coded:

-1=don't know

0-2=not important/not possible/not likely

3-7=neutral

8-10=important/possible/likely.

Statistical analysis

Chi-square tests were conducted to check whether the frequency of responses to the survey questions differed between the demographic classes of the respondents: type of beef operation enterprise, position within the operation, and between age classes, and between the first, second and third survey periods. Pairwise tests were also conducted to check for significant differences between categories.

Results and Discussion

Demographics of respondents

From the postcodes supplied, 94% of respondents operated their business in NSW, approximately 1% in each of Queensland, Victoria and a combined South Australia or Western Australia, and 4% in the USA.

Table 1. Industry Forums at which audiences were surveyed, and the number of respondents

| Industry Forum | Location | Number of Respondents |
|--|---|-----------------------|
| Survey period 1 (September to October 2013) | | |
| "Bull Select" field day | Wagga Wagga and Young, NSW | 33 |
| Visiting beef producers and extension advisers from Kentucky, USA, field day | Armidale, NSW | 17 |
| Cattle producers at Rabo Bank sponsored field day | Armidale, NSW | 27 |
| Cattle producers at Rabo Bank sponsored field day | Glen Innes, NSW | 42 |
| Cattle producers at NSW Farmers Federation Forum | Armidale, NSW | 12 |
| Cattle producers at Rangers Valley Feedlot, Producer field day | Glen Innes, NSW | 51 |
| Survey period 2 (November 2013 to April 2014) | | |
| Charolais Society Beef Information Nucleus (BIN) field day | Walcha, NSW | 7 |
| Live Animal Assessment Workshop | Caroona, NSW | 6 |
| TAFE Students | Wollongbar, NSW | 4 |
| Local Land Services (LLS) field days | Armidale and Inverell, NSW | 15 |
| LLS field day | Glencoe, NSW | 8 |
| Drought Information field day | Dungog, NSW | 14 |
| NSW Farmers Federation meeting | Armidale, NSW | 11 |
| Angus Society BIN field day | Armidale, NSW | 6 |
| Angus Society BIN field day | Armidale, NSW | 12 |
| Survey period 3 (August 2014 to September 2014) | | |
| Santa Gertrudis Yulgilbar Stud field day | Grafton, NSW | 67 |
| LLS Beef Producers field day | Casino, NSW | 16 |
| Ag Quip National Farming Field Days | Gunnedah, NSW | 64 |
| LLS Beef Producers field day at Yalgoo Hereford Stud | Walcha, NSW | 24 |
| Meat Standards Australia field day | Tocal Agricultural College, Paterson, NSW | 16 |
| Total number of respondents | | 452 |

As the forums focused on different cattle breeds, different production systems and were geographically widely spread, the author that distributed the surveys (TA) observed that very few participants were surveyed twice. The distribution of respondents by demographic categories is presented in Table 2.

Table 2. Percentage of respondents¹ in each demographic category for each survey period and across all periods

| Number / category | Period of survey | | | |
|----------------------------------|------------------|----------|----------|-------------|
| | Period 1 | Period 2 | Period 3 | All periods |
| Type of cattle enterprise | | | | |
| Breeding | 3 | 16 | 5 | 6 |
| Commercial | 81 | 55 | 78 | 75 |
| Breeding and Commercial | 10 | 17 | 10 | 11 |
| Other / Not stated | 6 | 12 | 7 | 8 |
| Position in enterprise | | | | |
| Owner | 76 | 69 | 68 | 72 |
| Manager | 10 | 14 | 16 | 13 |
| Other / Not stated | 14 | 17 | 16 | 15 |
| Age group of respondent | | | | |
| Less than 35 years | 15 | 14 | 23 | 18 |
| 35 to 55 years | 43 | 41 | 35 | 39 |
| More than 55 years | 42 | 45 | 41 | 42 |
| Other / Not stated | - | - | 1 | 1 |

¹ Number of respondents for survey period 1, 2 and 3 were 182, 83 and 187, respectively.

