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Submission on GM foods to the Review of Food Labelling Law and Policy

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Summary

The Food Standards Code currently requires all foods containing DNA and protein from a GM organism to be labelled as being GM.

There is ample evidence in the peer-reviewed scientific literature that meat and milk (and hence cream and cheese) from animals fed GM feed contain GM DNA from the feed. Indeed, the varieties of GM feed fed to these animals can be determined from measuring the GM DNA in the meat or milk. Therefore, according to the current Food Standards Code, these should be labelled. There is also evidence that there can be metabolic, physiological and immunological responses or differences in animals that eat GM crops. The NZ Commerce Commission has already warned a chicken producer that it risked breaching the Fair Trading Act with claims that chickens fed GM feed contained no GM ingredients. Moreover, the GM industry is now applying for patents on animals fed GM crops on the basis that animals fed a given GM crop are different or special to animals not fed that GM crop. (See Section 5.1 of this submission for more information)

Recommendation 1 – Animals fed GM feed
All products from animals fed GM feed should be labelled, including meat, milk, cheese and eggs. FSANZ has placed an editorial note defining the meaning of a GMO in the Standard that states: "This definition does not include a food derived from an animal or other organism which had been fed food produced using gene technology, unless the animal or organism itself is a product of gene technology." This should be replaced with: "This definition includes a food derived from an animal or other organism which had been fed food produced using gene technology." While no other change may be required in the Food Standards Code, in order to make the situation clear, Section 4 of Standard 1.5.2 should be changed as described in Recommendation 9.

There is also ample evidence in the peer-reviewed scientific literature that highly refined products also contain GM protein or GM DNA, including oils, highly processed flour, starch, sugars, corn syrup, lecithin, soy protein powder, soymilk, corn chips, tortillas, taco shells, tofu, miso and irradiated and sonicated foods. Therefore, according to the Food Standards Code, these should also be labelled. (See Sections 5.2 and 5.3 in this submission for more information.) Honey from bees that have foraged on GM crops has also been shown to contain GM DNA and therefore also needs to be labelled.

Recommendation 2 – Highly refined food
All foods containing ingredients that have come from a GM crop should be labelled. Labelling these foods requires no change to the Food Standards Code. It simply requires the Review Panel to inform FSANZ not to wrongly interpret the Code and for FSANZ to tell the food industry that that the Food Standards Code requires all foods from GM crops such as oil, starches, sugars and lecithin to be labelled. Honey obtained from bees that have foraged on GM crops should also be labelled.

Recommendation 3 – Processing aids, food additives and flavours
For the same reasons as for highly processed foods, all processing aids and additives from GM organisms should be labelled.

Determining if a food ingredient has come from a GM crop generally involves testing either for GM DNA or for the GM protein that the GM DNA is designed too produce. DNA is generally more robust at surviving food processing and refining processes. Cheap and effective protein-based tests are currently being used in the cropping industry on harvested crops, while more specific and sensitive tests to measure GM DNA are currently available in commercial laboratories in many countries to test for GM content in processed foods. These are currently used in Europe to police GM labelling laws. Moreover, more accurate and cheaper high through-put tests are currently finding their way into routine laboratories. (See Section 5.4 of this submission for more information.)

European regulations *Regulation (EC) 1829/2003* and *Regulation (EC) 1830/2003* not only provide for better labelling than occurs in Australia but also provide for traceability of GMOs through the foods chain, including highly refined substances such as oils, sugars, starches, lecithin, etc. The regulations aim to not only inform consumers, but to monitor and check information given on labels, to monitor the effects on the environment, to provide a means of surveillance for any potential effects on human or animal health and to withdraw any GMOs which are found to be potentially dangerous for human or animal health. Animal feed has the same protection as human food. (See Section 5.5 of this submission for more information.)

Recommendation 4 – How GM food and feed should be regulated
Food and feed should be regulated in Australian much as they are in the EC by regulations (EC) 1829/2003 and (EC) 1830/2003. This should be done in order not only to inform consumers, but to monitor and check information given on labels, to trace GMOs through the food chain, to monitor the effects on the environment, to provide a means of surveillance for any potential effects on human or animal health and to withdraw any GMOs which are found to be potentially dangerous for human or animal health.

Recommendation 5 – Unintentional presence
The current standards for unintentional presence should remain. (See discussion in Section 6.1 of this submission.)

Recommendation 6 – Point of sale labelling
If there is any move to have food from premises such as bakeries, restaurants and takeaways labelled for nutrient content, then labelling should be extended to GM ingredients.

New GM crops are emerging that use RNA rather than DNA methods. While many of these crops will be covered under current labelling laws, techniques that spray RNA onto crops may not be. There are also concerns about how to monitor these crops in the food supply as current detection techniques may not be adequate. (See Section 5.8 of this Submission for more information.)

Recommendation 7 – RNA crops
The Food standards Code should be changed to incorporate reference to RNA as described in Recommendation 9. Foods using RNA technologies should not be introduced into the Australian food supply until adequate detection tests have been established.

Recommendation 8 – How labels should look
The food industry appears to be concerned about the size of the panel used to describe the ingredients in foods. Currently, the words "genetically modified" are required after each GM ingredient. These could be removed and replaced by the commonly-accepted abbreviation "GM" in order to save room. An example of how labels for meat from animals fed GM feed could appear is, using the example of chicken: "Ingredients: chicken (fed GM feed)". An example of how milk, eggs, cheese etc from animals fed GM feed could appear is: "..from animals fed GM feed". An example of how processed goods could appear is, using the example of beef sausages: "Ingredients: beef (fed GM feed), wheat flour, soy (GM)".

Recommendation 9 – How the above recommendations should appear in the Food Standards Code
Section 4 (1) of the Food Standards Code should be changed to:

> **genetically modified food** means food that is, or contains as an ingredient, including a processing aid, a food produced using gene technology which –

(a) contains novel DNA and/or novel RNA and/or novel protein; or
(b) has had genes silenced or removed using gene technology; or
(c) has altered characteristics;

including –

(d) highly refined food obtained from a genetically modified organism;
(e) a processing aid or food additive from a genetically modified organism;
(f) flavours obtained using a genetically modified organism;
(g) products (including meat, milk, cream, cheese and eggs) from animals fed genetically modified organisms;
(h) products from bees foraged on genetically modified organisms or fed genetically modified organisms;

but does not include –

(i) a food, ingredient, or processing aid in which genetically modified food is unintentionally present in a quantity of no more than 10g/kg per ingredient.

Accurate qualitative (present/not present) and quantitative (percent present) tests for GM DNA are available in a number of countries including Australia to monitor the labelling laws. Cheaper qualitative testing can be used to test for unauthorised GMOs in the food supply. (See Section 6.1 of this Submission for more information.)

There may be a move by the GM industry and its supporters to argue that if consumers want to avoid GM foods, they can use "non-GM" or "GM free" labels, and that therefore there is no need for GM labels. However, this will reduce consumer choice. This is because of concerns from food manufacturers that if they label their foods as non-GM or GM free, they could be fined if tiny amounts of GM materials slip through, as occurred for a maker of soy-based sausages. (See Section 6.2 of this Submission for more information.)

Recommendation 10 – GM and non-GM labels
Both GM and non-GM labels should remain. There is evidence that if GM labels showing the presence of GM ingredients were dropped in favour of allowing only non-GM labels, consumer choice would be greatly reduced.

GMOs that are not authorised to enter the Australian food supply may enter this country from overseas imports. At present, there seems to be no monitoring or surveillance for these. (See Section 7 of this Submission for more information.)

Recommendation 11 – Unauthorised GM organisms
The Australian Quarantine inspection Service (AQIS) should routinely test a proportion of foods entering Australia to determine if unauthorised GMOs are present.

The two highest-level principles that should guide GM food labels are the protection on public health and safety, and enabling consumers to make an informed choice. Other policy drivers, in particular the commercial demands of industry are recognised but should not displace or relegate the two highest-level principles. Evidence is given of how FSNAZ may have been captured by, or unduly influenced by, the commercial food industry so that it has not given enough weight to the two highest-level principles and that hence, FSANZ may be in breach of its Act. (See Section 8 of this Submission for more information.)

Recommendation 12 – The FSANZ Board
It is recommended that FSANZ be re-structured so that it and the membership of its Board reflect a public commitment to the two highest-level principles. This would require a Board on which the majority of members are experts in medicine, public health, nutrition or food-borne disease and are independent of commercial food companies.

None of the 63 GM foods currently permitted into the Australian food supply has undergone long-term animal feeding studies or human health testing. The long-term effects of these crops on health are therefore unknown. The compliance regime should therefore reflect the high-level principle that consumers should be allowed to make their own informed choice about whether to eat these foods or not. In order to do this, they need to rely on the veracity of labels. Accurate, policed labelling is also required for epidemiological studies into the effects of these crops on human health. (See Section 9 of this Submission for more information.)

