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AGRICULTURAL AND RESOURCE ECONOMICS

Strengthening Producer-Funded Support for Research through Government Matching: Australian Experience and Lessons for the United States

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Symposium organized by the Farm Foundation, USDA-ERS and OECD on
Research and Innovation Policies for Sustainable Productivity Growth in Agriculture
The National Press Club
Washington DC
September 19–20, 2017

Main Points

- **Levy-based funding could be an efficient and equitable way to strengthen funding for some types of applied agricultural R&D at a time when public funding support is waning**
- **Generally not a significant source of funding for R&D (vs marketing) and is underutilized**
- **In Australia has been a major source of funding for agricultural R&D (as well as marketing) for 30+ years**
- **Key provisions contributing to success in Australia**
  - producer control over spending priorities
  - matching government support (1:1 up to 0.5% of levy revenue)
- **Sustainability questions**
  - is matching government support justified, and will it continue?
  - will producers support maintaining or increasing levies?

Main Points

- **High benefit-cost ratios imply persistent underinvestment in spite of government support – why?**
  - levy rates set too low to maximize national benefits—why?
- **Must account for real-world complications to make these programs sustainable (effective, efficient, equitable)**
  - diseconomies of diversity (versus economies of scale and scope)
  - costly processes of levy change
  - supermajority requirements
  - costly information and uncertainty
  - agency problems
- **Evolving issues ⇔ sustainability questions**
  - changing governance rules
  - matching support under threat (always!)
  - marketing versus R&D in organizations engaged in both
  - alternatives/complements (EPRs) add complications

Australia's Rural R&D System

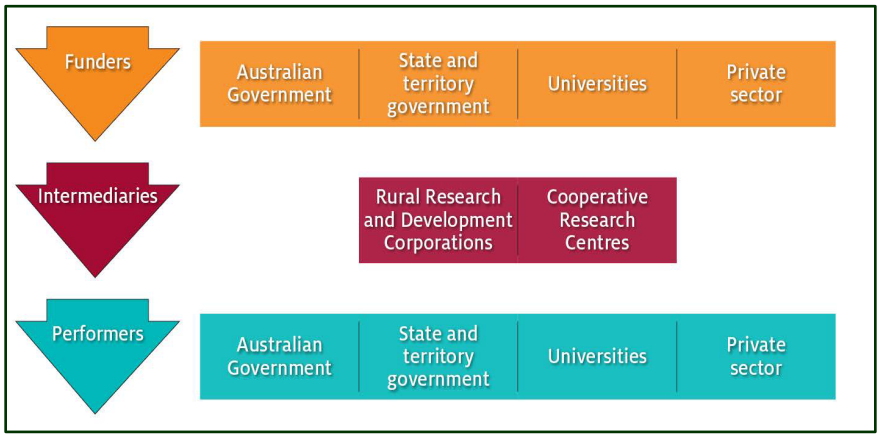
Australian Government
Department of Agriculture and Water Resources
ABARES

Rural research, development and extension investment in Australia

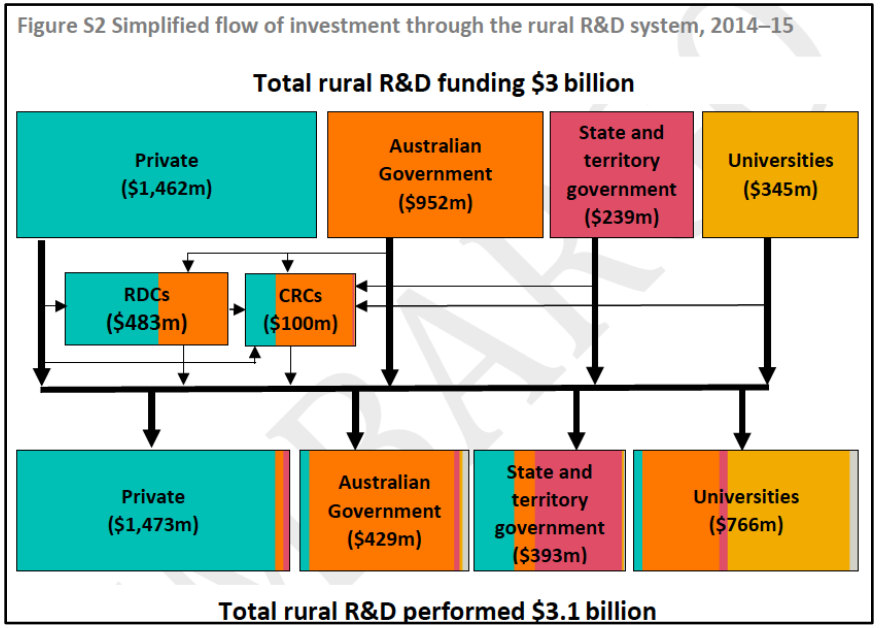
Niki Millist, Will Chancellor and Tom Jackson