Most respondents (75%) identified themselves as involved in commercial beef cattle production, 17% as bull breeders (with some also involved in commercial production)², and 8% in other roles, such as private or government advisor. These proportions differed ($P < 0.01$) in the three survey periods, with proportionally more bull breeders (33%) in period 2 than period 1 (13%) or period 3 (15%). Most respondents (72%) described their position or role in the beef operation as owner, 13% as manager, and 15% as "other" which included farm livestock attendants and advisors. Most respondents were aged between 35 and 55 years old (39%) or over 55 years of age (42%), with only 18% under 35 years of age. Proportions of respondents within each position or age category were similar (both $P > 0.1$) across the 3 survey periods.

Responses to survey questions

Responses to the survey questionnaire are presented in Table 3. Only 15% thought that reducing methane emissions was important, 32% considered it unimportant, 47% were neutral, and 6% did not know. The proportions of responses in each category changed between survey periods ($P < 0.01$) with the proportion of respondents believing it important compared to those with other views, increasing from the first survey period to the second survey period, and increasing again in the third

² Only a low number of respondents identified as being a "bull breeder and seller" (N=28 or 6% of respondents) and most indicated on the survey form that they were also involved in commercial cattle production. Similarly, only a small number identified as being a bull breeder and commercial producer ("combination of both"; N=51 or 11%). These two categories were combined and analysed together as "bull breeder".

Table 3. Categorised scores of responses to each question for each survey period and across all periods

| Question ¹ / score category ² | Percentage of responses | | | |
|---|-------------------------|----------|----------|-------------|
| | Period 1 | Period 2 | Period 3 | All periods |
| Q1. Importance | | | | |
| A (0 to 2) | 40 | 33 | 24 | 32 |
| B (3 to 7) | 43 | 50 | 50 | 47 |
| C (8 to 10) | 9 | 13 | 20 | 15 |
| D (Don't know) | 8 | 4 | 6 | 6 |
| Q2. Feasibility | | | | |
| A (0 to 2) | 19 | 16 | 15 | 17 |
| B (3 to 7) | 45 | 49 | 53 | 49 |
| C (8 to 10) | 8 | 19 | 13 | 12 |
| D (Don't know) | 28 | 16 | 19 | 17 |
| Q3. Profit/productivity | | | | |
| A (0 to 2) | 18 | 18 | 26 | 21 |
| B (3 to 7) | 33 | 48 | 38 | 38 |
| C (8 to 10) | 20 | 23 | 11 | 17 |
| D (Don't know) | 29 | 11 | 25 | 24 |

¹ Survey questions: Q1. In your opinion, how important is trying to reduce methane emissions from beef cattle? Q2. In your opinion, is breeding cattle for lower methane emissions possible? Q3. In your opinion, is breeding cattle for lower methane emissions likely to compromise the productivity and/or profitability of your business?

² Responses were scaled from 0 (not important) to 10 (very important) for Q1, 0 (not possible) to 10 (very possible) for Q2, and 0 (not likely) to 10 (highly likely) for Q3.

period (9% v. 13% v. 20% across the three periods; $P=0.01$). There were differences between age categories in the proportions of responses in each score class for importance ($P=0.02$), but pairwise tests did not detect significant ($P>0.1$) differences between any pair of age classes for any particular score. There was also a tendency for differences in proportions of responses between participants with different roles in the cattle operation ($P=0.09$) but no significant ($P>0.1$) pairwise differences. The percentages of responses between participants with different types of cattle operation did not differ ($P>0.1$).

For the second question, responses for all three survey periods combined showed most (49%) were neutral about whether it was possible to breed cattle for lower methane emissions, or did not know (22%), or thought it was not possible (17%). Only 12% thought this possible. The proportions of responses in each category differed between survey periods ($P=0.03$) with relatively more respondents in the second survey period (19%) responding that it was possible than the first (7%) survey period. The proportion of responses in each category did not differ between type of cattle operation, position within operation or age category (all $P>0.1$).

Responses to the third question over the three survey periods combined showed that most respondents (38%) were neutral or did not know (24%), while 17% thought a compromise with productivity was likely. The proportions of responses in each category differed between survey periods ($P < 0.01$) with relatively fewer “don’t know” responses in the second period than the other two. A lower proportion of those identifying as “managers” answered “don’t know”, compared to the proportion of “owners” with this view (10% v. 27%; $P = 0.03$), suggesting that “managers” were a class of people who were proportionally more prepared to give an opinion. The proportion of responses in each category did not differ between type of operation or age category (both $P > 0.1$). Chi-square tests were non-significant ($P > 0.05$) for other distributions in frequencies of responses to questions across the demographic classes and across the three survey periods.

