Producer Engagement in Research Funding

IHARF Soil and Crop Management Seminar
February 1, 2017

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University of Saskatchewan
Outline

• The producer returns to research
• Sources of research investment
• Models for funding elsewhere
• Options for funding crop research in Canada
Measuring the Returns to Research

• Present Value recognizes that “time is money”
  – Getting a dollar today is worth more than getting the dollar a year or five years from now. A 5% discount rate is used in most studies

• Benefit Cost Ratio = PV Benefits/PV Costs

• A B/C equal to 1:1 implies a 5% rate of return

• A B/C ratio of 2:1 is a very good investment
Other Evidence


J.M. Alston, M.A. Andersen, J.S. James, and P.G. Pardey

Springer, January 2010
## Marginal Returns to U.S. Public Agricultural R&E

<table>
<thead>
<tr>
<th>Returns to</th>
<th>Benefit-Cost Ratio (3% real discount rate)</th>
<th>Own-State</th>
<th>National</th>
</tr>
</thead>
<tbody>
<tr>
<td>State R&amp;E</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>48-State Average</td>
<td>21.0</td>
<td>32.1</td>
<td></td>
</tr>
<tr>
<td>48-State Minimum</td>
<td>2.4</td>
<td>9.9</td>
<td></td>
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<tr>
<td>48-State Maximum</td>
<td>57.8</td>
<td>69.2</td>
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</tr>
<tr>
<td>USDA Research</td>
<td>17.5</td>
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</tr>
</tbody>
</table>

Source: Persistence Pays – Alston et al. 2010
## The Returns to WGRF cereal research 1994-2030

<table>
<thead>
<tr>
<th>Varietal Type/Class</th>
<th>Benefit/Cost Ratio</th>
<th>Internal Rate of Return %</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Wheat</td>
<td>20.40</td>
<td>36%</td>
</tr>
<tr>
<td>CWRS</td>
<td>31.13</td>
<td>42%</td>
</tr>
<tr>
<td>CWHW</td>
<td>2.22</td>
<td></td>
</tr>
<tr>
<td>CWAD</td>
<td>35.91</td>
<td>44%</td>
</tr>
<tr>
<td>CPS</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>CWES</td>
<td>0.22</td>
<td></td>
</tr>
<tr>
<td>CWRW</td>
<td>1.26</td>
<td></td>
</tr>
<tr>
<td>CWSWS</td>
<td>28.42</td>
<td></td>
</tr>
<tr>
<td>All Barley</td>
<td>7.56</td>
<td>28%</td>
</tr>
<tr>
<td>2-R Malt</td>
<td>6.51</td>
<td>26%</td>
</tr>
</tbody>
</table>

