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For further information contact:

Centre for Population and Urban Research

PO Box 11A

Monash University VIC 3800

Australia

Phone (+61 3) 9905 2965

Fax (+61 3) 9905 2993

email: <bronwen.perry@arts.monash.edu.au>



MONASH University

PUBLIC PERCEPTIONS OF GM AGRICULTURE IN AUSTRALIA

■ **Carol Whitfield, Everada G. Cunningham and Michael Gilding**

Public policy is changing on GM agriculture in spite of public perceptions, not because of them.

Genetically modified (GM) agriculture promises another agricultural revolution, producing more food to feed more people. Its champions—from science, government and industry—celebrate its capacity for higher yields, enhanced nutrition, and lower pesticide use. Its opponents—mostly environmentalists—warn of unintended consequences, such as pesticide-resistant weeds, toxic foods, and reduced biodiversity. To drive the message home, they dub the product of GM agriculture as ‘Frankenfoods’.

In the US the champions of GM agriculture have prevailed. GM agriculture is pervasive, and most Americans now support it.¹ In Europe the opponents of GM agriculture have won the day. There GM agriculture is prohibited, and public opinion is strongly against it.² In Australia the battle is poised. GM cotton and carnations have been grown locally since 1996; locally farmed GM cottonseeds provide cooking oil for the fast food industry;³ processed food imported from the US and elsewhere includes GM ingredients; and in 2003 the Commonwealth Government Gene Technology Regulator (GTR) approved commercial GM canola crops. Yet in the wake of GTR approval, state and territory governments imposed their own moratoria on GM agriculture.⁴ This was to ‘give time for assessing both market acceptance of GM canola and the costs of keeping GM and non-GM grains separate in the handling and storage process’.⁵

It seems that time is running out. In 2008 the Victorian and New South Wales

governments lifted their bans, and the first commercial GM canola crops in Australia are in the ground.⁶ The Western Australian government looks set to lift its ban also.⁷ Lifting the bans begs inquiry as to public perceptions in Australia. Are governments responding to public opinion? Or are they ignoring it? Does public opinion about GM agriculture matter? This article reports the most recent findings from the Swinburne National Technology and Society Monitor (SNTSM). The SNTSM not only provides the most recent snapshot of public perceptions of GM agriculture; it provides longitudinal data, showing the trajectory of perceptions since the first survey in 2003.

UNDERSTANDING PUBLIC PERCEPTIONS

Public perceptions matter. In the early twenty-first century the science wars manifested themselves across a variety of fronts: nuclear energy, stem cell research, human cloning, nanotechnology, climate change—and GM agriculture. In turn, popular movements influence the course of scientific endeavour, technological innovation and regulatory frameworks.

There are three main approaches to making sense of public perceptions around science and technology. The first emphasises a knowledge deficit on the part of the public; the second emphasises a trust deficit; and the third highlights the situated knowledge of ordinary people.

The knowledge deficit approach assumes that the problem lies in the ignorance of ordinary folk. Scientists are trained ex-

perts who best understand the implications and risks of new scientific paradigms and their applications. For the most part the general public is not well educated in science, nor well informed about new technologies. On this account, it is vulnerable to misrepresentation by extremist groups (on the left and right) and sensationalism in the media. In the 1970s and 1980s scientists, governments and industry openly adopted this approach. Nowadays they are more discreet for fear of seeming arrogant. Even so, the approach is often implicit in their surveys and pronouncements. Its implication is that better education of the general public and better communication by scientists will ease the passage of new technologies.⁸ Following this logic, advocates of GM agriculture have emphasised its benefits and the disinformation of the media and environmentalists.

The trust deficit approach declares that knowledge is not the problem. After all, there is a vast empirical literature that finds no correlation between scientific knowledge and support for new technologies, or at best a weak correlation.⁹ In practice, most people have neither the time nor ability to understand the implications and risks of new technologies. Effectively they depend upon the judgements of experts. By implication, support for new technologies depends upon public trust in the institutions and agencies of science and government. In close connection, it depends upon the way in which expert knowledge is framed in the process of communication, especially by the media. Framing refers to the interpretative lens—or storylines—used in making sense of new technologies. For trust to prevail, framing must ‘remain true to the state of the underlying science’.¹⁰ In the wake of the science wars during the past decade or so, this approach is becoming mainstream. The Canadian biologist Mark Winston, for example, argues that the ‘blatantly self-serving attitudes of industry’¹¹ in introducing GM agriculture with minimal

independent testing or regulation eroded public confidence:

Biotechnology opponents have grasped one simple public relations fact considerably better than industry. Science and data cannot substitute for actions and statements that engender trust.¹²

The situated knowledge approach contends that ordinary folk do not so much trust authorities, as comply with them as they must.¹³ In close connection, they are not so much uninformed in their attitudes, as informed by their own experiences and circumstances.¹⁴ In other words, their knowledge is situated; it is pragmatic and local in orientation, rather than abstracted and universal. Accordingly it is routinely overlooked by scientists, and often disparaged—akin to the way in which medicos often dismiss their patients’ knowledge of their own bodies in arriving at a diagnosis. This approach to understanding public perceptions is inspired by the work of the British sociologist Brian Wynne,¹⁵ and is commonly adopted in the social sciences. For example, it underpins the argument of the British social psychologists George Gaskell and Martin Bauer that opposition to biotechnology ‘is not a problem residing in the public, rather it is a signal that something is going wrong with the technology’.¹⁶

THE BIOTECHNOLOGY AUSTRALIA REPORT

A 2007 government-sponsored report provides the most recent published account of public opinion around GM agriculture. The report was undertaken by a private research consultancy on behalf of Biotechnology Australia, a cross-departmental agency formed by the Howard Coalition Government to coordinate ‘non-regulatory biotechnology issues’. Biotechnology Australia has since been closed by the Rudd Labor Government.

The report compares a random telephone survey in 2007 with another in 2005.

In both surveys respondents were asked about their 'overall support for the use of gene technology in food and agriculture applications today' on a scale from 0 ('fully against') to 10 ('fully supportive'). The results indicate a significant increase in support. The average rating in 2005 was 4.9; in 2007 it was 5.5.¹⁷

In more specific terms, the survey asked respondents about awareness, perceived utility, perceived risk and perceived acceptability of GM food crops. The assumption here is that individuals undertake a kind of risk-benefit analysis in arriving at their attitudes. The report found substantial rises across the board. Awareness among respondents 'rose from 76% in 2005 to 85% in 2007, perceived utility rose from 64% to 83%, perceived risk dropped from 71% to 54%, and perceived acceptability rose from 48% to 73%'.¹⁸

The survey tested respondents' knowledge of GM crops and foods with four true or false questions: for example, 'most of the processed foods in Australian supermarkets contain GM ingredients' (false), and 'most of the vegetable oils produced in Australia are made from GM crops' (false). The findings indicated 'significant improvements in knowledge' since 2005, but also enduring misinformation. For example, 46 per cent of respondents were incorrectly informed about processed foods in supermarkets (compared with 48 per cent correctly informed), and 48 per cent were incorrectly informed about vegetable oils (compared with 41 per cent correctly informed).¹⁹

The survey also asked respondents about their 'willingness' to eat GM foods and a variety of other foods. The average rating (on a scale from 0 to 10) for organic food was 8.7; for non-organic food it was 6.1; for food containing preservatives it was 5.2; for food made from GM crops it was 5.1; for GM fruit and vegetables it was 4.9; for food grown with pesticides it was 4.6; and for meat from GM animals it was 4.2.²⁰

In 2005 respondents had been asked about their 'confidence' in eating the same foods, making comparison problematic. Even so, there were much larger rises in the rating of GM foods than non-GM foods during the period.

The report concluded that a significant shift in attitudes had occurred. This was because Australians were 'more familiar' with biotechnology. The 'trend towards greater acceptance' would continue as the 'technologies become a more normal part of everyday life'.²¹

Yet several caveats are in order. In the first place, respondents in 2007 were more fully primed. At the outset of the survey they were given definitions of biotechnology, gene technology and genetic modification.²² This was not the case in 2005. As already noted, the way questions are framed can have a major effect upon how people respond to them. In this context, it is not surprising that respondents in 2007 described themselves as more aware of biotechnology than those in 2005. Perhaps priming influenced other responses also. We do not know.

More generally, the survey is heavily grounded in the knowledge deficit model. This is exemplified in the true or false questions. It is also reflected in the attention to support for the technology at the expense of broader contextual issues, not least trust. Yet the survey did broach such issues through a set of statements about 'general attitudes', with which respondents could agree, disagree, or claim neutrality. The statement with which most respondents agreed (55 per cent of the sample) was 'Genetic modification is mostly for the benefit of commercial companies'. The statement with which most respondents disagreed (63 per cent) was 'R&D into genetic modification should be stopped'.²³ By implication, most Australians support research into genetic modification, but are concerned about how its benefits are applied. This point did not find its way into the conclusion.