Recommendation 13 – GM testing body and schedule
To reflect the current lack of evidence, and the possibility of future epidemiological investigations, it is recommended that:

- √ All commercially-available manufactured foodstuffs be tested, **at least biennially** for the presence or absence of genetically-modified ingredients, and the results compared against the labelling of the product. Where labels are found to be inaccurate, there should be similar treatment, for enforcement purposes, of both positive and negative claims of GM status.
- √ The schedule of testing be revised on a regular basis to reflect risks that may be identified from specific GM ingredients, including that based upon any evidence which may emerge in scientific and medical journals.
- √ Monitoring for compliance with the Food standards Code should be conducted on a national level as many food companies in Australia are national companies that produce their product in one State or Territory and and export it to others. A national compliance body should therefore be established to monitor compliance. This should not be done by FSANZ as I and others have lost trust in FSANZ's ability and willingness to be impartial.

1 Answers to questions in the consultation paper

This section provides answers to the numbered questions in the Issues Consultation Paper of the Food Labelling Law and Policy Review on the issue of labelling GM foods.

Q1. To what extent should the food regulatory system be used to meet broader public health objectives?

The food regulatory system should be used to meet the two highest-level principles of protecting public health and safety and enabling consumers to make informed choices. These are also described as the top two objectives of FSANZ in the *Food Standards Australia New Zealand Act 1991* (C'th). Other policy drivers such as the commercial demands of industry are recognised but should not be permitted to displace the two highest-level principles. See Section 8 of this submission for more details.

Q2. What is adequate information and to what extent does such information need to be physically present on the label or be provided through other means (eg education or website)?

In order to protect the two highest-level principles described above, GM food labelling should be placed on the food label itself rather than on a website or anywhere else.

Q3. How can accurate and consistent labelling be ensured?

More accurate GM labels are required that label products of animals fed GM feed; refined foods from GM crops such as oils, starch, sugars and lecithin; honey; and processing aids, food additives and flavours made from GMOs as described in Recommendations 1, 2 and 3 and Section 5 of this submission. GM food labels need to be policed to ensure accurate GM labelling. They appear not to be at present. Recommendations 4, 5, 6, 7, 8 and 9 and Sections 4 and 5 describe how GM labels could be regulated while Recommendations 10, 11 and 13 and Sections 6 and 7 describe how they should be policed.

Q4. What principles should guide decisions about government intervention on food labelling?

The highest-level principles described in Q1 and Section 8 should guide government intervention on food labelling.

Q5. What criteria should determine the appropriate tools for intervention?

The highest-level principles described in Q1 and Section 8 should determine the appropriate tools. That is, in order to protect public health and safety and to enable consumers to make and informed choice, GM food labelling should be mandatory.

Q6. Is this a satisfactory spectrum for labelling requirements?

Yes. However, the preamble to this question stated that food that has been genetically modified is

labelled. As Section 5 shows, many GM foods go unlabelled because FSANZ has decided that they do not require labelling. As Sections 6 and 7 show, many GM foods may go unlabelled because labelling laws are largely not policed.

Q7. In what ways could these misunderstandings and disagreements be overcome?

Not applicable to this submission, which covers GM foods.

Q8. In what ways can food labelling be used to support health promotion initiatives?

Not applicable to this submission, which covers GM foods.

Q9. In what ways can disclosure of ingredients be improved?

More accurate GM labels are required that label products of animals fed GM feed; refined foods from GM crops such as oils, starch, sugars and lecithin; honey; and processing aids, food additives and flavours made from GMOs as described in Recommendations 1, 2 and 3 and Section 5 of this submission.

Q10. To what extent should health claims that can be objectively supported by evidence be permitted?

Not applicable to this submission, which covers GM foods.

Q11. What are the practical implications and consequences of aligning the regulations relating to health claims on foods and complementary medicine products?

Not applicable to this submission, which covers GM foods.

Q12. Should specific health warnings (e.g., high level of sodium or saturated fat per serve) and related health consequences be required?

Not applicable to this submission, which covers GM foods.

Q13. To what extent should the labelling requirements of the Food Standards Code address additional consumer-related concerns, with no immediate public health and safety impact?

There is mounting evidence in the peer-reviewed scientific literature that GM foods can cause harm to animals (and therefore, likely to people) that eat them. However, a discussion of this literature is beyond the scope of this review. There is likely to be the need to undertake epidemiological studies into the effect of these foods on human health in the near future. For this reason alone, GM foods should be fully labelled as described in Recommendations 1 to 9, in order to be able to undertake such studies. The EC has far more thorough requirements for labelling of GM foods than Australia. A major reason is to provide for a means of surveillance for any potential effects on human or animal health and to withdraw any GMOs which are found to be potentially dangerous for human or animal health. Recommendations 1 to 9 describe the type of labelling that would facilitate such investigations.

Q14. What criteria should be used to determine the inclusion of specific types of information?

The highest-level principles described in Q1 and Section 8 should determine the information required. That is, in order to protect public health and safety and to enable consumers to make an informed choice, full GM food labelling should be mandatory.

Q15. What criteria should determine which, if any, foods are required to have country of origin labelling?

Not applicable to this submission, which covers GM foods.

Q16. How can confusion over this terminology in relation to food be resolved?

Not applicable to this submission, which covers GM foods.

Q17. Is there a need to establish agreed definitions of terms such as 'natural', 'lite', 'organic', 'free range', 'virgin' (as regards olive oil), 'kosher' or 'halal'? If so, should these definitions be included or referenced in the Food Standards Code?

Not applicable to this submission, which covers GM foods.

Q18. What criteria should be used to determine the legitimacy of such information claims for the food label?

Not applicable to this submission, which covers GM foods.

Q19 In what ways can information disclosure about the use of these technological developments in food production be improved given the available state of scientific knowledge, manufacturing processes involved and detection levels?

The food regulatory system should be used to meet the two highest principles of protecting public health and safety and enabling consumers to make informed choices. These are also described as the top two objectives of FSANZ in the *Food Standards Australia New Zealand Act 1991* (C'th). Other policy drivers such as the commercial demands of industry are recognised but should not be permitted to displace the two highest principles. See Section 8 of this submission for more details.

Q20. Should alcohol products be regulated as a food? If so, should alcohol products have the same labelling requirements as other foods (i.e., nutrition panels and list of ingredients)? If not, how should alcohol products be regulated?

Not applicable to this submission, which covers GM foods.

Q21. Should minimum font sizes be specified for all wording?

The font size for GM food labelling should be the same font size as for nutritional content.

Q22. Are there ways of objectively testing legibility and readability? To what extent should objective testing be required?

Not applicable to this submission, which covers GM foods.

Q23. How best can the information on food labels be arranged to balance the presentation of a range of information while minimising information overload?

Not applicable to this submission, which covers GM foods.

Q24. In what ways can consumers be best informed to maximise their understanding of the terms and figures used on food labels?

Not applicable to this submission, which covers GM foods.

Q25. What is an appropriate role for government in relation to use of pictorial icons on food labels?

Not applicable to this submission, which covers GM foods.

Q26. What objectives should inform decisions relevant to the format of front-of-pack labelling?

Not applicable to this submission, which covers GM foods.

Q27. What is the case for food label information to be provided on foods prepared and consumed in commercial (e.g., restaurants, take away shops) or institutional (schools, pre-schools, worksites) premises? If there is a case, what information would be considered essential?

If there is any move to have food from premises such as bakeries, restaurants and takeaways labelled for nutrient content, then labelling should be extended to GM ingredients (Recommendation 6).

Q28. To what degree should the Food Standards Code address food advertising?

Not applicable to this submission, which covers GM foods.

Q29. In what ways can consistency across Australia and New Zealand in the interpretation and administration of food labelling standards be improved?

Not applicable to this submission.

Q30. In what ways can consistency, especially within Australia, in the enforcement of food labelling standards be improved?

A national labelling authority could be established to monitor the labelling laws on GM foods as described in Recommendation 13 and Section 9 of this submission. At present, because GM DNA testing to determine whether a food company is complying with GM food labelling laws is relatively

expensive, no national, State or Local government body appears willing to do them.

Q31. What are the strengths and weaknesses of placing the responsibility for the interpretation, administration and enforcement of labelling standards in Australia with a national authority applying Commonwealth law and with compatible arrangements for New Zealand?

As described in Recommendation 13 and Section 9, monitoring for compliance with the Food Standards Code should be conducted on a national level as many food companies in Australia are national companies that produce their product in one State or Territory and and export it to others. Therefore, a national compliance body should be established to monitor compliance.

Q32. If such an approach was adopted, what are the strengths and weaknesses of such a national authority being an existing agency; or a specific food labelling agency; or a specific unit within an existing agency?

This should not be done by FSANZ as I and others have lost trust in FSANZ's ability and willingness to be impartial

Q33. If such an approach was adopted, what are appropriate mechanisms to deal with the constitutional limits to the Commonwealth's powers?

Not applicable to this submission.

Q34. What are the advantages and disadvantages of retaining governments' primary responsibility for administering food labelling regulations?

