

**BEFORE THE**

Canterbury Regional  
Council

**IN THE MATTER OF**

the Environment  
Canterbury (Temporary  
Commissioners and  
Improved Water  
Management) Act 2010

**AND**

**IN THE MATTER OF**

Submission and Further  
Submission on the  
Proposed Canterbury Air  
Regional Plan

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**STATEMENT OF EVIDENCE OF NICHOLAS BRIAN PYKE ON BEHALF OF THE  
COMBINED CANTERBURY PROVINCES, FEDERATED FARMERS OF NEW ZEALAND**

Dated 18 September 2015

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## **Qualifications and Experience**

1. My name is Nicholas Brian Pyke. I have a BSc, Post Graduate Diploma in Plant Science and a Masterate in Plant Science from Massey University. I am currently employed as CEO of the Foundation for Arable Research (FAR), based in Templeton and I am on the board of FAR Australia. I am a member of the Advisory Boards for the Lincoln University Seed Research Centre and the Farmers Mill.
2. I have been employed as CEO of FAR for 20 years and have been responsible for all aspects of FAR investments in research and extension for the cropping industry in New Zealand, and more recently Australia over that time to ensure FAR delivers benefits to the cropping industry. This has included research and extension on a range of crops and environmental issues including crop establishment, cultivation, crop residue management, agrichemical use, soil management and soil quality.
3. Prior to being employed by FAR I was a scientist with HortResearch, MAF and Agriculture Canada working primarily on fruit crops but also on pasture fertility and sustainable sphagnum moss management.
4. I am a member of the NZ Institute of Agricultural and Horticultural Science, the NZ Institute of Primary Industry Management, the NZ Royal Society and the NZ Institute of Directors.

## **Code of Conduct**

5. Notwithstanding that this is a Regional Council hearing, I have read the Environment Court Code of Conduct for expert witnesses and agree to comply with it. I confirm that I have not omitted to consider materials or facts known to me that might alter or detract from the opinions I have expressed.

## **Background**

6. The Foundation for Arable Research (FAR) undertook a very comprehensive review of stubble management in New Zealand in 2013 for Environment Canterbury to inform the Air Regional Plan<sup>1</sup>.
7. This review clearly articulated the benefits to crop production from allowing burning of crop residue and identified some of the risks associated with restricting burning. It also identified opportunities to manage stubble in other ways and the potential benefits of other stubble management practices. There are a number of ways of managing stubble, such as baling, incorporation by cultivation, using as a mulch on the soil surface, grazing and burning. New Zealand cropping farmers use the full

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<sup>1</sup> FAR 2013: Review of the role and practices of stubble burning in New Zealand, including alternative options and possible improvements. A report prepared for Canterbury Regional Council. 66 pages.

range of these techniques to effectively manage stubbles within sustainable cropping farm systems. The benefits of other methods of stubble management have resulted in a decline in the areas burnt each year, but stubble burning is still an essential management practice for cropping farmers.

8. The report also recommended that ECan work closely with farmers to determine an appropriate regulatory approach to crop residue burning management and provided valuable information which could very effectively be used to develop a robust air plan for stubble burning.
9. The FAR review identified the Code of Practice for burning.
10. Since the completion of the review FAR has worked with cropping farmers and ECan to develop a Farm Environment Plan for cropping. This plan<sup>2</sup> was released earlier this year and has received significant support from farmers, consultants and the industry. The best way to manage stubble burning is within a Farm Environment Plan and an update of the FAR Farm Environment Plan could very easily address burning.

### **Environmental Benefits from Burning**

11. The FAR review highlights a number of environmental factors in relation to stubble burning. Some key factors which should be considered are:
  - The carbon release from the plant stubble into the atmosphere is very similar for burning vs incorporation. The timeframe of release is different in that it is immediate in a burning scenario.
  - Maintaining the diversity and sustainability of New Zealand cropping rotations.
  - The use of stubble burning reduces the use of synthetic pesticides and therefore the amount of these potentially toxic compounds, some with long residual periods, in the rural environment.
  - Reduced spraying as a result of stubble burning will reduce the concerns of land owners adjacent to rural land. This will be particularly apparent in the Crop Residue Burning Buffer Areas where there may be a significant number of adjacent property owners, a proportion of whom will be non-rural.
  - Reduced fuel usage through reduced cultivation and spraying associated with burning will reduce emissions from fossil fuels.
  - Good stubble burning practices and good cultivation management will result in improved soil quality.

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<sup>2</sup> FAR 2015: Farm Environment Plan.

[http://www.far.org.nz/mm\\_uploads/FEP\\_for\\_Arable\\_Enterprises4.pdf](http://www.far.org.nz/mm_uploads/FEP_for_Arable_Enterprises4.pdf)

[http://www.far.org.nz/mm\\_uploads/Guide\\_to\\_FEP\\_for\\_Arable\\_Enterprises.pdf](http://www.far.org.nz/mm_uploads/Guide_to_FEP_for_Arable_Enterprises.pdf)