Research by the Australian Bureau of Agricultural and Resource Economics and Sciences

Research Report 17.11
September 2017



Source: Millist, N., W. Chancellor, and T. Jackson. *Rural Research, Development and Extension Investment in Australia.* ABARES Research Report, Canberra, September 2017.



Source: Millist, N., W. Chancellor, and T. Jackson. *Rural Research, Development and Extension Investment in Australia.* ABARES Research Report, Canberra, September 2017.

Australia's Rural R&D Corporations

- **R&D Corporation (RDC) model**
  - foundations in 1950s
  - precursor "Councils" introduced in 1985
  - "Corporate" structure introduced in 1989 legislation, with further revisions in 1991
  - some evolution since
- **Key Features**
  - industries could establish levy-based R&D funds
  - committed Commonwealth to provide a dollar-for-dollar matching up to 0.5% of output value
    - some levies exceed 0.5%
    - some matching for voluntary contributions
  - substantial autonomy
  - substantial producer representation
  - created several non-commodity RDCs
    - only one survives!

John Kerin, 1988

The way I saw it; the way it was

The making of national agricultural and natural resource management policy

Jeffrey Clyde, *Carwoola Cottage*, 1981

John C. Kerin

Rural R&D Corporation	Industry Contribution	Government Contribution	Total Expenditure
Statutory RDCs	A$ million in 2014-15		
Grains RDC	**117.6**	**67.9**	**185.4**
Fisheries RDC	7.4	18.7	26.1
Australian Grape and Wine Authority	11.9	12.4	24.2
AgriFutures Australia (was RIRDC)	4.5	12.7	17.2
Cotton RDC	7.3	7.3	14.6
Industry Owned Corporations			
Meat and Livestock Australia Ltd	**55.3**	**42.3**	**97.6**
Horticulture Australia Ltd	**43.1**	**41.0**	**84.1**
Dairy Australia Ltd	25.8	21.4	47.2
Australian Wool Innovation Ltd	19.4	12.5	31.8
Sugar Research Australia Ltd	22.7	6.1	28.7
Australian Meat Processor Corp. Ltd	14.2	0.0	14.2
Australian Pork Ltd	5.2	5.2	10.4
Forest and Wood Products Australia Ltd	2.6	3.3	5.9
Australian Egg Corporation Ltd	2.0	1.8	3.8
Australian Livestock Export Corp. Ltd	0.9	0.0	0.9
Total	***339.8***	***252.7***	***592.6***

Source: Derived from N. Millist, W. Chancellor, and T. Jackson. *Rural Research, Development and Extension Investment in Australia.* ABARES Research Report, Canberra, September 2017.

RDC Spending in Perspective

- **According to Millist et al. (2017) total public funding for agricultural R&D (excluding food R&D) in Australia was about A$1.5 billion in 2014-15**
- **RDCs spent about 40% of that total (A$600 million), financed**
  - a bit over half from levies
  - a bit less than half from the Commonwealth government
- **In spending their share RDCs significantly influence the rest of the public (and private) spending**
- **Issues arise about**
  - the effects on the research agenda
  - whether the rate of matching grant is appropriate
    - fairness?
    - efficiency (crowding in or crowding out? additionality?)

RDC Funding and Expenditure

	1985	1989	1995	2008-09	2014-15
			Millions of Australian Dollars (nominal)		
Industry Contribution	26.5	48.5	102.6	247.6	339.8
Commonwealth Contribution	23.7	68.5	126.2	218.1	252.7
Total Expenditure	*47.5*	*121.2*	*239.2*	*488.2*	*592.6*
			Millions of Australian Dollars (real, 2010 values)		
Total Expenditure	*116.7*	*222.4*	*383.9*	*519.9*	*560.6*

Source: Based on Productivity Commission (2011) and Millist et al. (2017)

Performance Reiews

- **ACIL Tasman (2011)**
  - BCAs for 160 RDC projects undertaken over 2008–2010
  - average BCRs (median BCRs)
    - after 5 years: 5.1 (2.7)
    - after 20 years: 9.2 (4.5)
    - after 30 years: 10.7 (5.0)

