

Land management practice trends in Australia's northern and remote agricultural industries



Introduction

Northern and remote Australia includes 11 Natural Resource Management (NRM) regions in Western Australia, South Australia, the Northern Territory, Queensland and New South Wales (Figure 1). In 2010-11 this area of 596 million hectares, 76 per cent of the Australian continent, contained 3203 grazing (beef cattle/sheep) businesses and 491 broadacre cropping businesses. There were an estimated 646 horticultural businesses in 2009-10; (figures are not available for 2010–11). Wool and meat contributed \$2.5 billion, broadacre cropping and horticulture contributed \$281 million and \$252 million to the gross value of agricultural production in northern and remote Australia in 2010-11, 6.7 per cent of the total gross value of agricultural production in Australia (ABS 2012).

Improving soil condition is important to agricultural productivity and the quality of ecosystem services provided to the community from rural lands. Wind and water erosion, soil carbon rundown and soil acidification processes reduce the land's ability to provide clean air and water and productive soils, protect biodiversity and maintain the resilience of the landscape to climate change, whilst producing food and fibre.

Caring for our Country—the Australian Government's \$2 billion flagship natural resource management initiative—is funding projects in the sustainable farm practices national priority area under the improving management practices and landscape scale conservation targets. These projects provide information to farmers in the broadacre cropping, dairy, horticulture and beef cattle/sheep industries about land management practices that will help improve soil condition and contribute to maintaining a healthy environment.

By 30 May 2012, \$448 million had been approved for projects across Australia to improve soil and biodiversity management practices on farm. On farm practice change is being monitored using the biennial Australian Bureau of Statistics' (ABS) Agricultural Resource Management Survey (ARMS), which surveys 33 000 of Australia's 135 000 agricultural businesses (farmers) with results currently available for 2007–08 and 2009–10. Some data have also been collected via the ABS' Agricultural Census in 2010–11.

Results are reported at the national, state and natural resource management (NRM) region levels (ABS 2009). The numbers reported for 2007–08 and 2009–10 are estimated from a sample of about one-quarter of all agricultural businesses, so the results are subject to sampling error. This is most pronounced for regions with small numbers of agricultural businesses and for questions with lower response rates. Data were not publishable for some practices in some regions. Note that in 2009–10 no horticulture businesses were reported for the Alinytjara Wilurara/ South Australian Arid Lands region.



Figure 1. The location of horticulture, grazing and cropping in natural resource management (NRM) regions northern and remote Australia. Sources: ABARE–BRS (2010a), ABARES–BRS (2010b) (horticulture) and 2005–06 Agricultural census. Note that the area of horticulture has been exaggerated for display.

Industry profiles

According to ABS estimates, the number of grazing (beef cattle/sheep) businesses in northern and remote Australia increased from 3076 to 3203 between 2007–08 and 2010–11, as did the number of broadacre cropping businesses (from 473 to 491). There was an estimated decrease in horticultural businesses from 738 to 646 between 2007–08 and 2009–10.

In 2009–10 the estimated average age of beef cattle/ sheep farmers was 54, with the youngest farmers (51 years old) in the Northern Territory region, and the oldest (58 years) in the Western Australian Rangelands region. On average farmers had been managing their holdings for 20 years and had been farming in their local region or shire for 27 years. Approximately 810 (24 per cent) of beef cattle/sheep businesses had a Landcare group member.

During the same period the average age of broadacre crop farmers was 54, with the youngest farmers

(51 years old) in the Desert Channels region and the oldest (63 years) in the Alinytjara Wilurara/South Australian Arid Lands regions. On average farmers had been managing their holdings for 20 years and had been farming in their local region or shire for 23 years. Approximately 71 (16 per cent) of broadacre cropping businesses had a Landcare group member.

The average age of farmers in horticulture was 49, with the youngest farmers (49 years) in the South West (Queensland) region and the oldest (52 years) in the Western (New South Wales) and Northern Territory regions, although figures were not publishable for 4 of the 9 regions. On average, farmers had been managing their holdings for 13 years, and had been farming in their local region or shire for 15 years; data were only publishable for 5 out of 9 and 6 out of 9 regions respectively. Only 28 horticultural businesses, 4 per cent, reported having a Landcare group member, but for this item, data were only publishable for the Northern Gulf and Northern Territory regions.



a holding.

Land management practices

Project funding provided by Caring for our Country to encourage farmers to better manage ground cover, to test and lime soils regularly and to build soil carbon, has complemented the activities of state agencies, industry and community groups. Data from the ABS 2010–11 agricultural census (which surveyed

Ground Cover Management

Beef cattle/sheep industry - maintaining ground cover

Monitoring ground cover levels in paddocks and using ground cover targets (the desired percentage of soil covered by living or dead vegetation) helps protect the soil from loss through wind and water erosion, whilst helping to build soil carbon. Maintaining good ground cover also improves drought resilience by ensuring pastures can respond quickly to rain.