A move away from government administration would likely violate the two highest-level principles of public health and safety and enabling consumers to make an informed choice as described above and in greater details in Section 8. As described in Section 8, there is evidence that FSANZ has become, to some extent, captive to the economic demands of industry and may have placed those demands above the two highest-level principles. Consumers need to have confidence in the food supply. A move away from government administration would further reduce that confidence.

Q35. If a move to either: self regulation by industry of labelling requirements; or co-regulation involving industry, government and consumers were to be considered, how would such an arrangement work and what issues would need to be addressed?

See answer to Q34, above.

Q36. In what ways does such split or shared responsibility strengthen or weaken the interpretation and enforcement of food labelling requirements?

Not applicable to this submission.

Q37. What are the strengths and limitations of the current processes that define a product as a food or a complementary medicine?

Not applicable to this submission, which covers GM foods.

Q38. What are the strengths and weaknesses of having different approaches to the enforcement of food labelling standards for imported versus domestically produced foods?

Unauthorised GMOs in the food supply are grown overseas and imported into Australia. Therefore, imported food should be subjected to greater analysis for unauthorised GMOs than foods from crops grown in Australia and this should be undertaken by AQIS as it is the most logical body to do so. At present, AQIS does not test for GM content unless FSANZ asks it to, and FSANZ has apparently never asked it to. See Recommendation 11 and Section 7 for more information. Most authorised GM food ingredients also come from overseas and should be subjected to Australian GM food labelling laws in the same manner as Australian foods.

Q39. Should food imported through New Zealand be subject to the same AQIS inspection requirements?

For GM foods, the answer is no, as long as NZ has a similar quarantine inspection service as Australia, as NZ doesn't currently grow GM crops commercially.

2 About IHER

The Institute of Health and Environmental Research Inc. (IHER) is a not-for-profit research institute with an interest in genetically modified (GM) organisms, particularly those destined for food. Its directors hold the following degrees: ordinary degrees in Medicine, Science and Agriculture, Honours Degrees in Agricultural Science and Organic Chemistry, a Master of Public Health, and PhDs in Plant Genetics and Medicine. The Directors have training and expertise in plant science, agriculture, medicine, chemistry, biochemistry, nutrition, epidemiology and biostatistics.

3 What are GM foods?

GM foods contain ingredients that come from GM organisms (GMOs). Most of these organisms are GM crops. To make these crops, genetic engineers join sections of DNA that may come from plants, bacteria, animals and viruses and insert them into a plant. Genes coding for antibiotic resistance are often included. The aim is to get the plant to produce one or more new proteins. Usually, these proteins are of two types: proteins that are insecticides or proteins that make the plant resistant to herbicides. Many GM plants do both by having several GM genes "stacked" into them. The US govt has recently approved a GM corn variety simultaneously containing eight "stacked" GM genes coding for herbicide tolerance and insecticidal proteins. Many of these crops also contain genes coding for antibiotic resistance.

The vast majority of GM crops grown in the world consist of maize, soy, cotton and canola. They are mostly used for animal feed, however, significant amounts enter the human food supply, including as refined products such as oils, starch and sugars.

4 How GM foods are labelled

Food Standards Australia New Zealand (FSANZ) regulates the food supply in Australia and New Zealand and hence also regulates GM organisms for human consumption in those counties. GM food regulations are given in the Australia New Zealand Food Standards Code as Standard 1.5.2, Food Produced Using Gene Technology.

Labelling laws for GM foods were introduced in December 2001.

This section refers to the current Food Standards Code, accessed on 27 April 2010 at http://www.foodstandards.gov.au/thecode/foodstandardscode.cfm.

GM food is addressed in Standard 1.5.2, Food produced using gene technology, of the Food Standards Code. Standard 1.5.2 requires GM food to be labelled. Food produced using gene technology is defined in Section 1 of the Standard to be:

> ***"a food produced using gene technology*** *means a food which has been derived or developed from an organism which has been modified by gene technology."*

FSANZ has then placed an "editorial note" in the Standard to state:

> *"This definition does not include a food derived from an animal or other organism which has been fed food produced using gene technology, unless the animal or organism itself is a product of gene technology."*

Section 4 (1) of Standard 1.5.2 further defines GM food as:

> *"**genetically modified food** means food that is, or contains as an ingredient, including a processing aid, a food produced using gene technology which –*
>
> *(a) contains novel DNA and/or novel protein; or*
> *(b) has altered characteristics;*
>
> *but does not include –*
>
> *(c) highly refined food, other than that with altered characteristics, where the effect of the refining process is to remove novel DNA and/or novel protein;*
> *(d) a processing aid or food additive, except where novel DNA and/or novel protein from the processing aid or food additive remains present in the food to which it has been added;*
> *(e) flavours present in the food in a concentration no more than 1g/kg;*
> *or*
> *(f) a food, ingredient, or processing aid in which genetically modified food is unintentionally present in a quantity of no more than 10g/kg per ingredient."*

In Section 4 (3) of Standard 1.5.2 , the Standard states:

> *"Where genetically modified food is displayed for retail sale other than in a package, any information that would have been required under clause 5 of this Standard on the label on the food if it was packaged, must be displayed on or in connection with the display of the food."*

While in Section 4 (4) of the Standard, it states:

> *"This Division does not apply to food intended for immediate consumption which is prepared and sold from food premises and vending vehicles, including restaurants, take away outlets, caterers, or self-catering institutions."*

Section 5 of Standard 1.5.2 then gives examples of how GM labels should look.

5 Peer-reviewed scientific evidence for GM labelling

This section discusses how the Standard compares to evidence in the peer-reviewed scientific literature as well as how the current Standard is being interpreted by FSANZ and whether scientific evidence supports their interpretation of the Standard or supports more extensive labelling. To do this, parts of the current Food Standards Code will be addressed in the order that they appear in Section 4 above, and compared to the peer-reviewed scientific literature.

5.1 Animals fed GM feed

The editorial note written by FSANZ into the Food Standards Code given above says that if an animal is fed GM feed, the meat, milk, cheese and eggs produced from it does not need to be labelled.

It is clear that FSANZ has made this statement in contravention of scientific evidence that these products have been shown to contain GM DNA and/or protein and hence should be labelled. More specifically, a number of studies have now shown that DNA (including GM DNA) can survive digestion and be found in the tissues of animals eating it (Schubbert et al 1997; Einspanier et al 2001; Mazza et al 2005). Moreover, a recent survey of milk on Italian supermarket shelves found GM DNA in over a third of milk samples tested (Agodi et al, 2006). These researchers were able to determine which GM crops the cows had eaten by looking in their milk.

In a recent case in New Zealand, Prof. Jack Heinemann, Professor of Genetics and Molecular Biology of the University of Canterbury, New Zealand, wrote a report for the New Zealand Commerce Commission (NZCC), the NZ version of Australia's ACCC, in response to consumer concerns about GM-free labels on chickens that had been fed GM feed. The advertising used by the chicken company is described in the NZCC's media release, dated 18 November, 2010 as (http://www.scoop.co.nz/stories/BU0911/S00547.htm):

> *"In the advertising, Inghams stated that its chicken products contained "No ... GM ingredients" and "have no added hormones, GM ingredients or artificial colours" when the chickens had been fed soya feed which comprised 13 per cent genetically modified soy. Inghams also stated on its website that "Inghams GM policy is clear. Our poultry contains no GM content and are not genetically modified."*

The Commission engaged Prof Heinemann to research and report on whether animals exposed to feed containing GM material (GM feed) do in fact contain "no GM ingredients". Prof Heinemann used the peer-reviewed scientific literature to write his report. In it, he provides evidence that GM DNA in animal feed that is fed to pigs, cows, fish, chickens and sheep can survive digestion and be found in the parts of the body that are consumed by people. Moreover, he provides evidence that novel proteins in GM crops can be found in animals that have eaten GM crops and that there can be metabolic, physiological and immunological responses or differences in animals that eat these GM crops. A copy of his report is attached as an appendix to this submission.

The report was summarised on the same website as:

> *In his report, a copy of which is available on the Commission's website, Professor Heinemann concluded, "The cumulative strength of the positive detections reviewed …leave me in no reasonable uncertainty that GM plant material can transfer to animals exposed to GM feed in their diets or environment, and that there can be a residual difference in animals or animal-products as a result of exposure to GM feed …" "*

As a result, the NZCC issued a warning to Inghams that it risked breaching the Fair Trading Act with claims that its chickens contained no genetically modified ingredients. The Commerce Commission Director Fair Trading, Andrew Sparrow stated in the NZCC media release (http://www.scoop.co.nz/stories/BU0911/S00547.htm):

> *""To consumers, perception is everything. Someone buying a chicken that is promoted as containing no GM ingredients, would not expect that the chickens had been fed on 13 per cent GM soya feed," said Mr Sparrow.*
>
> *"The message to all food manufacturers is clear – consumers want to be able to make informed choices. Breaches of the Fair Trading Act undermine consumer confidence in your products, so compliance, through honest representations in labelling and advertising, is actually good for business," said Mr Sparrow."*

Inghams didn't even wait for the NZCC to conclude its investigation – it ceased the advertising as soon as the Commission started its investigation.