- **Productivity Commission (2007, 2011)**
  - reported similar evidence and accepted that BCRs were favorable
  - nevertheless recommended reduced rates of matching support
    - especially for ”industry-focused” RDCs

U.S. Potential for Levy-funded R&D

	2017 Farm Cash Receipts	Industry Contribution @ 0.5%	Government Contribution @ 1:1	Total Funds
	$ billions		*$ millions*	
All commodities	**366.6**	**1,832.8**	**1,832.8**	**3,665.5**
Animals and products	**176.5**	**882.5**	**882.5**	**1,764.9**
Meat animals	89.2	445.9	445.9	891.9
Cattle and calves	**67.6**	**337.9**	**337.9**	**675.8**
Hogs	**21.6**	**108.0**	**108.0**	**216.0**
Dairy products, Milk	38.4	191.8	191.8	383.7
Poultry and eggs	41.9	209.6	209.6	419.2
Broilers	**29.8**	**149.1**	**149.1**	**298.3**
Crops	**190.1**	**950.3**	**950.3**	**1,900.6**
Food grains	11.0	55.0	55.0	109.9
Rice	**2.4**	**11.8**	**11.8**	**23.7**
Wheat	**8.6**	**42.8**	**42.8**	**85.6**
Feed crops	54.6	273.0	273.0	546.1
Corn	**45.8**	**228.8**	**228.8**	**457.5**
Cotton	7.4	37.2	37.2	74.4
Oil crops	42.6	212.8	212.8	425.5
Vegetables and melons	20.4	102.2	102.2	204.4
Fruits and nuts	23.8	118.8	118.8	237.7

California Mandated Marketing Programs

Type of CA Program	Promotion	Research	Total
	$ millions in 2004-05		
Federal Marketing Orders (11)	24.8	3.6	41.6
California Marketing Orders (29)	71.4	13.1	101.1
CA Commodity Commissions (20)	50.7	8.2	75.4
CA Commodity Councils (3)	7.1	0.2	8.6
Total (63)	**154.0**	**25.0**	**226.7**

- **In 2004 applied to 2/3 of total CA farm production value**
  - total farm value of commodities under check-offs: $21 billion
  - total program spending ≈ 1% of this production value
  - research spending ≈ 0.1% of gross value for these commodities

Source: Carman (2007)

Lessons?

Lessons

- **Levy-based funds can provide an efficient and fair source of funding for commodity collective (toll) goods, including certain types of R&D**
- **In practice, around the world (including the United States) levies are used much more extensively for commodity promotion than R&D**
- **Australia's rural RDC system appears to have**
  - significantly enhanced Australia's total agricultural R&D portfolio over the past 30+ years
  - influenced the emphasis within that portfolio
- **Issue of mutual additionality is crucial consideration for both government and producer partners**

Lessons (continued)

- **Real-world levy-based programs involve many features that are often ignored in discussions of how they work:**
  - large transaction costs and institutional inertia
  - information problems
  - supermajority requirements with diverse constituents
  - agency problems
- **Theoretical analysis that allows for these characteristics shows that**
  - levies will tend to be set too low to maximize net social benefits
  - matching government grants can be helpful by
    - encouraging an increase in levy rates
    - adding directly to the available research resources

Some related institutional innovations

Cooperative Research Centers (CRCs)

- **Public-private partnerships, not just for agriculture**
- **Agricultural CRCs typically involved**
  - private firms
  - RDCs
  - CSIRO & universities
  - NGOs
  - Commonwealth and State government departments
- **Focused program of applied research**
  - specific issue (e.g., wheat quality; dryland salinity; weed management)
  - finite horizon (typically 5–7 years; some much longer)
  - typically < $10 million /year (some much greater)
    - core funding from Commonwealth government
    - $2.5 m – $3.5 m per year

End-Point Royalties (EPRs)