The estimated proportion of beef cattle/sheep businesses in northern and remote Australia monitoring ground cover levels decreased from 76 per cent in 2007–08 to 11 per cent in 2009–10, decreases may have occurred in all regions; data were not publishable for 6 regions (Figure 2). The percentage of businesses setting ground cover targets decreased from 44 to 15 per cent between 2007–08 and 2010–11, with decreases occurring in most regions with publishable data (Figure 2).

Broadacre cropping industry - tillage practices

all agricultural businesses) and the 2007-08 and

2009-10 ARMS, help track trends in the adoption of

these practices. Note that the percentage of farmers

reporting the use of particular practices can exceed

100 where more than one method (e.g. crop residue

retained in some areas, burnt in others) is used on

Farmers have been encouraged to move to onepass sowing systems to reduce the risk of soil loss through wind and water erosion, lower greenhouse gas emissions and to improve water use efficiency. Figure 3 shows that there has been a decrease from 41 per cent to 34 per cent in the number of broadacre cropping businesses in northern and remote Australia not cultivating apart from sowing when preparing cropping land between 2007-08 and 2010-11. This number has increased in 2 NRM regions (where data were reportable for both time-points), with the greatest increase (from 50 to 86 per cent) in the Alinytjara Wilurara/South Australian Arid Lands region. Significant decreases in the number of broadacre cropping farmers using no cultivation have occurred in the Northern Territory (from 47 to 21 per cent) and South West (Qld) (from 42 to 24 per cent) regions between 2007-08 and 2010-11.

There was an estimated increase from 47 to 78 per cent in the area prepared for crops and pastures without cultivation apart from sowing in northern and remote Australia between 2007–08 and 2009–10 with a decline to 62 per cent in 2010–11 (Figure 4).



Businesses monitoring ground cover levels in paddocks

Businesses with minimum ground cover level targets

Figure 2. The percentage of beef cattle/sheep businesses in northern and remote Australia monitoring ground cover in 2007–08 and 2009–10 (no data for ground cover monitoring were collected in 2010–11), and with targets for minimum ground cover levels in 2007–08, 2009–10 and 2010–11. Data for the number of businesses monitoring ground cover levels in paddocks were not publishable for the Western, Cape York, Desert Channels, South West, Alinytjara Wilurara/South Australian Arid Lands and Western Australian Rangelands regions in 2009–10.



Figure 3

Businesses cultivating three or more times

Businesses cultivating once or twice

Busineses not cultivating (apart from herbicide spraying or sowing)

Figure 3. Percentage of broadacre crop businesses in northern and remote Australia using different cultivation intensities to prepare land between 2007–08 and 2010–11. The 2007–08 numbers include businesses preparing land for pasture. Data for the number of businesses not cultivating were not publishable for the Cape York (2007–08), Desert Channels (2007–08 and 2009–10), Southern Gulf (2009–10) and Alinytjara Wilurara/ South Australian Arid Lands (2009–10) regions. Data for the number of businesses cultivating once or twice were not publishable for the Desert Channels (2009–10) and Southern Gulf (2007–08 and 2009–10) regions. Data for the number of businesses cultivating three or more times were not publishable for the Western (2007–08), Northern Gulf (2009–10), South West (2007–08), Southern Gulf (2007–08 and 2009–10) and Northern Territory (2007–08) regions.



Area not cultivated (apart from herbicide spraying or sowing)
Area cultivated once or twice

Area cultivated three or more times

Figure 4

Figure 4. Percentage of crop area northern and remote Australia prepared by broadacre cropping businesses using different cultivation intensities between 2007–08 and 2010–11. The 2007–08 numbers include areas prepared for pasture. Data for the area not cultivated were not publishable for the Cape York (2007–08), Desert Channels (2007–08 and 2009–10), Southern Gulf (2009–10) and Alinytjara Wilurara/South Australian Arid Lands (2007–08 and 2009–10) regions. Data for the area cultivated once or twice were not publishable for the Desert Channels (2009–10), Northern Gulf (2009–10), Southern Gulf (2007–08 and 2009–10) and Alinytjara Wilurara/South Australian Arid Lands (2009–10), Northern Gulf (2009–10), Southern Gulf (2007–08 and 2009–10) and Alinytjara Wilurara/South Australian Arid Lands (2009–10), Southern Gulf (2007–08 and 2009–10) and Alinytjara Wilurara/South Australian Arid Lands (2009–10), Southern Gulf (2007–08 and 2009–10) and Alinytjara Wilurara/South Australian Arid Lands (2009–10), Southern Gulf (2007–08 and 2009–10) and Alinytjara Wilurara/South Australian Arid Lands (2007–08), Southern Gulf (2007–08 and 2009–10) and Northern Territory(2007–08) regions.