Implications

The proportion of people working within the parts of the NSW cattle industry surveyed who thought it important to reduce methane emissions from beef cattle increased across the survey period, from 9% to 20% of respondents. This increase is opposite to the slight decline between 2009 and 2011 in agreement with the statement “Farmers should contribute to emission reductions along with other parts of the economy” reported in the Victorian farmer survey by Schwarz *et al.* (2012). Something appears to have been changing farmers’ opinions on the importance of GHG. Prior to the start of the survey period, in 2011 the Australian national government enacted the “Carbon Farming Initiative” (CFI) (Department of the Environment and Energy, 2017) which offered financial incentives to farmers who adopted practice changes that captured carbon within their farm landscape or reduced GHG emissions from their enterprises. The CFI identified methane emissions from cattle and sheep as being a major source of GHG from agriculture and intensified public discussion on the environmental impact of livestock production. The CFI included approved practices (“Methodologies”) that were applicable to beef production. A combination of information dissemination associated with the CFI and public discussion may have been responsible for the increasing trend in the importance of reducing methane emissions across the survey period.

Only 12% of respondents thought it possible to breed cattle for lower methane emissions and only 21% thought that, if possible, it would not compromise productivity. This concern over compromise in productivity was also detected in the Victorian farmer survey reported by Schwarz *et al.* (2012). They reported the mean response by livestock farmers in 2011 to the statement “It is possible to reduce greenhouse gas emissions from my farm, and become more profitable” was 2.8, and to the statement “Reducing greenhouse gas emissions in agriculture will result in lower production levels” was 3.1, both on a scale 1 = strongly disagree, to 5 = strongly agree, and both being close to the neutral or unsure responses expressed by 62% of participants in this survey. Uncertainty within the beef cattle industry over whether it is possible to breed cattle for lower methane emissions, and whether it is possible without a compromise in productivity, is a significant barrier to adoption of a breeding solution for reduced methane emissions, and will require a concerted extension and education campaign on the opportunity and benefit.

Conclusions

Although a growing proportion of participants across the survey period thought reducing enteric methane emissions to be important, overall more than three-quarters did not, indicating that at the time of the surveys most cattle producers in NSW would be unlikely to adopt changes in their enterprise solely to reduce enteric methane GHG emissions. Increasing these proportions will require a concerted extension and education campaign clearly showing that it is possible to lower methane emissions without compromising productivity and/or profitability, and clearly explaining environmental and any economic benefits.

References

Department of Agriculture and Water Resources (2017), Filling the Research Gap (FtRG). Available at: <http://www.agriculture.gov.au/ag-farm-food/climatechange/carbonfarmingfutures/ftrg> [Verified 6 June 2017].

Department of the Environment and Energy (2017), Carbon Farming Initiative (CFI) methodologies overview. Available at: <http://www.environment.gov.au/climate-change/emissions-reduction-fund/cfi/publications/factsheet-methodologies-overview> [Verified 6 June 2017].

Donoghue, K.A., Bird-Gardiner, T., Arthur, P.F., Bird, S.H., Herd, R.M. and Hegarty, R.S. (2016), "Genetic parameters for methane production in Australian beef cattle", *Journal of Animal Science*, 94, 1438-1445.

Pickering, N.K., Oddy, V.H., Basarab, J., Cammack, K., Hayes, B., Hegarty, R.S., Lassen, J., McEwan, J.C., Miller, S., Pinares-Patiño, C.S. and de Haas, Y. (2015), "Animal board invited review: genetic possibilities to reduce enteric methane emissions from ruminants", *Animal*, 9, 1431-1440.

Schwarz, I., Graymore, M., Brownell, B. and Vergne Lehmann, L. (2012), *The Victorian Farmer Survey on Climate Change 2011*, Victorian Department of Primary Industries, Horsham Campus Research Precinct, Horsham.