Finally, even though the GM industry has repeatedly argued that animals fed on GM feed are no different to those fed non-GM feed, its has been patenting GM crops that contradict this stance. In its patent application for a crop currently in front of FSANZ for safety approval, Monsanto not only stated that feeding the GM plant changed the composition (the fat profile) of the tissues of the pigs that ate it, but did so in a way that could not be achieved by simply feeding the same fats to pigs as supplements. In fact, the GM plant was so successful at changing the bodily composition of pigs that Monsanto also applied for a patent on the pigs that ate the crop on the basis that the pig was apparently now an invention of Monsanto (International patent publication number WO 2009/097403 A1). This is an admission from the GM industry that animals fed GM crops are different or special when compared to animals fed non-GM crops and may legitimately be labelled.

Therefore, there is ample evidence that FSANZ has wrongly interpreted the Standard. The editorial note should be removed from the Standard and replaced with a note that produce such as meat, milk, cream, cheese and eggs from animals fed GM crops should be labelled. The European approach to this issue is given in Section 5.5, below.

Recommendation 1 – Animals fed GM feed

All products from animals fed GM feed should be labelled, including meat, milk, cheese and eggs. Labelling them would simply require removing an editorial note placed in the Code by FSANZ that reads: "This definition does not include a food derived from an animal or other organism which had been fed food produced using gene technology, unless the animal or organism itself is a product of gene technology." and replacing it with: "This definition includes a food derived from an animal or other organism which had been fed food produced using gene technology." While no other change may be required in the Food Standards Code, in order to make the situation clear, Section 4 of Standard 1.5.2 should be changed as described in Recommendation 9.

5.2 Highly refined foods from GM crops

The Food Standards Code states that highly refined food, other than that with altered characteristics, where the effect of the refining process is to remove novel DNA and/or novel protein, does not need to be labelled. FSANZ has interpreted this to repeatedly state in other documents and in the media that highly refined products such as cooking oil, sugars and starches from GM crops contain no DNA or protein and therefore do not need to be labelled, with very few exceptions. One exemption is if a GM plant is designed to produce a different type of oil than normal for that plant (for example if a canola plant was engineered to produce fish oils) then the oil would still need to be labelled. So, how accurate is this view?

Determining if a food ingredient has come from a GM crop generally uses one of two approaches – looking for the DNA that has been inserted to make the plant genetically modified, or looking for the protein that the plant has been designed to make as a result. Finding DNA or protein in refined foods depends very much on how refined the product is, the methods used to refine it and the food being tested (Gryson, 2010). Refining generally involves purification steps that denature proteins and fragment DNA, while food processing may involve mechanical stress, heating, pH variations and fermentation that may degrade or remove DNA from the sample (Gryson, 2010). Generally, DNA is more robust at surviving such processing conditions than protein.

5.2.1 Oil from GM crops

Even though protein can denature more easily than DNA and is therefore more difficult to pick up, it has been known for decades that there is a small amount of protein in vegetable oils. For example, numerous editions of the "bible" of food composition, McCance and Widdowson, have stated that oils contain a small amount of protein, including a recent supplement listing 18 different vegetable oils (Chan et al, 1994). Others have confirmed that this specifically includes oils on supermarket shelves (Moneret-Vaurtrin et al, 1998). Even FSANZ's own safety assessment of a GM canola variety shows there to be a small amount of protein in the oil (FSANZ, 2000). Yet, FSANZ has still concluded that there is no protein in the oil from that crop (FSANZ, 2000), and that oils do not contain protein, particularly novel protein. Since both the GM crop industry and FSANZ have long argued that GM protein behaves the same as "ordinary" protein, they have also argued, *ipso facto,* that oil from GM canola contains GM protein and must be labelled.

Moreover, FSANZ has also concluded, by referring to documents given to it by Monsanto that even if there were some protein in oil, there is not enough to cause any health effects, such as allergic reactions. In doing so, FSANZ has managed to miss a significant body of scientific literature and clinical knowledge. For example, in one published oral provocation test, 22% of patients allergic to peanuts reacted to peanut oil (Moneret-Vautrin et al, 1998). In another peer-reviewed study, various manufacturer's brands of refined, bleached and deoderised oils from almonds, peanuts and walnuts had enough of the allergenic proteins left in them to show immunoreactivity with sera from patients with significant nut or peanut allergies (Teuber et al, 1997). There are also published, clear cases of infants aged two weeks to three months showing allergic reactions from consuming peanut oil in milk formulae (Moneret-Vautrin et al 1994). Finally, a number of neonatal units recommend not even putting products containing peanut oil in the skin of babies in order to prevent a possible allergic reaction.

DNA is more robust at being able to survive food processing conditions than protein, so it provides for a better method of determining whether oil has come from a GM crop (Costa et al, 2010; Bogani et al 2009).

There is a significant body of literature describing the relative ease of finding DNA in virgin olive oil, largely because the oil is mechanically processed and often doesn't undergo further refining (see Costa et al 2010 for review). Indeed, DNA tests on olive oil have been used to determine whether oil marketed as olive oil is in fact olive oil or an alternative, cheaper, mis-labelled oil (Costa et al 2010). However, oil from the main genetically engineered crops (cotton, canola, soy and corn) tends to be more highly refined. The GM industry and FSANZ have long argued that this precessing removes all DNA from the oil.

However, it has been known for a decade that there is a small amount of DNA in canola oil (Hellebrand et al, 1998). More recently, Costa et al (2010) investigated whether DNA in general, and GM DNA more specifically, could be found during and after commercially refining soy bean oil. Oil from soybeans constitutes a high proportion of oil in the human food supply, being 30% of all oil consumed in 2007 (Costa et al 2010).

Commercial methods of chemically refining soybean oil involve a number of steps using methods that can significantly affect the quality and quantity of DNA remaining. First, the seeds are cleaned, cracked, laminated, extruded and the oil extracted with hexane. The oil is then degummed using phosphoric acid, neutralised using concentrated sodium hydroxide, washed to remove the formed soaps, bleached using activated carbon or clays, and then deoderised using steam at reduced pressure. Even so, DNA could be detected after every step of the process, while GM DNA that identified the oil as coming from a particular type of GM soy bean was found at all steps of the process except for some intermediate steps during oil refining, possibly due to sample instability during those stages. Significantly, GM DNA could be detected in the final product destined for supermarket shelves (Costa et al, 2010).

Using a different GM DNA detecting technique, Bogani et al (2009) also found GM DNA from GM soy beans at every stage of the industrial soybean processing chain, including crude and degummed oil.

The methods used to find GM DNA are important in order to prevent false negative results in oils and other foods. First, the food matrix generally includes inhibitors of the testing process such as proteins, fats, polysaccharides, polyphenols and phenols (see Bogani et al 2009 or Gryson, 2010 for reviews). For example, polyphenols can irreversibly bind to DNA and reduce the yield and purity of extracted DNA (Gryson et al 2007) while other compounds may inhibit the polymerase enzyme often used for GM DNA testing (Margarit et al, 2006). Dealing with them can be crucially important in being able to detect DNA that is present in the foodstuff (Gryson, 2010). Methods are available to deal with some of these, such as the Wizard® method (Bogani et al, 2009; Costa et al, 2010; Smith and Maxwell, 2007), that, if not used, may cause a false-negative result. Moreover, some extraction methods are better suited to some processed foods than others, so that a particular methods should be chosen on a case-by-case basis (Gryson, 2010).

Second, refining generally causes some degradation of DNA, resulting in shorter fragments of DNA. Not only are shorter fragments more stable than longer fragments (Gryson, 2010), but primers are required that can pick-up and amplify these shorter sections. Using primers that only look for longer fragments may produce a false-negative result. Bogani et al (2009) recommend looking for fragments of 188, 195 and 470 base pairs (bp) when looking for GM soy in processed products, while Gryson (2010), in a substantial review of methods for detecting GM DNA in a variety of processed foods, recommends looking for a maximum of only 150 bp.

Third, the quantity of material tested may be quite important. DNA is a contaminant of the oil that remains after the oil is refined. If only a tiny oil sample is taken for testing, there may be too little DNA present to be picked-up. While Bogani et al (2009) required only ½ ml to be able to find GM DNA in crude and degummed oils, Costa et al (2010) used 200ml to find GM DNA in more refined oil

samples. Costa et al (2010) also first spun the oil at high speed to isolate the impurities (including DNA) from the oil and then using the Nucleospin® method, which separated contaminants from nucleic acids by spinning them through a membrane that trapped the nucleic acids (Nucleospin User Manual, 2002). The volume of oil used by Zhang et al (2007) was not given and may have been too small to find GM DNA in refined soybean oil and soybean salad oil. However, the volume used was enough to find GM DNA in crude soybean oil.

