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Appendix D: Examples of advances in technology in Australian agriculture

Submissions to the inquiry provided the following examples of advances in technology that have benefited agriculture in Australia:

- Mechanisation;[1]
- Fertilisers[2] such as superphosphate[3] and nitrogen,[4] and broader plant nutrition;[5]
- Crop rotation[6] and fallowing;[7]
- Nitrogen fixing;[8]
- Animal genetics and breeding;[9]
- Crop protection products such as fungicides, herbicides and insecticides[10]
- Plant genetics and breeding;[11]

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1 University of South Australia, *Submission 7*, p. 1; The Warren Centre for Advanced Engineering, *Submission 43*, p. 2; CSIRO, *Submission 55*, p. 11.

2 CSIRO, *Submission 55*, p. 9.

3 Mr David McKeon, General Manager Advocacy and Policy, Grain Growers Ltd, *Committee Hansard*, Canberra, 22 February 2016, p. 6.

4 ADF-DA, *Submission 65*, p. 5; GRDC, *Submission 87*, p. 9.

5 Warren Centre for Advanced Engineering, *Submission 43*, p. 2; GRDC, *Submission 87*, p. 9.

6 Professor John Hamblin, *Submission 3*, p. 3; Grain Trade Australia, *Submission 21*, p. 3.

7 GRDC, *Submission 87*, p. 8, p. 16.

8 GRDC, *Submission 87*, p. 9.

9 ADF-DA, *Submission 65*, p. 4; CCA-SCA-ALFA, *Submission 84*, p. 7.

10 CropLife Australia, *Submission 50*, p. 4; Bayer CropScience, *Submission 78*, p. 5.

11 The Australian Plant Genomics Facility, *Submission 42*, p. 2; Tasmanian Institute of Agriculture, *Submission 44*, p. 1; ACIAR, *Submission 60*, p. 4.

- Disease resistance;[12]

- Minimum or no tillage;[13]

- Genetically modified crops;[14]

- Integrated management practices[15] and best practice programs;[16]

- Animal monitoring, including oestrus detection, temperature recording, body condition and weight measurements;[17]

- Carcass classification and traceability;[18]

- Animal tracking, using GPS, RFID,[19] and UAVs;[20]

- Controlled traffic farming;[21]

- Precision agriculture;[22]

- Sterile insect technology;[23]

- Remote sensing for yield mapping,[24] soil, water and pasture monitoring and measurement;[25]

- Drone or UAV use for crop assessment,[26] weed detection and tree and vegetable crop analysis,[27] and pest management;[28]

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12 Charles Sturt University, *Submission 17*, p. 4; Department of Primary Industries and Regions South Australia, *Submission 19*, pp. 3-4; GRDC, *Submission 87*, p. 9.

13 Grain Trade Australia, *Submission 21*, p. 3; CropLife Australia, *Submission 50*, p. 6; ATSE, *Submission 56*, p. 4; Ag Institute Australia, *Submission 73*, pp. 5-6.

14 Grain Trade Australia, *Submission 21*, p. 3; AusBiotech, *Submission 33*, p. 2; CropLife Australia, *Submission 50*, p. 2.

15 Southern Farming Systems and the Australian Controlled Traffic Farming Association, *Submission 61*, p. 3; Cotton Australia, *Submission 72*, p. 1.

16 GrowCom, *Submission 67*, p. 3; Cotton Australia, *Submission 72*, p. 1.

17 ADF-DA, *Submission 65*, p. 4; CCA-SCA-ALFA, *Submission 84*, p. 7.

18 Australian Pork Limited; *Submission 70.1*, p. 1.

19 ADF-DA, *Submission 65*, p. 4; CCA-SCA-ALFA, *Submission 84*, p. 7.

20 Australian Centre for Field Robotics, *Submission 94*, p. 4.

21 Southern Farming Systems and the Australian Controlled Traffic Farming Association, *Submission 61*, p. 2; GrowCom, *Submission 67*, p. 3; Australian Sugar Milling Council, *Submission 68*, p. 2.

22 Southern Farming Systems and the Australian Controlled Traffic Farming Association, *Submission 61*, p. 2; The Warren Centre for Advanced Engineering, *Submission 43*, p. 2; Tasmanian Institute of Agriculture, *Submission 44*, p. 1.

23 GrowCom, *Submission 67*, p. 3.

24 Australian Sugar Milling Council, *Submission 68*, p. 2.

25 ADF-DA, *Submission 65*, p. 4.

26 DAWR, *Submission 88*, p. 7; Falcon UAV, *Submission 103*, p. 1; Mr Kim Russell, Chairman, Southern Farming Systems, *Committee Hansard*, Canberra, 22 February 2016, p. 1; Dr Joanne Luck, Research Director, Plant Biosecurity Cooperative Research Centre, *Committee Hansard*, Canberra, 22 February 2016, p. 16.

27 Australian Centre for Field Robotics, *Submission 94*, p. 2.

- Variable rate technology;[29]
- Robotics,[30] including robotic milking[31] and robotic crop monitoring;[32]
- Automation,[33] including harvesting,[34] planting,[35] irrigation[36] and spraying systems,[37] and automated livestock weighing and handling;[38]
- Driverless or GPS guided vehicles;[39] and
- Use of big data.[40]

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28   Department of Primary Industries and Regions South Australia, *Submission 19*, p. 7.

29   Ag Institute Australia, *Submission 73*, p. 6; RIRDC, *Submission 74*, p. 3; Vanderfield Pty Ltd, *Submission 79*, p. 11.

30   Tasmanian Institute of Agriculture, *Submission 44*, p. 1.

31   ADF-DA, *Submission 65*, p. 4

32   University of Sydney, *Submission 40*, p. 4.

33   Tasmanian Institute of Agriculture, *Submission 44*, p. 1.

34   Agromillora Australia, *Submission 38*, p. 2; University of Sydney, *Submission 40*, p. 4; Southern Farming Systems and the Australian Controlled Traffic Farming Association, *Submission 61*, p. 2.

35   Australian Sugar Milling Council, *Submission 68*, p. 2.

36   ADF-DA, *Submission 65*, p. 4; Australian Sugar Milling Council, *Submission 68*, p. 2; CCA-SCA-ALFA, *Submission 84*, p. 7.

37   Australian Sugar Milling Council, *Submission 68*, p. 2.

38   University of Sydney, *Submission 40*, p. 4.

39   Tractor and Machinery Association of Australia, *Submission 54*, p. 2.

40   The majority of submissions to the inquiry discussed the use of big data.