Source: Gray, Nagy, Guzel (2012)
The Returns to Zero Tillage Research

- Awada, Gray and Nagy 2015 (Canadian Journal of Agricultural Economics)
### Benefits from Zero Tillage Adoption on the Prairies 1985-2012 (Million $2010)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Alberta</th>
<th>Saskatchewan</th>
<th>Manitoba</th>
<th>Total Prairie</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Onsite Benefits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Short Run Benefits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduced machinery Cost</td>
<td>393.00</td>
<td>668.42</td>
<td>158.54</td>
<td>1,229.96</td>
</tr>
<tr>
<td>Reduced labour Cost</td>
<td>141.96</td>
<td>241.45</td>
<td>57.27</td>
<td>440.68</td>
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<tr>
<td>Reduced fuel Cost</td>
<td>367.19</td>
<td>715.28</td>
<td>127.08</td>
<td>1,209.55</td>
</tr>
<tr>
<td>Reduced other inputs Cost</td>
<td>49.14</td>
<td>56.15</td>
<td>19.00</td>
<td>124.29</td>
</tr>
<tr>
<td>Increased production-reduced fallow</td>
<td>1,858.18</td>
<td>3,802.95</td>
<td>269.82</td>
<td>5,930.95</td>
</tr>
<tr>
<td><strong>Total Short Run Onsite benefits</strong></td>
<td>2,809.47</td>
<td>5,484.25</td>
<td>631.71</td>
<td>8,925.43</td>
</tr>
<tr>
<td><strong>Long Run Benefits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduced Wind Erosion</td>
<td>147.29</td>
<td>346.07</td>
<td>67.96</td>
<td>561.32</td>
</tr>
<tr>
<td>Increasing Soil Organic Matter</td>
<td>1,139.99</td>
<td>2,212.37</td>
<td>352.09</td>
<td>3,704.45</td>
</tr>
<tr>
<td>Reduced Soil salinity</td>
<td>38.34</td>
<td>87.82</td>
<td>8.92</td>
<td>135.08</td>
</tr>
<tr>
<td>Increased Production (soil quality)</td>
<td>1,233.07</td>
<td>2,940.83</td>
<td>450.49</td>
<td>4,624.39</td>
</tr>
<tr>
<td><strong>Total Long Run Onsite benefits</strong></td>
<td>2,558.69</td>
<td>5,587.09</td>
<td>879.46</td>
<td>9,025.25</td>
</tr>
<tr>
<td><strong>Total Onsite Benefits</strong></td>
<td>5,368.16</td>
<td>11,071.34</td>
<td>1,511.17</td>
<td>17,950.70</td>
</tr>
<tr>
<td><strong>Offsite Benefits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Reduced Carbon Dioxide</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil carbon sequestration</td>
<td>223.48</td>
<td>415.10</td>
<td>62.34</td>
<td>700.92</td>
</tr>
<tr>
<td>Fuel emission reduction</td>
<td>14.12</td>
<td>28.01</td>
<td>4.12</td>
<td>46.25</td>
</tr>
<tr>
<td>2. Reduced NO$_x$</td>
<td>5.66</td>
<td>8.54</td>
<td>2.30</td>
<td>16.46</td>
</tr>
<tr>
<td><strong>Total Offsite Benefits</strong></td>
<td>243.27</td>
<td>451.65</td>
<td>68.76</td>
<td>763.67</td>
</tr>
<tr>
<td><strong>Total Zero Tillage benefits</strong></td>
<td>5,611.43</td>
<td>11,522.99</td>
<td>1,579.93</td>
<td>18,714.37</td>
</tr>
<tr>
<td>Sources of Funds</td>
<td>Zero Tillage RD&amp;E projects ($Millions)</td>
<td>General RD&amp;E ($Millions)</td>
<td>Data Source/Total</td>
<td></td>
</tr>
<tr>
<td>----------------------------------</td>
<td>----------------------------------------</td>
<td>--------------------------</td>
<td>----------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Public Sector</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federal tax credit</td>
<td>4.044</td>
<td></td>
<td>Private Machinery Firms</td>
<td></td>
</tr>
<tr>
<td><strong>Provincial Institutions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>16.645</td>
<td>0.409</td>
<td>ICAR; ADF; SSCA</td>
<td></td>
</tr>
<tr>
<td>Alberta</td>
<td>3.623</td>
<td>0.694</td>
<td>ICAR; ACTS</td>
<td></td>
</tr>
<tr>
<td>Manitoba</td>
<td>1.084</td>
<td>0.168</td>
<td>ICAR; ManDak</td>
<td></td>
</tr>
<tr>
<td>Universities</td>
<td>0.583</td>
<td>0.515</td>
<td>ICAR</td>
<td></td>
</tr>
<tr>
<td><strong>Public – Private Sectora:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public/NGOs/Private</td>
<td>1.879</td>
<td>2.848</td>
<td>ICAR</td>
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<tr>
<td><strong>Total Public Expenditures</strong></td>
<td><strong>$54.089</strong></td>
<td><strong>$17.312</strong></td>
<td><strong>$71.401</strong></td>
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<tr>
<td><strong>Private Sector</strong></td>
<td><strong>$56.745</strong></td>
<td></td>
<td>Private Machinery</td>
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<tr>
<td><strong>Total RD&amp;E Expenditure</strong></td>
<td><strong>110.834</strong></td>
<td><strong>17.312</strong></td>
<td><strong>128.146</strong></td>
<td></td>
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<tr>
<td>Variables</td>
<td>5 year delay counterfactual Base Case Scenario</td>
<td>2 year delay counterfactual Scenario 1</td>
<td>10 year delay counterfactual Scenario 2</td>
<td></td>
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<tr>
<td><strong>Onsite Benefits</strong></td>
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<td></td>
</tr>
<tr>
<td><strong>Short Run Benefits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Reduced machinery Cost</td>
<td>474.6</td>
<td>199.1</td>
<td>765.4</td>
<td></td>
</tr>
<tr>
<td>b) Reduced labour Cost</td>
<td>171.4</td>
<td>71.9</td>
<td>276.5</td>
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</tr>
<tr>
<td>c) Reduced fuel Cost</td>
<td>431.2</td>
<td>180.5</td>
<td>695.2</td>
<td></td>
</tr>
<tr>
<td>d) Reduced other inputs Cost</td>
<td>40.3</td>
<td>21.5</td>
<td>98.8</td>
<td></td>
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<tr>
<td>e) Increased Production (fallow)</td>
<td>3,282.2</td>
<td>960.9</td>
<td>7,459.5</td>
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</tr>
<tr>
<td><strong>Total Short Run Onsite benefits</strong></td>
<td><strong>4,399.8</strong></td>
<td><strong>1,433.9</strong></td>
<td><strong>9,295.3</strong></td>
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<tr>
<td><strong>Long Run Benefits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Reduced Wind Erosion</td>
<td>196.0</td>
<td>78.6</td>
<td>330.9</td>
<td></td>
</tr>
<tr>
<td>b) Increasing Soil Organic Matter</td>
<td>1,673.8</td>
<td>689.0</td>
<td>2,630.4</td>
<td></td>
</tr>
<tr>
<td>c) Reduced Soil salinity</td>
<td>39.5</td>
<td>16.1</td>
<td>65.2</td>
<td></td>
</tr>
<tr>
<td>d) Increased Production (soil quality)</td>
<td>1,173.5</td>
<td>450.4</td>
<td>1,959.2</td>
<td></td>
</tr>
<tr>
<td><strong>Total Long Run Onsite benefits</strong></td>
<td><strong>3,082.8</strong></td>
<td><strong>1,234.1</strong></td>
<td><strong>4,985.8</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total Onsite Benefits</strong></td>
<td><strong>7,482.5</strong></td>
<td><strong>2,668.0</strong></td>
<td><strong>14,281.1</strong></td>
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</tr>
<tr>
<td><strong>Offsite Benefits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Reduced Carbon Dioxide</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil carbon sequestration</td>
<td>298.6</td>
<td>118.1</td>
<td>472.2</td>
<td></td>
</tr>
<tr>
<td>Fuel emission reduction</td>
<td>14.1</td>
<td>5.7</td>
<td>23.8</td>
<td></td>
</tr>
<tr>
<td>b) Reduced NO&lt;sub&gt;x&lt;/sub&gt;</td>
<td>6.7</td>
<td>2.6</td>
<td>10.5</td>
<td></td>
</tr>
<tr>
<td><strong>Total Offsite Benefits</strong></td>
<td><strong>319.4</strong></td>
<td><strong>126.3</strong></td>
<td><strong>506.6</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total Zero Tillage benefits</strong></td>
<td><strong>7,802</strong></td>
<td><strong>2,794.3</strong></td>
<td><strong>14,787.6</strong></td>
<td></td>
</tr>
</tbody>
</table>