When these are not done, authors that report GM DNA in less refined foodstuffs tend not to find it in oil from GM crops (Margarit et al, 2006).

Note that commercial GM DNA laboratories offer a service for finding GM DNA in oils including from canola, corn and soy. Genetic ID, a US-based company is one that does so (http://www.ifoam.org/about_ifoam/membership/pdfs/Client_Ordering_Instructions.pd).

5.2.2 Highly processed flour

Corbisier et al (2005) took soy flour with a 1% GM content (which would trigger a GM label in many countries) and processed it by mixing it with water to turn it into a slurry and then mixing it at varying velocities and heating it at varying temperatures to mimic food production processes. They not only found GM DNA at the end of the process in all samples, but determined that the end products contained 1% GM material, even though the DNA was quite highly degraded in some samples. In fact, rather than finding it difficult to find GM DNA, they found that care was needed with more highly degraded samples to prevent more than 1% GM material being recorded at the end.

Corn flour is produced using a dry milling process in which the whole kernel (often without the germ) is finely ground using a mechanical process (Smith and Maxwell, 2007). After this process, DNA can be found in as little as 200mg of corn flour (Smith and Maxwell, 2007).

5.2.3 Starch from GM crops

Cornstarch is produced from the corn kernel using a wet milling process in which the kernels are soaked in a weakly acidic solution and then ground to a slurry before the starch granules are separated from the other components. Even after this process, which is designed to separate the starch granules from the other cellular material, quantifiable DNA can be found using the Wizard® method in only 200mg of cornstarch (Smith and Maxwell, 2007).

Meanwhile, Bogani et al (2009) found GM DNA from GM soy in crude flour and proteic flour, even though the DNA from proteic flour was highly degraded with an average fragment size below 500bp.

5.2.4 Sugars from GM crops

Similar to oil, there is a small amount of protein in sugars. McCance and Widdowson (Chan et al, 1994), the "bible" of food composition, shows that the amount of protein in sugar reduces as it is more highly refined, from 1.2% protein in black treacle, to 0.5% in Demerara sugar to 0.1% in brown sugar to a trace in white sugar. Of the 11 different types of sugars recorded in this reference book, only three contained no measurable protein. Since both the GM crop industry and FSANZ have long argued that GM protein behaves the same as "ordinary" protein, they have also argued, *ipso facto,* that sugars from GM crops contain GM protein and must be labelled.

DNA has also been found in sugar destined for chocolate (Gryson et al, 2007) and in corn syrup (Margarit et al, 2006). Since both the GM crop industry and FSANZ have long argued that GM DNA behaves the same as "ordinary" DNA, they have also argued, *ipso facto,* that sugars from GM crops contain GM DNA and must be labelled. Note that GM DNA laboratories offer a service for finding GM DNA in corn syrup. Genetic ID, a US-based company is one that does so (http://www.ifoam.org/about_ifoam/membership/pdfs/Client_Ordering_Instructions.pd).

5.2.5 Lecithin from GM crops

Lecithin is commonly used in food as an emulsifier and lubricant and soybeans are a major source of food-grade lecithin. It is usually obtained from degummed soy oil (Bogani et al 2009).

Gryson et al (2007) found DNA in lecithin while Bogani et al (2009) found GM DNA in lecithin from GM soybeans. The latter authors also found that DNA was degraded in the process to about that present in soy oil due to repeated thermal and chemical treatments.

Zhang et al (2007) also found GM DNA in lecithin from soy using a different GM DNA detection method (triplex nested PCR).

Lecithin is commonly used in chocolate, where the presence of polyphenols from the cocoa component of the chocolate can seriously impede the test for GM DNA in the lecithin by reducing the yield and purity of the DNA (Gryson et al 2007). The low levels of lecithin in the chocolate, at around 0.5%, can also be problematic (Gryson et al 2007). Together, they can make it difficult to find GM DNA from the lecithin in chocolate when it is present. Again, the method of extraction, sample size and PCR method are important in being able to find GM DNA (Gryson et al 2007).

Note that GM DNA laboratories offer a service for finding GM DNA in lecithin. Genetic ID, a US-based company is one that does so (http://www.ifoam.org/about_ifoam/membership/pdfs/Client_Ordering_Instructions.pd).

5.2.6 Other processed foodstuffs

GM DNA has been found in soy protein powder, chocolate beverage (probably from lecithin from GM soy) and infant rice cereal (Zhang et al, 2007) as well as soymilk, corn chips, tortillas, taco shells, tofu, miso, irradiated foods and sonicated foods (Gryson, 2010).

5.2.7 Honey from bees browsing on GM crops

Honey contains 0.4% protein (Chan et al, 1994). As the protein in honey is generally obtained from pollen from foraged plants, this protein is likely to contain GM protein and GM DNA. This was confirmed in 2009 when Greenpeace took three samples of honey from beehives placed near a GM canola crop in Australia. DNA testing showed that two of the samples contained GM DNA (ABC, 2009; Morton, 2009). Therefore, according to the Food Standards Code, honey from bees that have foraged on GM crops should be labelled.

Recommendation 2 – Highly refined food

All foods containing ingredients that have come from a GM crop should be labelled as they are in the European Union. This includes oil, starches, sugars and lecithin from GM crops. Honey from bees that have foraged in GM crops should also be labelled. The Food Standards Code currently requires all foods containing DNA and protein from a GM organism to be labelled as being GM. Labelling these foods therefore requires little change to the Food Standards Code. It mostly requires the Review Panel to inform FSANZ not to wrongly interpret the Code and for the Review Panel and FSANZ to inform the food industry that the Food Standards Code requires all foods from GM crops such as oil, starches, sugars and lecithin to be labelled.

5.3 Processing aids, food additives and flavours

Unfortunately, there was not enough time to specifically review the peer-reviewed scientific literature to determine if there is GM DNA or protein in these products. However, this submission does present evidence that refined food from GM crops does contain GM DNA and protein as a contaminant of the final product. It is therefore highly likely that processing aids and food additives from GM organisms should also contain GM DNA and protein as part of the final product as they would also only be refined to food grade standards rather than analytical reagent grade standards.

Recommendation 3 – Processing aids, food additives and flavours

All processing aids, food additives and flavours from GM organisms should be labelled.

5.4 Current and future GM testing methods

Determining if a food ingredient has come from a GM crop generally uses one of two approaches – looking for the DNA that has been inserted to make the plant genetically modified, or looking for the protein that the plant has been designed to make as a result.

The most common currently-used protein-based assays are immunoassays. They are a currently used mostly as convenient, low-cost and effective screening tools for the farming industry. For example, a farmer may use this method to determine the amount of GM contamination in his apparent non-GM crop, or a grain bulk-handler may test for the amount of GM contamination in a silo of pooled grain, or a buyer of grain may test for the amount of GM material in the grain before processing it into flour. Recent advances have allowed these tests to become truly quick (3-5 minutes per test) cheap (a few cents a test – see for example: http://www.sdix.com/agriculture.htm), portable and able to be used by almost anyone, which has allowed them to move from the laboratory into farmer's fields, bulk handling sites, storage sites and factories (Holst-Jensen, 2009). The usual method is to use lateral flow strips that look a little like a pregnancy test kit or a urine dipstick (as used by diabetics to test for glucose and ketone bodies in the urine). They can be quite accurate. The test for the Roundup Ready protein for example is sensitive to 0.5% GM contamination in non-GM grain. They can be bought on-line from a number of manufacturers and they contain instructions on how to use them. Meanwhile, the US Department of Agriculture has developed protocols of how many times to test bulk containers such as trucks full of grain to obtain an accurate assessment of the level of contamination throughout the whole truck-load. These tests are therefore playing a significant role in traceability management for food manufacturers for GM labelling requirements. Farmers can and do test their crops with these methods to show that they are GM free, as can bulk handlers and food manufacturers before the crops are processed into food. They are currently being used in this way in Australia. Food manufacturers

can therefore obtain GM-free materials for their products using a well-established, cheap and effective identity preservation system and provide evidence to any GM label policing entity that if GM material is found in their final product, that it was inadvertent.

DNA methods are usually used by global food traders, the food processing industry and law enforcement authorities (Holst-Jensen, 2009). They are more specific and sensitive than protein-based assays and are more suitable to processed foods. The most common, currently-used methods for GM DNA testing are agarose gel electrophoresis, UV spectrometry, conventional polymerase chain reaction (PCR) and real-time PCR (Gryson, 2010). However, methods of finding GM DNA and protein in foods are improving constantly, particularly as a result of the European Union's labelling requirements of GM foods, which appear to have stimulated considerable development of newer, more sensitive and more accurate methods. There has even been a recent issue of the journal "Analytical and Bioanalytical Chemistry" devoted entirely to the issue of these newer methods, which include microarrays for GM screening which offer high-throughput and even simultaneous detection methods, and digital PCR techniques (Emons, 2010). High throughput methods are currently finding their way to routine laboratories and are based on combinations of one or several oligoplex PCRs followed by multiplex (pooled) identification of the amplified DNA, or apply multiple simultaneous PCRs (Holst-Jensen, 2009). Not only should these methods improve the accuracy of the tests, but, when combined with increasing automation in these laboratories, they should also reduce the cost of DNA testing. Future technologies are expected to be faster, cheaper and allow for both multiplexing and quantitation (Holst-Jensen, 2009).