Broadacre cropping industry - Crop residue management

Retaining residues between crops affords protection from soil loss through wind and water erosion, whilst helping to improve soil organic matter (soil carbon). While seasonal factors, such as the incidence of pests, weeds and disease, and heavy stubbles (in wetter years) may affect management, nationally the trend since 1995–96 has been for increases in the numbers of farmers retaining residue, and in the area over which crop residue is retained up until 2009–10, followed by a decline in 2010–11.

Between 2007–08 and 2009–10 there was an estimated increase from 27 to 30 per cent in the number of farmers retaining crop residues in northern and remote Australia, followed by a decline to 28 per cent in 2010–11 (Figure 5). The 4 NRM regions where data were reportable for 3 years showed a similar pattern. The estimated area where crop residue was retained after harvest increased from 51 per cent to 82 per cent in 2009–10, declining to 61 per cent in 2010–11 (Figure 6).

Horticulture industry - maintaining ground cover

Using alternate or cover crops or mulching and/ or matting between the main horticultural plantings helps protect against soil loss from water wind and water erosion. Where organic mulches are used these may also contribute to building soil organic matter. An estimated 15 per cent of all horticulturalists in northern and remote Australia used alternate or cover crops to maintain ground cover levels between their main horticultural plantings in 2009—10, and 35 per cent used mulching and or matting in the same period (Figure 7). Data for the number of businesses using alternate or cover crops were not publishable for 3 of the 8 regions with horticultural businesses, whereas data for the number of businesses using mulching and/ or matting were not publishable for 4 regions.



Businesses leaving crop residue (stubble or trash) intact

Businesses modifying crop residue (stubble or trash)

Businesses removing crop residue (stubble or trash)

Figure 5. Percentage of broadacre cropping businesses in northern and remote Australia using different crop residue management practices between 2007–08 and 2010–11. Data for the number of businesses leaving crop residue intact were not publishable for the Cape York (2009–10), Desert Channels (2009–10) and Alinytjara Wilurara/South Australian Arid Lands (2009–10), South West (2009–10), Southern Gulf (2007–08 and 2009–10) and Alinytjara Wilurara/South Australian Arid Lands (2007–08 and 2009–10), South West (2009–10), Southern Gulf (2007–08 and 2009–10) and Alinytjara Wilurara/South Australian Arid Lands (2007–08 and 2009–10) regions. Data for the number of businesses removing crop residue were not publishable for the Cape York (2007–08 and 2009–10), Desert Channels (2007–08 and 2009–10), South West (2009–10) and Alinytjara Wilurara/South Australian Arid Lands (2007–08 and 2009–10), Desert Channels (2007–08 and 2009–10), South West (2009–10) and Alinytjara Wilurara/South Australian Arid Lands (2007–08 and 2009–10), Desert Channels (2007–08 and 2009–10), South West (2009–10) and Alinytjara Wilurara/South Australian Arid Lands (2007–08 and 2009–10), Desert Channels (2007–08 and 2009–10), South West (2009–10) and Alinytjara Wilurara/South Australian Arid Lands (2007–08 and 2009–10), Desert Channels (2007–08 and 2009–10), South West (2009–10) and Alinytjara Wilurara/South Australian Arid Lands (2007–08 and 2009–10), regions.



Figure 6. Percentage of crop area in northern and remote Australia reported by broadacre cropping businesses with different crop residue management practices between 2007–08 and 2010–11. Data for the area with crop residue left intact were not publishable for the Cape York (2007–08 and 2009–10), Desert Channels (2009–10) and Alinytjara Wilurara/South Australian Arid Lands (2007–08 and 2009–10) regions. Data for the area with crop residue modified were not publishable for the Cape York (2007–08 and 2009–10), Desert Channels (2009–10), South West (2009–10), Southern Gulf (207–08 and 2009–10), Desert Channels (2007–08, Northern Gulf (2009–10), South West (2009–10), Southern Gulf (207–08 and 2009–10) and Alinytjara Wilurara/South Australian Arid Lands (2007–08 and 2009–10) regions. Data for the area with crop residue modified were not publishable for the Cape York (2007–08 and 2009–10), South West (2007–08 and 2009–10), South West (2007–08 and 2009–10), Northern Gulf (2009–10), South West (2009–10) and Alinytjara Wilurara/South Australian Arid Lands (2007–08 and 2009–10), Northern Gulf (2009–10), South West (2009–10) and Alinytjara Wilurara/South Australian Arid Lands (2007–08 and 2009–10), Northern Gulf (2009–10), South West (2009–10) and Alinytjara Wilurara/South Australian Arid Lands (2007–08 and 2009–10), regions.