(Source: Awada, Gray and Nagy, 2015)
<table>
<thead>
<tr>
<th>Benefits to:</th>
<th>Source of RD&amp;E</th>
<th>B/C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural sector</td>
<td>Public</td>
<td>109.3</td>
</tr>
<tr>
<td>Agricultural sector</td>
<td>Public + Private</td>
<td>60.8</td>
</tr>
</tbody>
</table>
Benefits of Regional Variety Trials
Calen Covey M.Sc. 2012

Benefits of Regional Variety Trials 1971-2010
($Million)

63:1 Benefit Cost Ratios
### SPG Pulse Research (1984-2024)

<table>
<thead>
<tr>
<th></th>
<th>Genetics Research</th>
<th>Development Acceleration</th>
<th>Total Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Producer Ben/Cost</td>
<td>27.81</td>
<td>15.77</td>
<td>20.19</td>
</tr>
<tr>
<td>Producer IRR</td>
<td>39.5%</td>
<td>40.4%</td>
<td></td>
</tr>
<tr>
<td>Industry Ben/Cost</td>
<td>26.91</td>
<td>23.29</td>
<td>24.6</td>
</tr>
</tbody>
</table>

Source: Gray, Galusko, Nagy and Weseen, 2008
The Underfunding of Research is Problem #1

• High B/C ratios indicate many lost opportunities
• research can increase economic growth while addressing food security
• We can learn from other Agricultural Knowledge Systems
Three Sources for Research Funding

- Public (government)- taxes
- Industry (producer)- check-offs
- Private (investor owned firms)- technology sales royalties

- Stronger property rights are needed to stimulate private investment...especially in wheat barley and oats
Table 1: Estimated Spending on Variety Development by Crop Kind