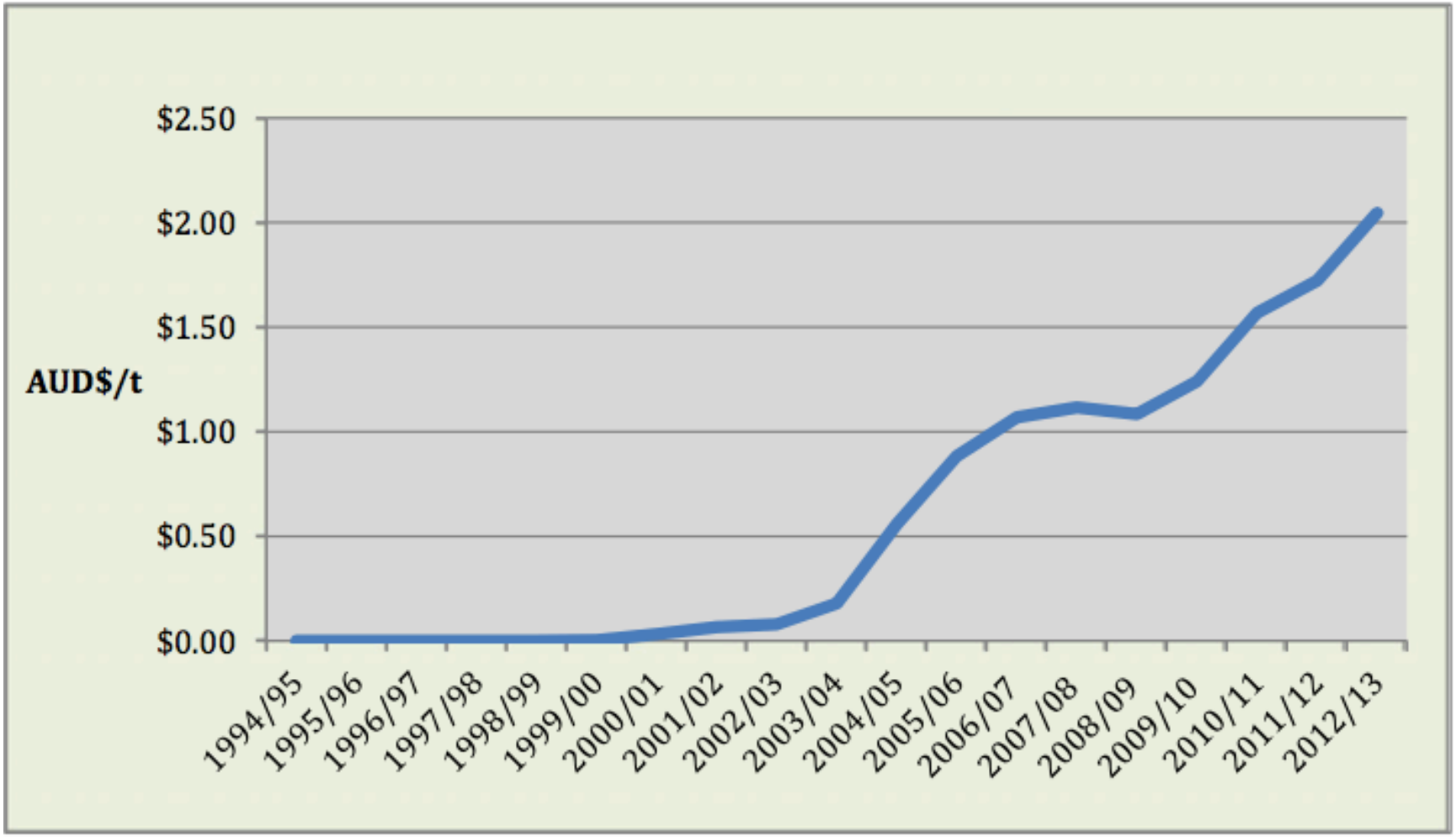
- **Enabled by 1994 Plant Breeders Rights (PBR) Act**
  - IP owners collect variety-specific royalties (rates set by owners upon first release) when grain is delivered to the first handler
    - requires cooperation of marketers
  - affords IP protection for self-pollinating crops comparable to that of seed for hybrids or patented varieties
    - some issues with evasion in vertically-integrated businesses
  - have become significant for wheat in Australia
    - public-private partnerships
    - now commercially self-reliant

End-Point Royalties (EPRs)

- **Four for-profit breeding firms were established after GRDC announced a tender in 1999**
  - **Australian Grain Technologies Pty Ltd**
    - GRDC & SARDI & U. Adelaide => ?? (many changes)
  - **InterGrain Pty Ltd**
    - GRDC & DAFWA => GRDC & DAFWA & Monsanto => ??
  - **LongReach Plant Breeders**
    - ~~GRDC &~~ AWB & Syngenta => Pacific Seeds & Syngenta => ??
  - **HRZ Wheats**
    - GRDC & CSIRO & NZ Plant and Food Research & Landmark Operations Ltd => & Dow =>??