5.5 How GM food and feed are regulated in Europe

Regulation (EC) 1829/2003 on GM food and feed regulates the placing on the market of food and feed products containing or consisting of GMOs and also provides for the labelling of such products to the final consumer (Scipioni et al, 2005). Business operators have to request an authorisation to use a GMO in food or feed and the products authorised need to be entered into a public register of GM food and feed (Scipioni et al, 2005).

Regulation (EC) 1830/2003 on traceability and labelling of GMOs and the traceability of food and feed products from GMOs requires business owners to transmit and retain information about products that contain or are produced from GMOs at every stage of placing the product on the market (Scipioni et al, 2005). Operators need to have a traceability management in place to identify to whom and from whom products are made available (Scipioni et al, 2005). This regulation also stipulates that all of the following must be labelled: human food and animal feed containing or consisting of GMOs, food and feed produced from GMOs, and food and feed containing ingredients produced from GMOs. That is, all GMOs must be able to be traced throughout the food chain. This includes highly refined substances from GMOs such as oils, sugars, starches, lecithin, etc. The regulation aims to not only inform consumers, but to monitor and check information given on labels, monitor the effects on the environment, to provide a means of surveillance for any potential effects on human or animal health and to withdraw any GMOs which are found to be potentially dangerous for human or animal health. Animal feed has the same protection as human food. In order to facilitate the traceability of GMOs, the Regulation requires operators to transmit the following in writing: an indication that the products consist or contain GMOs and the unique alphanumerical identifiers assigned to the GMOs contained in the products. Note that the EU has a system for developing and assigning unique identifiers for individual GMOs.
(http://europa.eu/legislation_summaries/environment/nature_and_biodiversity/l21170_en.htm).

Member States also inspect and monitor products, including sampling and qualitative and quantitative analyses of food and feed, something that rarely happens in Australia. Member States are able to detain a product that does not meet the conditions laid down in the Regulation

(http://europa.eu/legislation_summaries/environment/nature_and_biodiversity/l21170_en.htm).

Some scientists have also developed methods to assure the absence of GMOs in food products to comply with labelling requirements, based on Hazard Analysis and Critical Control Points (HACCP) and Failure Mode and Effect Analysis (FMEA) methods that are already used in the food industry for other reasons (Scipitoni et al, 2005).

Because all animal feed from GMOs is labelled in the EU, it allows for future labelling of all meat, milk, cheese, cream and eggs from animals fed GM feed. The EU appears to be moving in this direction, with news on 5 May 2010, that Members of the European Parliament voted almost unanimously in favour of introducing compulsory labelling of meat from animals fed on GM feed (http://www.theecologist.org/News/news_round_up/478435/eu_votes_for_labels_on_nano_cloned_and_gm_food.html). Meanwhile, retailers in Europe, the UK and Ireland are using the traceability and labelling of animal feed to place what are in essence, non-GM labels on produce from non-GM-fed animals. For example, Tesco, Sainsburys, Marks & Spencer and Budgen stores all have quality labels for meat and dairy produce from livestock fed on certified GM-free animal feed, while Marks & Spencer state that: "All...[our]... fresh meat and poultry, salmon, shell eggs and fresh milk comes from animals fed on a non-GM diet." (For details, see the appendix).

Recommendation 4 – How GM food and feed should be regulated

Food and feed should be regulated in Australian much as they are in the EC by regulations (EC) 1829/2003 and (EC) 1830/2003. This should be done in order not only to inform consumers, but to monitor and check information given on labels, to trace GMOs through the food chain, to monitor the effects on the environment, to provide a means of surveillance for any potential effects on human or animal health and to withdraw any GMOs which are found to be potentially dangerous for human or animal health.

5.6 Unintentional presence

Recommendation 5 – Unintentional presence

The current standards for unintentional presence should remain. The discussion around this point is given below in Section 6.1.

5.7 Point of sale labelling

Recommendation 6 – Point of sale labelling

If there is any move to have food from premises such as bakeries, restaurants and takeaways labelled for nutrient content, then labelling should be extended to GM ingredients.

5.8 Labelling of crops produced using RNA technologies

Less than ten years ago, a surprise observation by plant scientists while genetically modifying plants led to a whole new area of genetic modification that has already arrived in our food supply in potatoes and papayas (Eamens, 2008). The GM industry has long relied on the Central Dogma that a piece of

DNA is transcribed into a section of RNA (ribonucleic acid) which then gets translated into a single protein, in order to make claims about the safety of its crops. However, RNA technologies rely on the fact that some sections of RNA do not produce proteins, but instead interact with DNA to silence sections of that DNA. Variously called sRNA, dsRNA, siRNA, miRNA, RNAi or hpRNA, the aim is to use RNA to silence DNA (genes) in the GM plant or to silence genes in viruses and insects that attack the plant. Applications include producing designer flower colours, making medical compounds in plants, changing metabolic pathways in plants, and protecting the plant from viral or insect attack (Eamens, 2008; Trivedi, 2010). As there is considerable interest in these techniques from agrochemical companies (Trivedi, 2010), it can only be concluded that these types of GM crops will become a larger part of the Australian food supply. The main safety concern with these crops is that the RNA may not just silence the section of DNA that it is designed to silence, but that it may also silence sections of DNA in people or animals that eat them (Trivedi, 2010), particularly as the GM industry has already stated that "Numerous endogenous plant small RNAs were found to have perfect complementarity to human genes as well as those of other mammals." (Ivashuta et al, 2009), indicating that RNA designed to silence genes in plants may also silence genes in animals and humans.

Note that the GM industry has long relied upon statements about the safety of GM crops that involves the following argument: GM DNA is no different to "normal" DNA and is completely digested in the gut and cannot transfer to the tissues of the body to cause harm. Yet this new approach by the GM industry using RNA relies upon these statements being wrong. That is, these techniques rely on RNA (which has a structure very similar to DNA) being eaten by an insect, surviving digestion, entering the tissues of the insect and then silencing genes in those tissues. In fact, it appears that these RNA techniques are now being used by the GM crop industry **because** nucleic acids such as RNA and DNA are so successful at surviving digestion, being taken up by the tissues of the recipient organism and acting on the host. The method has now been patented. It should be noted that dsRNA, when injected into one part of the body of an invertebrate, can also affect other parts of the body, either through transfer of the RNA inside the body, or by long-distance silencing of genes distant from the site of uptake.

As most of these crops still rely on altering DNA in order to make these various forms of RNA, they should still be covered by the current Food Standards Code for labelling purposes. However, the finding that simply spraying dsRNA onto insect's food can be enough to kill them (Trivedi, 2010) has led to the concern that these forms of RNA may not need to be genetically incorporated into plants using GM techniques, but instead may be able to be sprayed onto crops or soil, or incorporated into vehicles similar to snail pellets to scatter near crops. Indeed, one company is already preparing for field tests of a spray targeting the Colorado potato beetle (Trivedi, 2010). The Food Standards Code should therefore be changed to include reference to RNA, as shown in Recommendation 9.

There are also concerns about how to monitor foods containing these forms of RNA as they to some extent preclude the use of protein, or PCR-based GM detection methods (Holst-Jensen, 2009). Possible alternatives to cope with these include genomic microarrays, DNA sequencing approaches, electrochemical sensors and mass spectrometry (Holst-Jensen, 2009). These foods should not be permitted into the food supply until good quality methods are available to detect and monitor them.

Recommendation 7 – RNA crops

The Food standards Code should be changed to incorporate reference to RNA as described in Recommendation 9. Foods using RNA technologies should not be introduced into the Australian food supply until adequate detection tests have been established.

5.9 Label appearance

Recommendation 8 – How labels should look

The food industry appears to be concerned about the size of the panel used to describe the ingredients in foods. Currently, the words "genetically modified" are required after each GM ingredient. These could be removed and replaced by the commonly-accepted abbreviation "GM" in order to save room.

An example of how labels for meat from animals fed GM feed could appear is, using the example of chicken: "Ingredients: chicken (fed GM feed)". An example of how milk, eggs, cheese etc from animals fed GM feed could appear is: "..from animals fed GM feed". An example of how processed goods could appear is, using the example of beef sausages: "Ingredients: beef (fed GM feed), wheat flour, soy (GM)".