<table>
<thead>
<tr>
<th>Item</th>
<th>Units</th>
<th>Wheat</th>
<th>Barley</th>
<th>Canola</th>
<th>Corn</th>
<th>Soybeans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expenditures on Variety Development</td>
<td>million</td>
<td>46.1</td>
<td>10.0</td>
<td>64.8</td>
<td>16.5</td>
<td>9.6</td>
</tr>
<tr>
<td>Private (Via CSTA)</td>
<td>million</td>
<td>6.2</td>
<td>1.7</td>
<td>64.8</td>
<td>16.5</td>
<td>9.6</td>
</tr>
<tr>
<td>Producer</td>
<td>million</td>
<td>6.2</td>
<td>1.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public (Government and Universities)</td>
<td>million</td>
<td>33.7</td>
<td>6.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm cash receipts (2013 &amp; 2014 average)</td>
<td>million</td>
<td>5,628</td>
<td>684</td>
<td>7,635</td>
<td>2,231</td>
<td>2,337</td>
</tr>
<tr>
<td>Expenditures per 1 of cash receipts</td>
<td>%</td>
<td>0.8%</td>
<td>1.5%</td>
<td>0.8%</td>
<td>0.7%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Acreage (2013 to 2015 average)</td>
<td>million acres</td>
<td>27.5</td>
<td>6.4</td>
<td>20.3</td>
<td>3.4</td>
<td>4.5</td>
</tr>
<tr>
<td>Expenditures/acre</td>
<td>/acre</td>
<td>1.67</td>
<td>1.27</td>
<td>4.18</td>
<td>1.32</td>
<td>1.83</td>
</tr>
<tr>
<td>Seed purchases (sales by seed companies)</td>
<td>million</td>
<td>181</td>
<td>51</td>
<td>1,219</td>
<td>371</td>
<td>364</td>
</tr>
<tr>
<td>Expenditures per 1 of Seed Sales (purchases)</td>
<td>%</td>
<td>25.5%</td>
<td>19.6%</td>
<td>5.3%</td>
<td>4.4%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Seed purchases as a % of cash receipts</td>
<td>%</td>
<td>3.4%</td>
<td>7.4%</td>
<td>16.0%</td>
<td>16.6%</td>
<td>16.6%</td>
</tr>
</tbody>
</table>
The Agricultural Growth Act 2015

• The Act provides stronger plant breeders rights
• Consistent with the international UPOV 1991 that Canada signed in 1991
• It could be used to increase royalty income for crops if producers and the industry develop a system for end point royalty collection
• This has been done in France and Australia
Approximate Crop Research % of Gross
Selected Crops 2010
Canadian and UK wheat production 1989-2014
Source: FAOSTATS
Avoid the UK wheat model

- IPRs are too weak - 53% of average royalty paid on saved seed, which also limits royalties
- $27 million revenue is split between six very small breeding programs with little or no private upstream research
- 15 year gap in partnership with public research
- “the get out of the way and they will come” approach did not work well – several elements were missing
Approximate Crop Research % of Gross Selected Crops 2010

- Wheat Canada
- Wheat Australia
- Canola Canada
- UK Wheat
- SPG pulse

Private Breeding % of Gross
Levy Funding % of Gross
Govt Funding % of Gross
Australia’s balanced approach

• Matched (1% + .5 %) (non-refundable) check-off funding of Gross industry sales for 27 grains
• GRDC became the driver of the whole system
• Continued public support for basic research
• Strong IPRs and creation of three breeding firms with private-producer-public shareholders
End Point Royalties

- *End Point Royalties (EPRs)* collected on the sale of harvested grain
- This reduces producer risk
- Full royalties even with farm saved seed
- *EPRs* are now generating enough revenue to support breeding firms but it took 15 years to get there
Aussie Wheat PPPPs

Australian Grain Technologies Pty Ltd (2002) -
- 48% of wheat market share
- Mace wheat variety is dominant
- Scepter 2016 – 7% higher yielding than Mace
- The dominant breeder

InterGrain Pty Ltd (2007)
- high market share in noodle wheats,
- small overall -$5 M/yr loss

HRZ Wheats Pty Ltd (2003)
Average End point royalty rates ($/t)
Western Australia 1998-2012
Wheat Production in Australia & Canada 1989 to 2014 (FAOSTATS 2017)
Lessons from France

- Uniform farm saved seed royalty on all wheat varieties $1.00/t
- Negotiated between farm organisations and the seed industry
- Uniform high royalty rates for all certified wheat seed and 50% of farmer purchase seed each year. > $40-$60M/yr
- Long history of public-private partnerships
- Breedwheat – is a large scale seven year public–private genomics research project
- The system appears to perform well with a large public research presence
Wheat Production in Canada & France 1989 to 2014 (FAOSTATS 2017)