- **State Departments of Agriculture & GRDC no longer maintain significant wheat breeding programs**

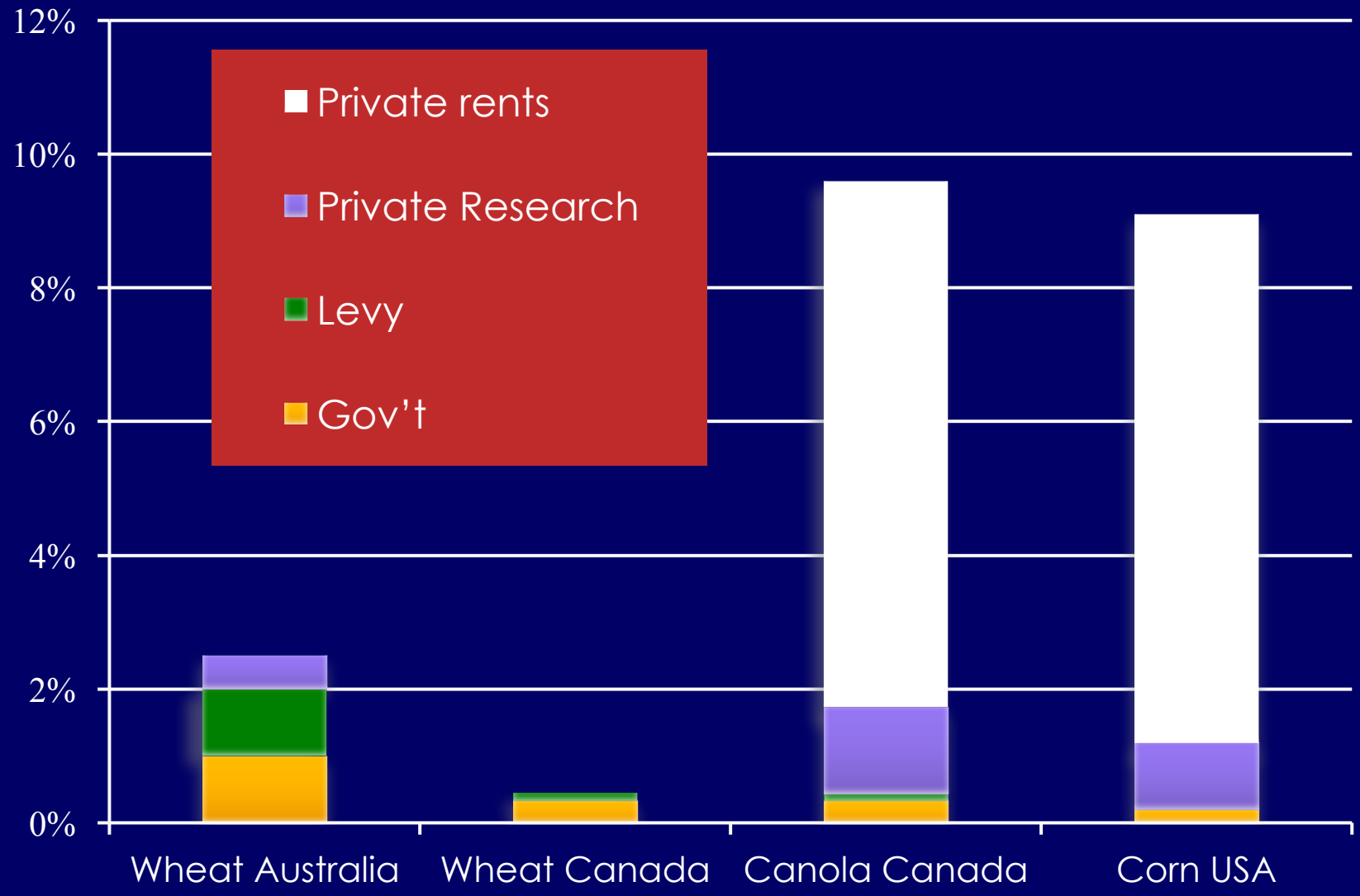
End-Point Royalties (EPRs)



Weighted average wheat EPR rate in Western Australia, 1999–2011

Source: Gray, Kingwell, Galushko and Bolek (2017)

Crop Research Intensity by Funding Source, and Private Rents – 2010



Source: Alston and Gray (2013)

Thank You!

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