Australian agriculture – dealing with climate change

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Australia's greenhouse gas emissions by sector, 2006



Australia's agricultural GHG emissions profile, 2006



Climate change impacts on agriculture

Warm spells /Heat waves	Very likely
Heavy precipitation	Very likely
Rise in drought affected areas	Likely
Intense tropical cyclones	Likely

- Impacts on agriculture
 - changes in pasture and crop growth
 - increased thermal stress
 - changes in livestock productivity
 - increased expenditure to manage rising incidences of pests and diseases

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climate change – percentage change in Australian agricultural output

relative to the reference case (no adaptation or mitigation)



climate change – percentage change in Australian agricultural exports

relative to the reference case (no adaptation or mitigation)





Adaptation options in agriculture

- improve crop varieties to increase resilience in a changing climate
- alter timing and location of cropping activities
- enhance water use efficiency and storage
- adapt livestock annual production cycle to better match feed production
- change or improve feed concentrates for livestock
- diversify farming activities or increase off farm income

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GM technology – adaptation

- enhanced drought tolerance
 - up to 60% yield increase
- increased resistance to pests and disease
- increased resistance to salinity, heat and frosts
- lower use of herbicide and pesticide sprays

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The Carbon Pollution Reduction Scheme (ETS) – the mechanics

- Set to commence in 2010
- Government sets emissions cap and issues emissions permits equal to the cap
- Covered firms must hold emissions permits equal to level of emissions in each year
- Approximately 1000 companies with emissions greater than 25kt CO₂-eq will need to hold permits

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The Carbon Pollution Reduction Scheme (ETS) – the mechanics

- Auctioning preferred method of initial permit distribution
 - revenues used for R&D and assistance to most strongly affected households or businesses
- Firms compete in the market for the number of permits they need
 - minimises economy wide cost of meeting cap
 - emission permits flow to those that value them most

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Issues in including agriculture in an ETS

- Agriculture initially excluded from the scheme
 - measurement issues
 - no agricultural offsets
- Decision time for agriculture = 2013
- Earliest possible start date = 2015
- Government consulting on:
 - point of obligation: trade off between transaction costs and farm level incentives
 - emissions estimation and reporting



Upstream and downstream liability

Obligation to hold scheme units



Production input

Upstream point of obligation fertiliser distributor



The Farm: source of direct emissions

Production input



Obligation to

hold scheme

units

Downstream point of obligation – eg, dairy, abattoir

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Eligibility for emissions-intensive, trade-exposed (EITE) support

- If agriculture is included in the scheme may be eligible for support
 - provided via free allocation of permits to existing and new EITE firms to cover between 60 – 90% of emissions associated with production and electricity use
 - higher levels of assistance beef and dairy cattle production; sheep; rice production

- lower levels of assistance pig industry
- Support withdrawn in the medium term

average share of emission intensive inputs in total costs

Australia, 2005-06



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impacts of a carbon penalty of \$40/t CO₂-e on agricultural production costs



increase in diesel prices in response to given carbon penalties,

based on emissions intensity of fuel only



impacts of a carbon penalty of \$40/t CO₂-e on agricultural production costs



Mitigation options

- waste management
- improved feed conversion efficiency
- alter fertiliser applications
- carbon sequestration

GM technologies

 lower use of herbicide and pesticide sprays reduces fuel requirements

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- use of conservation tillage on herbicide tolerant plants
- some plants require 50–60% less nitrogen

Concluding comments

- climate change will reduce agricultural productivity
- impacts will differ across regions & countries
- an emissions trading scheme will increase farm costs
- improving productivity is fundamental to adapt to climate change and maintain competitiveness

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