THE SWINBURNE MONITOR

The Swinburne National Technology and Society Monitor (SNTSM) is a national telephone survey of a random sample of 1000 Australian residents aged 18 and over about perceptions of emerging technologies, including GM agriculture. The first survey was undertaken in 2003, the most recent in 2008—a much longer time frame than the Biotechnology Australia surveys.

Each year the SNTSM asks respondents to rate their ‘comfort’ with a variety of technologies, ranging from 0 (‘not comfortable at all’) to 10 (‘very comfortable’). ‘Comfort’ is a deliberately wide-ranging concept. It encompasses ‘support’ in the sense of opinion, but extends to a more complex mix of beliefs and emotions. It is plausible, for example, that someone might be ‘uncomfortable’ with GM agriculture but still support it. It seems unlikely, though, that someone might be ‘comfortable’ with the technology but oppose it.

The SNTSM also asks questions about demographics and trust. The demographics include respondents’ highest educational qualification. This is relevant to assessment of the knowledge deficit approach insofar as it allows us to see if more educated respondents are more comfortable with new technologies. The trust questions ask respondents about their trust in various organisations and institutions for information about new technologies, ranging from 0 (‘don’t trust at all’) to 5 (‘trust a very great deal’). These questions are relevant to the trust deficit approach insofar as this approach proposes that more trust predicts more comfort.

The SNTSM does not provide scope to assess the situated knowledge approach, for the obvious reason that situated knowledge cannot be gauged through a random survey instrument. Surveys are blunt instruments for some purposes.

The 2008 survey included three additional questions about GM food. One asked

respondents how knowledgeable they were about GM food, using a scale from 0 (‘no knowledge’) to 10 (‘very knowledgeable’). This question provides another vehicle to explore the knowledge deficit approach. Two further questions asked respondents about their willingness ‘to eat genetically modified crops, such as corn and canola’ and ‘genetically modified animals, such as chicken and salmon’, again using a scale from 0 (‘not willing at all’) to 10 (‘very willing’). These questions were intended to provide more information about ‘comfort’. As it happened, they also provided the means to compare this survey with the Biotechnology Australia survey.

The 2008 survey was undertaken at the Swinburne University of Technology Computer Assisted Telephone Interviewing (CATI) facility between 8 to 20 September. Altogether 1000 respondents were interviewed. As is commonly the case in random surveys, women (63 per cent of respondents) and the elderly (average age 54) were over-represented. Accordingly, results were weighted by gender and age, consistent with the Australian population at large.

No change in perceptions

The average ‘comfort’ rating for GM agriculture in the 2008 SNTSM was 4.3. There was considerable variation among respondents. The most frequent response was 0 (19.6 per cent); the second most frequent response was 5 (18.5 per cent); the third most frequent response was 7 (10.5 per cent). As anticipated, the average ‘comfort’ rating in the 2008 SNTSM was less than the average ‘support’ rating in the 2007 Biotechnology Australia survey, which was 5.5. The difference between means is statistically significant ($t=10.19$, $p<.001$). At least part of the reason for this difference is that some people support GM agriculture but are uncomfortable about it nonetheless.

The average 'willingness' of SNTSM respondents in 2008 to eat 'GM crops, such as corn and canola' was 4.3. In contrast, the average 'willingness' of respondents in the 2007 Biotechnology Australia survey to eat 'GM fruit and vegetables' was 4.9. The difference is again significant, albeit more moderately so ($t=7.76$, $p<.001$). In this instance the difference is not explained by the framing of the specific question. If anything, GM 'fruit and vegetables' might be expected to cause more discomfort than GM 'corn and canola'. The fact that the reverse is the case suggests methodological factors at work. Specifically, it is consistent with the suggestion that the 2007 Biotechnology Australia survey primed its respondents through extra information about biotechnology provided at the outset of interviews.

This suggestion is confirmed by consideration of the SNTSM comfort rating since its beginnings. It was 4.2 in 2003; 3.8 in 2004; 4.0 in 2005; 4.2 in 2006; 4.1 in 2007; and 3.9 in 2008. 'Comfort' with GM agriculture barely changed between 2003 and 2008. There is no support for the suggestion of the Biotechnology Australia study that Australians are becoming more comfortable with GM agriculture. Again, the implication is that the difference in the Biotechnology Australia surveys between 2005 and 2007 was an artefact of their methods.