Figure 6



Managing soil acidity

It is estimated that about 50 per cent of Australia's agricultural land has a surface soil pH less than or equal to 5.5, which is below optimum for extremely acid-sensitive agricultural crops, and below the optimal level to prevent subsoil acidification (National Land and Water Resources Audit 2001). Where soil acidity moves further down the soil profile, damage may be irreparable. Very acid soils are unlikely to support good ground cover, increasing the risk of soil loss through wind and/or water erosion and reducing input to soil carbon. Areas at high risk of soil acidification are where the soil pH is currently low, the soil has a low capacity to buffer against pH decreases, and the dominant (current and/or past) agricultural practices are highly acidifying.

Regular testing of soil pH and applications of lime and/or dolomite can be used to manage surface soil pH in more intensive agricultural industries such as broadacre cropping and horticulture. Testing soil nutrient levels to better match fertiliser applications to crop requirements can also help slow soil acidification.

Broadacre cropping - soil testing and liming

Between 2007–08 and 2009–10, the estimated percentage of broadacre cropping businesses in northern and remote Australia undertaking pH and nutrient testing decreased, from 40 to 25 per cent and from 37 to 25 per cent respectively. There was also an estimated decrease in soil testing for all regions except Cape York, where pH testing increased (Figure 8). The estimated percentage of cropping businesses applying lime and dolomite to their holdings to manage soil acidity increased from 7 to 18 per cent between 2007–08 and 2009–10 (Figure 9).

Horticulture - soil testing and liming

The estimated percentage of horticultural businesses undertaking pH and nutrient testing decreased from 34 to 28 per cent and 31 to 28 per cent respectively between 2007–08 and 2009–10 (Figure 10). Over this period there was an estimated increase (from 16 to 27 per cent) in the percentage of horticultural businesses applying lime or dolomite (Figure 11).



Figure 7

Businesses using alternate or cover crops between crops
Businesses using mulching and/or matting between crops

Figure 7. The percentage of horticultural businesses northern and remote Australia using different methods to maintain ground cover between horticultural plantings in 2009—10. Note that no data are available for 2007—08 or 2010–11. Data for the number of businesses using alternate or cover crops between crops were not publishable for the Western, Cape York and Southern Gulf regions. Data for the number of businesses using mulching and/ or matting between crops were not publishable for the Western, Cape York, Desert Channels and South West regions.



Figure 8. Percentage of broadacre cropping businesses in northern and remote Australia undertaking pH and soil nutrient testing in 2007-08 and 2009-10. Data for the number of businesses undertaking pH testing were not publishable for the Cape York (2007-08 and 2009–10), South West (2007–08 and 2009–10), Southern Gulf (2009–10) and Alinytjara Wilurara/South Australian Arid Lands (2009–10) regions. Data for the number of businesses undertaking nutrient testing were not publishable for the Western (2007–08), Cape York (2007-08 and 2009-10), South West (2007-08 and 2009-10), Southern Gulf (2009-10) and Alinytjara Wilurara/South Australian Arid Lands (2009-10) regions.



Channels

Figure 9

Remote

Businesses applying lime or dolomite

Gulf

Figure 9. Percentage of broadacre cropping businesses in northern and remote Australia applying lime and dolomite to their holdings in 2007–08 and 2009–10. Data for the number of businesses applying lime or dolomite were not publishable for the Western (2007–08 and 2009–10), Cape York (2007–08) and Western Australian Rangelands (2007–08) regions.

(QLD)

Gulf

2009-10

2007-08

(WA)

Wilurara/ SA

Arid Lands

2

2009-

ş

2007-

Northern

Territory

Figure 10



Figure 10. Percentage of horticultural businesses in northern and remote Australia undertaking pH and soil nutrient testing in 2007–08 and 2009-10. Data for the number of businesses undertaking pH testing were not publishable for the Western (2007-08 and 2009-10) and South West (2007-08 and 2009-10) regions. Data for the number of businesses undertaking nutrient testing were not publishable for the Western (2007-08 and 2009-10), Cape York (2007-08) and South West (2007-08) regions.



Businesses applying lime or dolomite

Figure 11. Percentage of horticultural businesses in northern and remote Australia applying lime and dolomite to their holdings in 2007–08 and 2009-10. Data for the number of businesses applying lime or dolomite were not publishable for the Cape York (2009-10), Desert Channels (2009–10), South West (2007–08) and Southern Gulf (2009–10) regions.



Conclusions

The comparatively small number of cropping, grazing and/or horticultural businesses in some natural resource management regions in northern and remote Australia has limited the data published by the ABS for some practices. The available data suggest that there are opportunities to further reduce the number of cultivations undertaken by broadacre cropping

businesses, and that more grazing businesses may need to monitor and manage ground cover levels to slow the rate of soil loss through wind and/or water erosion in northern and remote Australia. Given the extensive and insidious nature of soil acidification, there may also be a need to increase regular testing and where needed, liming of cropping and horticultural soils in some regions.

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