## **Chemical Saving**

12. Restrictions to burning will increase agrichemical usage in Canterbury. Some of the chemicals used pose an environmental risk, in particular some of the residual herbicides. Some of the products are broad spectrum and will impact on non-target and beneficial species, such as carabid beetles.
13. Slug baits: The FAR review identified that “Slug pressure and use of slug pellets has increased in UK crops in recent years and it is likely that the ban on stubble burning is a contributory factor. This increased use of slug pellets, combined with wet weather over winter, has resulted in some instances of contamination of freshwater with the molluscicide, metaldehyde, in the UK.”
14. If burning is restricted then it is probable that this will result in increased use of slug baits and an increased risk of contamination of water. The imposition of controlled burning in areas adjacent to towns could increase the risk of fresh water contamination. If slug bait was applied to 20% of the area that was not burned that would result in the use of 135,000kg of a slug bait such as SlugOut and the use of 6750kg of metaldehyde (active ingredient in SlugOut) on farms.
15. In some areas of New Zealand (e.g. Bay of Plenty) use of triazine herbicides has resulted in their detection in freshwater. Restrictions on burning are likely to result in increases in grass weed problems, which will need to be controlled through increased cultivation or increased use of some herbicides which may contaminate waterways.
16. The use of neonicotinoid insecticides is under significant scrutiny worldwide as there is some evidence linking them to bee deaths. In areas where there are grass seed and cereal stubbles that are not burnt then it may be necessary to increase the use of these insecticides to control pests such as Argentine Stem Weevil, particularly given that the biological control currently used has shown signs of failing.

## **Agrichemical Efficacy and Resistance Management**

17. The FAR review noted that the efficacy of a number of herbicides is impaired by the presence of surface straw and that increases in dose rates of up to 90% have been used internationally to get adequate efficacy.
18. A major risk through reduced use of burning is the removal of a major cultural weed control method which reduces the risk of resistance occurring. The FAR review highlighted that “With continuous use there is a high risk of resistance developing to the dominating group of foliage acting herbicides used to control most annual grass weeds, the ‘fops’, ‘dems, and ‘dens’. Hence, it is good practice to adopt a range of modes of action to control annual grass weeds which realistically requires that the straw is burnt where reduced tillage is adopted.” In the case of herbicides these other modes of action would be used as alternates.

19. Internationally a number of weeds are resistant to a number of herbicide groups. If similar resistance evolved in New Zealand, or if these weeds entered New Zealand as a result of a biosecurity breach, reducing the ability to use burning in Crop Residue Burning Buffer Areas could result in these weeds being a significant threat to crop farming. The Crop Residue Burning Buffer Areas could become a reservoir for herbicide resistant weeds which then spread to surrounding areas. In the UK the incidence of herbicide resistant black-grass has increased dramatically, partly due to the removal of burning, with black grass now resistant to a range of herbicide products covering more than one chemical mode of action (Group A, B and C). Black grass is one of the major threats to crop production in the UK and on many farms now dictates the cropping rotations that farmers can use. Herbicide resistance costs the Australian Grains industry in excess of \$200 million per annum.

### **Soil Quality**

20. Restricting burning will result in increased cultivation to prepare a suitable seed bed for many crops. Increased cultivation can be either the depth and soil disturbance of cultivation or the number of passes. A FAR programme of research done in association with the MAF Sustainable Farming Fund (2003-2008) resulted in greater adoption of reduced tillage techniques<sup>3</sup>. The removal of cereal straw residues through baling or burning is an important prerequisite to the establishment of small seeded crops in the New Zealand rotation. Degradation of soil quality will result in greater loss of soil through both wind and water erosion and will also result in increased surface ponding and flooding. Introducing Crop Residue Burning Buffer Areas will increase the risk of flooding, silting and airborne soil erosion in these areas. The drop in soil quality from increased cultivation will be, to some extent, offset by the increased organic matter incorporated into soil.
21. Management of soils in full stubble situations will result in the need for increased investment in machinery to incorporate stubble. This machinery will usually be larger and will increase the damage to soil through both cultivation and compaction.

### **Standing vs Cut stubble**

22. The proposed air plan differentiates between standing and cut stubble. In practice both will always co-exist in a paddock after harvest as the harvester cuts the standing grain at a height above ground level, leaving a combination of cut and standing stubble, which if burnt, will always burn together. If there is a requirement to shorten the length of standing stubble this will result in increased fuel usage in the combine harvester and increased cost to the grower.

### **Crop Residue Burning Buffer Areas**

23. The development of these zones and controls around burning is not strongly

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<sup>3</sup> FAR Focus 2012: Grass 2 Crop. FAR Focus: 5. 56pp.

supported by some of the data available. While modelling of stubble burns did indicate smoke and particulates may be detected up to 6km downwind, the modelling indicated that the particulates would only exceed the World Health Organisation Guidelines for particulates within the paddock being burned.

24. The management of stubble burning in Canterbury, including the Crop Residue Burning Buffer Areas could be effectively managed through a Farm Environment Plan.

### **Increase in Costs**

25. The biggest costs could be the loss of crop diversity in the cropping rotations, since small seeded crops, often high value vegetable seed crops, would be the crops that would carry the highest risks and increased costs if burning was restricted or banned.
26. Any restriction to burning of crop residues is likely to significantly increase input costs for growers. Some cost analysis is provided in the FAR review with burning providing significant cost saving to farmers in the form of reduced cultivation (saving \$50 to \$150/ha for ploughing), reduced herbicide use involving at least one application (at least \$40/ha). The use of burning will also allow reduced use of insecticides, particularly neonicotinoid seed treatments (\$70/ha) and slug treatments (\$100/ha). These savings could be more than \$300/ha where multiple inputs are saved.
27. Thus savings to farmers for the area burnt in Canterbury each year could be as high as \$13.5 million per annum.

### **References:**

FAR 2013: Review of the role and practices of stubble burning in New Zealand, including alternative options and possible improvements. A report prepared for Canterbury Regional Council. 66 pages.

FAR 2015: Farm Environment Plan.

[http://www.far.org.nz/mm\\_uploads/FEP\\_for\\_Arable\\_Enterprises4.pdf](http://www.far.org.nz/mm_uploads/FEP_for_Arable_Enterprises4.pdf)

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