Briefly, it seems that public perceptions of GM agriculture have barely changed in the past five years. The majority of Australians are still uncomfortable with GM agriculture.

A trust deficit

The SNTSM does not support the knowledge deficit approach to making sense of public perceptions around GM agriculture. The correlation between respondents' comfort with GM agriculture and their level of education is weak ($r = .13$, $p<.01$);

the correlation with comfort with GM agriculture and their evaluation of their knowledge about GM food is weaker still ($r=.07$, $p<.05$). These findings are consistent with other studies. However knowledge is operationalised, large-scale surveys consistently find little or no correlation between greater knowledge and technology-friendly attitudes.

In contrast, the SNTSM supports the trust deficit approach. Using confirmatory factor analysis, an independent cluster measurement model identifies four institutional clusters. The first is scientific institutions: the CSIRO, scientists, universities and hospitals. The second is business: major international companies, Australian companies, small business, and the commercial media. The third is government: federal and state governments. The fourth is oppositional institutions: the environmental movement and trade unions. Churches, the non-commercial media and the public service are removed from the analysis to achieve adequate fit. Trust in government institutions has little influence on comfort with biological engineering technologies ($\beta=.15$, $p<.001$). Trust in scientific and business institutions has significant influence (respectively, $\beta=.34$, $p<.001$; $\beta=.27$, $p<.001$), two to three times stronger than the knowledge variables. Trust in oppositional institutions has substantial influence ($\beta=-.51$, $p<.001$), five times stronger than the knowledge variables. The model explains over one fifth of the variance in comfort with genetic modification.

Given that environmentalists drive the opposition to GM agriculture, it is not surprising that trust in oppositional institutions (including environmental organisations) predicts discomfort with GM agriculture. Similarly, the fact that science and industry are champions of GM agriculture makes it unsurprising that trust in scientific and business institutions predicts comfort with GM agriculture. Presumably trust in

government institutions does not predict comfort with GM agriculture because governments themselves adopt a variety of positions; sometimes champion, sometimes roadblock.

Australians trust scientific institutions more than they trust any other institutional cluster for information about new technologies (M=3.6), but they trust business institutions less than any other (M=2.0). The difference is highly significant ($t=53.57$, $p<.001$). It is consistent with the finding of the Biotechnology Australia survey that a majority of Australians believe that GM is mostly for the benefit of commercial companies, but they do not want R&D into GM stopped. It seems that Australians' reservations about business institutions trump their confidence in science when it comes to their comfort with GM agriculture.

Briefly, the problem for GM agriculture is not so much the ignorance of ordinary folk, but rather lack of trust in the institutions responsible for its commercialisation. The findings beg closer consideration of trust. In particular, qualitative research grounded in the situated knowledge approach might facilitate a better understanding of how trust is forged, and how it is lost.

A FALSE DAWN

The Biotechnology Australia report precipitated cautious celebration among advocates of GM agriculture. One industry commentator, Graeme O'Neill, welcomed the Biotechnology Australia report as evidence that 'Australia's anti-GM movement has lost its decade-long stranglehold on public opinion towards all things GM'. In his words:

There are no GM roosters out there yet, but if there were, they'd be heralding the growing light, and the imminent end of a dark age in Australian agriculture. Welcome to the 21st century.²⁴

The SNTSM shows that the Biotechnology Australia surveys heralded a false dawn.

Public support for GM food is not gaining ground. Notwithstanding considerable diversity in Australians' perceptions of GM food, most remain uncomfortable with it. The false dawn was an artefact of the survey techniques employed in the Biotechnology Australia surveys. Australian governments are lifting their moratoria despite public opinion, not because of it.

A trust deficit, rather than a knowledge deficit, informs Australians' discomfort with GM agriculture. The SNTSM highlights the precariousness of trust in new technologies. Once compromised, it is not easily regained. For the moment, industry advocates can probably forget about GM roosters. Politicians are lifting their moratoria, but the public reserves its judgement.

Acknowledgments

The authors are indebted to Gordana Bruce, Christine Critchley and Elizabeth Hardie for their management of the Swinburne Technology and Society Monitor, and to Christine Critchley for her weightings of the data.

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