5.10 How the above recommendations should appear in the Food Standards Code

Recommendation 9 – How the above recommendations should appear in the Food Standards Code

Section 4 (1) of the Food Standards Code should be changed to:

> **genetically modified food** means food that is, or contains as an ingredient, including a processing aid, a food produced using gene technology which –
>
> (a) contains novel DNA and/or novel RNA and/or novel protein; or
> (b) has had genes silenced or removed using gene technology; or
> (c) has altered characteristics;
>
> including –
>
> (d) highly refined food obtained from a genetically modified organism;
> (e) a processing aid or food additive from a genetically modified organism;
> (f) flavours obtained using a genetically modified organism;
> (g) products (including meat, milk, cream, cheese and eggs) from animals fed genetically modified organisms;
> (h) products from bees foraged on genetically modified organisms or fed genetically modified organisms;
>
> but does not include –
>
> (i) a food, ingredient, or processing aid in which genetically modified food is unintentionally present in a quantity of no more than 10g/kg per ingredient.

6 How GM food labelling is policed

6.1 Policing the Standard and the 1% limit

Because foods that are "unintentionally" contaminated by up to 1% per ingredient can escape a GM label, many food manufacturers believe that they do not need to label a GM ingredient if it is present at less than 1%. However, FSANZ has been clear that this exemption only applies "where the manufacturer has actively sought to avoid GM ingredients but GM material is inadvertently present" and that "the food manufacturer needs to be able to demonstrate that they have sought to source non-GM food for their product. Such measures include document verification, identity preservation systems or batch testing, presumably using either GM protein or GM DNA detection methods. However if testing shows a GM ingredient is present, labelling is required regardless of whether the level is below 1 percent." (FSANZ, 2005)

There appears to be a move by the GM industry and its supporters to argue that it is not possible to monitor for GM content in food because the GM testing laboratory in Australia has not been accredited for the test by NATA (National Association of Testing Authorities) and/or the GM testing procedure is not accurate enough. Their argument appears to be that if one cannot enforce the labelling laws in court, then there is no point in having GM labelling laws at all. The real situation is this. The only laboratory in Australia that has NATA accreditation to conduct GM testing is DTS (Dairy Technical Services Ltd.) in Victoria. DTS is a 56-year old company which took over AssureQuality's GM testing service when it merged with AssureQuality. The company has NATA accreditation for a qualitative test (which determines if GM material is or is not present in the foodstuff). They do not have NATA accreditation for the quantitative test (which gives the percentage of GM material in the foodstuff). No-one in Australia has, because NATA first needed to determine how to accredit a test that it had never had to accredit before. NATA has now determined what is required and DTS is in the process of gaining that accreditation. However, the DTS laboratory is a licencee/partner of Eurofins GeneScan, an international company with six locations word-wide, including this laboratory in Australia. Eurofins GeneScan provides the testing kits, methods, protocols, consumables and trains the operators. The qualitative test used can detect only 20 copies of the GM DNA being tested-for. The quantitative test uses a real-time polymerase chain reaction (PCR) system with a limit of quantification of 0.1% for some GMOs and 0.05% for others. This means that the test is more than capable of detecting the 1% GM content limit that triggers labelling regardless of "intention", given that this amount is 10 to 20 times the minimum amount the test can detect. For all these reasons, various managers I spoke to in DTS felt assured that their GM testing procedures were accurate and would stand up to scrutiny in court if that was required in order to police the labelling of Australian foodstuffs.

Moreover, if an Australian GM policing body did not want to use this laboratory, it could use one overseas. Most GM testing laboratories are situated either in Europe or the US and they often receive samples from other countries. Given the current value of the Australian dollar against the Euro and the US dollar, it may be a more cost-effective option anyway. The Australian laboratory was used by FSANZ when it did the only monitoring of the labelling laws it has apparently done, while the Australian Oilseeds Federation used an overseas laboratory when it tested for the percentage of GM contamination in apparent non-GM Australian canola seeds a few years ago.

Furthermore, this needs to be placed in the context of the current labelling laws. As stated above, only foods that are "unintentionally" contaminated by up to 1% per ingredient can escape a GM label. That is, for a food that does not have a GM label on it, if that food is tested and and found to have **any** GM material in it (even below 1%) whether by a qualitative (present/not present) DNA test or a quantitative (percentage present) DNA test, and it can be established that the manufacturer **knew** that

the food contained GM materials by looking at company records for example, then that food needs to be labelled as containing GM material and the manufacturer is in breach of the labelling requirements if he does not do so. However, if that same manufacturer can establish by company records that he bought what he believed to be non-GM materials, then that food does not need to be labelled, unless the food is found to contain over 1% GM material for an ingredient. If the food contains over 1%, it needs to be labelled as containing GM ingredients regardless of company records or intentions. Therefore, for most of these situations, the The NATA-accredited qualitative present/not present test by DTS laboratories is fully capable of being used.

There are two main types of GM DNA testing. Qualitative testing can be used to test for unauthorised GM materials in foods or to certify the purity of identity-preserved material while quantitative (percentage contamination) testing can be used to comply with labelling requirements (Holst-Jensen, 2009). The European Network of GMO Laboratories (ENGL) has prepared a guidance document for GM testing methods to assist testing laboratories to select, compare and validate results, and norms or standard have been published or are under establishment at regional and national levels in may countries (Holst-Jensen, 2009).

The only policing of the labelling laws that FSANZ has ever done involved a small pilot survey in 2003 (FSANZ, 2003). In a study without a suitable sampling rationale, 69 samples of various foodstuffs were taken with only 51 of them tested. Of those tested, 22% of samples were positive for GM DNA. The highest proportion of positive results was for soy milk (42% of samples), corn chips (15%) and tacos (75%). None of them had a GM label. FSANZ asked 36 food companies supplying 53 of the samples about their management systems to determine the GM status of the ingredients. Although only 39% had suitable systems, FSANZ concluded that there was a "high level of industry compliance with the labelling requirements"[i] and that any future survey could just ask manufacturers for documents rather than testing actual food (FSANZ, 2003). The survey results completely contradict this. FSANZ was silent on whether any of the companies with GM content in their food should have been prosecuted for failure to follow requirements for unintentional presence. Yet, assuming random distribution, statistically speaking, four companies should have been prosecuted. FSANZ has done no testing since, even though the proportion of GM material in the food supply has substantially increased since then, so some food manufacturers may now be above the 1% limit, which would trigger a GM label regardless of "intention."

All companies that have a GMO approved by FSANZ to enter the Australian food supply should be required to have reference material for that GMO made available to Australian GM DNA detection laboratories so that those laboratories can measure the amount of that GMO in the Australian food supply, before that GMO receives final approval to enter Australia.

6.2 Negative claims, consumer choice and the story of the sausage

Much of this section has been previously published by this author (Carman, 2008).

There appears to be a move by the GM industry and its supporters to argue that if consumers wish to avoid GM foods, they can do so by relying on foods labelled as "non-GM" or "GM-free" and that therefore, there is no need for foods to be labelled if they contain GM ingredients. This section provides evidence of how this move would remove consumer choice.

The Standard is silent on negative claims on a food label such as "GM free" or "non-GM". FSANZ has instead stated that such claims are subject to provisions regarding false and misleading conduct under various legislation (FSANZ, 2005). The Australian Competition and Consumer Commission (ACCC) and legal advice to the Network of Concerned Farmers both state that GM-free-labelled food must not contain any trace of GM material whatsoever and that under the *Trade Practices Act 1974*

(C'th), the definition of "non" is similar to "no" or "free of" (http://www.non-gm-farmers.com/news_details.asp?ID=1761) Therefore, "GM-free" and "non-GM" labels both mean that GM material must not be in the food and that, in fact, the product needs to have "no contact with novel DNA and/or protein during the production process." (http://www.non-gm-farmers.com/news_details.asp?ID=1761).

An example of how this can work is given by Bean Supreme, a New Zealand (NZ) maker of vegetarian, soy-based sausages. Only one of 12 of its products was found to test positive for GM material and then only at 0.0088%. Yet the NZ Food Safety Authority (NZFSA) referred the case to the Commerce Commission for prosecution. The company was subsequently found to be in breach of the *Fair Trading Act 1986* because it had labelled its sausages as "non-GM". Rather than face legal bills estimated at $63,000 the company pleaded guilty and was fined $4,250 plus costs (http://www/non-gm-farmers.com/news_details.asp?ID=1866; http://www/non-gm-farmers.com/news_details.asp?ID=1873). If the company had not put this claim on its products, it would not have been prosecuted, as it was easily able to demonstrate that it had worked hard to source non-GM ingredients and that the contamination was well below 1%. The role of FSANZ in this prosecution is unknown. While the Standard was determined by FSANZ for both Australia and New Zealand, NZFSA enforces the Standard in New Zealand, but may do so in consultation with FSANZ (http://www.nzfsa.govt.nz/about-us/profile/december-2007/index.htm#P60_4833). It should be noted that Australian law is similar to New Zealand law.

As a result, even though surveys have repeatedly found that a high proportion of consumers do not want to eat GM food, consumers are likely to be denied a choice to source clearly-labelled GM-free food, because food manufacturers are concerned about being fined if tiny amounts of contamination slip through. Meanwhile, by not policing or enforcing the current GM labels, uncaring or unscrupulous manufacturers are getting away with putting unlabelled GM ingredients in their food.

Australia now has a situation where the best way a consumer can choose not to eat GM foods is to use a publication by an activist, NGO organisation (Greenpeace's *The True Food Guide;* http://www.truefood.org.au/guide2.html) rather than via any government service, including anything offered by FSANZ. In writing its Guide, Greenpeace asks for food manufacturer's written policies on using GM ingredients. It has then used the information to establish a traffic light system of GM labelling, accessible via a website or printed leaflet.

Australia therefore has the absurd situation where the government and FSANZ have so failed consumer needs for GM labelling and enforcement that Greenpeace, an NGO activist body with far fewer resources than government, has been taken on a role of government to provide the type of GM labelling system that consumers want.

Recommendation 10 – GM and non-GM labels

Both GM and non-GM labels should remain. There is evidence that if GM labels showing the presence of GM ingredients were dropped in favour of allowing only non-GM labels, consumer choice would be greatly reduced.

7 Unauthorised GM organisms

Only a subset of all GM organisms that have been developed are permitted into the Australian food supply. Qualitative (present/not present) GM DNA testing can be used to determine if they are present in food and food ingredients imported from countries that grow them. If they are present, those foods or food ingredients could then be removed from the food supply. The best place to test for these would be at the border, by the Australian Quarantine inspection Service (AQIS). However, it was revealed at a Senate Estimates Committee hearing several years ago that AQIS will only do this if it is asked to do so by FSANZ, and that FSANZ has never asked AQIS to do so. Consequently, it appears that there may be no monitoring of unauthorised GM organisms in the Australian food supply.

Recommendation 11 – Unauthorised GM organisms

The Australian Quarantine inspection Service (AQIS) should routinely test a proportion of foods entering Australia to determine if unauthorised GMOs are present.

8 Highest-level principles

The Review is required to consider principles that should guide government regulatory intervention.

The highest-level principle at stake is recognised within the very reasons for the establishment of the review. The protection of public health and safety clearly should be considered the highest principle. Enabling consumers to make informed choices is a secondary, but still vitally important principle. These are supposed to be the two top objectives of FSANZ.

Other policy drivers, in particular the commercial demands of industry, are recognised. However, it is clearly the proper role of government to ensure that these other policy drivers are not permitted to displace or relegate the two highest-level principles. Unfortunately, there is a well-recognised risk in governments all over the world, that public policy regulators may become, to some extent, captive to the economic demands of industry. In our view, some food labelling decisions made in Australia in recent years have reflected the reality of that risk and compromised government focus on the two highest-level principles.

It is clear that this has occurred, at least in part, by the process of drafting the definition of genetically modified food in Food Standard 1.5.2, and some specific decisions made by FSANZ over the past decade.

FSANZ has three objectives, in descending order of priority, as described in Section 10(1) of the *Food Standards Australia New Zealand Act 1991* (C'th). They are:

> *(a) the protection of public health and safety;*
> *(b) the provision of adequate information relating to food to enable consumers to make informed choices; and*
> *(c) the prevention of misleading or deceptive conduct.*

The fact that FSANZ does not require any animal or human safety studies to be done on GM crops appears to breach aim (a). By not requiring labelling of purified products like oils from GM organisms or meat, milk and cheese produced from animals fed GM crops, FSANZ has denied consumers the choice they want, in contravention of aim (b). Also, because FSANZ has done essentially no policing of GM foods on supermarket shelves, it allows manufacturers to get away with

putting GM ingredients into foods without labelling, in breach of aims (b) and (c) of its Act. It could therefore be argued that FSANZ is in breach of all three aims of its Act.

Furthermore :

- The definition (in Standard 1.5.2) of genetically modified food assumes by omission and despite a lack of evidence that the only potential problems from GM organisms would necessarily be related to the *intended* effects of genetic engineering.
- FSANZ interprets Standard 1.5.2 to state that the effect of refining foods such as vegetable oil, has removed novel DNA and novel protein. This interpretation has been relied upon to eschew any enforcement of the Standard in respect of these highly refined foods, despite evidence (cited above) that undermines the FSANZ interpretation.
- FSANZ has inserted an editorial note in the Standard which excludes from the definition of genetically modified food, any meat, milk, cheese and eggs from animals that have been fed GM feed. This exclusion must be revisited, based on evidence that these products can contain GM DNA.

It therefore appears that these policy positions have been taken, at least in part, because FSANZ has been captured by, or is at least unduly influenced by, the commercial food industry and has not given sufficient weight to the two highest-level principles referred-to above. Evidence for the undue influence comes from the composition of the Board of FSANZ. Most members of the Board are employed by, or have been employed by, the food industry rather than being employed in medicine, public health, nutrition, food safety or other areas relevant to being primarily concerned with public health and safety.

Recommendation 12 – The FSANZ Board

It is recommended that FSANZ be re-structured so that it and the membership of its Board reflect a public commitment to the two highest-level principles. This would require a Board on which the majority of members are experts in medicine, public health, nutrition or food-borne disease and are independent of commercial food companies.

9 Compliance regime

The Review's Terms of Reference require it to consider principles and approaches to achieve compliance with labelling requirements, and appropriate and consistent enforcement.

Any effective compliance regime must require some schedule of independent testing, to check the veracity of any list of ingredients or other product claims. Independent tests are critical to underpin public confidence in the regime.

However, ascertaining the risks posed by various foodstuff ingredients requires a body of scientific evidence about the effects on human health from each particular ingredient. Some foodstuffs have been had their effects monitored for generations. Some adverse health effects, such as peanut allergies, are well documented. However, other more recent innovations such as GM crops have entered our food supply with little, if any, evidence of their long-term effects.

As of 27 April 2010, 63 GM crops were permitted in the Australian food supply. Not one of them has undergone a long-term animal feeding study to compare the health effects of the GM food to its non-GM equivalent. None have undergone human health testing. The long-term effects on human health are therefore unknown. Although some might take the view that the risk is insignificant or slight, there is insufficient evidence on which a body charged with protecting public health could come to that conclusion about any particular genetically modified food, let alone every GM variety currently available.

It is beyond the scope of this submission to discuss the potential long-term health effects of genetically-modified food, which are discussed elsewhere (Carman, 2004). It is sufficient for present purposes to highlight the lack of evidence that would support any strong conclusions, either positive or negative. Given this lack of data, it is our submission that a compliance regime should reflect the high-level principle that consumers should be enabled to make their own, informed choices about whether to eat these foods or not. The lack of data on potential long-term health effects means that choosing any genetically-modified food represents some level of risk. Consumers should be free to knowingly either take or reject the risks, as they perceive them to be, but they cannot make even this decision if they cannot rely on the veracity of labels.

Section 6.1 described a FSANZ pilot survey in 2003, in which 51 foodstuffs were tested for the presence of GM ingredients, of which 22% had GM content. In the intervening seven years, the proportion of GM material in the food supply has increased considerably, yet to our knowledge, this is the only attempt undertaken to monitor compliance with Standard 1.5.2. Given the as-yet unknown and unquantifiable risks of genetically modified foods, our submission is that the almost complete neglect of labelling compliance monitoring and enforcement over the past decade cannot give consumers any confidence in the compliance regime.

Furthermore, if animal studies later show adverse health effects from eating a particular GM crop, or anecdotal evidence emerges of harm to people from eating these crops, the public would likely demand a proper investigation into the matter. An epidemiological study investigating the effects of the GM food on human health would be one of the most likely consequences as it utilizes one of the most powerful investigative tools available. However, such an investigation will be profoundly difficult without comprehensive labelling of GM crops that is coupled with a compliance regime, as it will otherwise be profoundly difficult to determine who has been eating a given GM crop and who has not. If you don't know who has been eating GM crops, you cannot determine if their illnesses are due to eating GM crops or something else entirely.

Monitoring for compliance with the Food standards Code should be conducted on a national level as many food companies in Australia are national companies that produce their product in one State or Territory and and export it to others. A national compliance body should therefore be established to monitor compliance. This should not be done by FSANZ as I and others have lost trust in FSANZ's ability and willingness to be impartial.

Recommendation 13 – GM testing body and schedule

To reflect the current lack of evidence, and the possibility of future epidemiological investigations, it is recommended that:

- √ All commercially-available manufactured foodstuffs be tested, **at least biennially** for the presence or absence of genetically-modified ingredients, and the results compared against the labelling of the product. Where labels are found to be inaccurate, there should be similar treatment, for enforcement purposes, of both positive and negative claims of GM status.
- √ The schedule of testing be revised on a regular basis to reflect risks that may be identified

from specific GM ingredients, including that based upon any evidence which may emerge in scientific and medical journals.

- √ Monitoring for compliance with the Food standards Code should be conducted on a national level as many food companies in Australia are national companies that produce their product in one State or Territory and and export it to others. A national compliance body should therefore be established to monitor compliance. This should not be done by FSANZ as I and others have lost trust in FSANZ's ability and willingness to be impartial.

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