![Graph showing wheat production in Canada and France from 1989 to 2014. The graph includes a linear trend line for both countries.](image-url)
Evidence from the hybrid seed industry (where IPRs are very strong)

- For US Corn and Soybeans and Canadian Canola:
  - Seed costs are 10% of gross farm revenue
    - Research is about 1% of gross farm revenue
    - About 10% of rents get reinvested in R&D

- Is this Underinvestment?
  - Compared to what? Public? Producer?
The Canadian Canola Outcome

• Hybrid seed IPRs are secure
• faster yield increases than publically funded wheat
• However:
  – Two firms dominate
  – Seed costs $60 per are or 15% of gross revenue – these exceed land rents! and are steadily increasing
  – About 9% of $770 Million in rents gets reinvested in breeding
• Hybrid corn and GM soybeans look similar concentration/pricing/investment
Implications for Crop Innovation in Canada
A balanced “4P” approach is needed

• 4P: Private-Producer-Public Partnerships

• Balance is required for:
  – greater overall funding
  – to provide industry goods and public goods while tapping into global knowledge owned by multinationals
## 3 Types of Knowledge Inputs for Innovation

<table>
<thead>
<tr>
<th>Public Goods</th>
<th>Industry Goods</th>
<th>Private Goods</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(non-excludable)</strong></td>
<td><strong>(non-excludable)</strong></td>
<td><strong>(excludable)</strong></td>
</tr>
<tr>
<td>Basic Science Research</td>
<td>Crop genomics, germplasm, unprotected varieties</td>
<td>IP Protected crop varieties/traits/processes</td>
</tr>
<tr>
<td>Science literacy/ ecology/chemistry/biology</td>
<td>Agronomy/ best management practices</td>
<td>Protected production process</td>
</tr>
<tr>
<td>Business management</td>
<td>knowledge dissemination product, input testing</td>
<td>Patentable mechanical innovations</td>
</tr>
<tr>
<td>Human and model crop Genomics</td>
<td>Crop disease research, biological control systems</td>
<td>Chemical Pesticides Inoculants</td>
</tr>
<tr>
<td>Pathogen Research</td>
<td>Quality standards/systems Market access</td>
<td>product and market development</td>
</tr>
</tbody>
</table>
Approximate Crop Research % of Gross
Selected Crops 2010

- Private Breeding % of Gross
- Levy Funding % of Gross
- Govt Funding % of Gross

Wheat Canada
Wheat Australia
Canola Canada
UK Wheat
SPG pulse
The 4P balanced approach for Canada (Private)

- Governments should work with industry to pass regulations that will create a one-percent End Point Royalty on the sale of all crops that would be paid to variety owners
  - This would provide a large and immediate stream of revenue for all successful crop breeders without a long phase in period
  - It would allow private industry to also invest in non-hybrid non-GM platforms
The 4P balanced approach for Canada (Producer)

- The federal government should use its research mandate to facilitate the creation of producer-controlled, non-refundable check-offs that would automatically matched by government (tax credits)
- Accountability can be enhanced with a share structure
- Corporations similar to the Australian RDC models could undertake applied R&D and extension for the benefit of the sector
- As in Australia, these corporations would also be in a position to foster 4P partnerships with the private and public sector
The 4P balanced approach for Canada (Public)

• Government should continue their public support for basic and applied scientific research
• Long term and/or matching commitments would help ensure future contributions
• Producer engagement in the process in critical
• The Grain Roundtable has a Value Creation Working Group co-chaired by Harvey Brooks from SaskWheat and Tom Steves for AlbertaWheat
Summary

• High rates of return to research indicate lost opportunities to benefit from more ag research
• Innovation systems work best through 4P partnerships
  – Broad uniform EPR mechanisms to create demand pull for private applied research
  – Levy-funded producer run national research organisations for industry goods and leadership.
  – Long term government commitments to fund public research
Approximate Crop Research Intensity and Returns (% of Gross) Selected Crops 2010

- Wheat Canada
- Wheat Australia
- Canola Canada
- UK Wheat
- SPG pulse

NPV Producer Benefits
Private Rents % of Gross
Private Breeding % of Gross
Levy Funding % of Gross
Govt Funding % of Gross
## Approximate Crop Research Intensity and Returns (% of Gross) Selected Crops 2010

<table>
<thead>
<tr>
<th>Crop</th>
<th>Govt Funding % of Gross</th>
<th>Levy Funding % of Gross</th>
<th>Private Breeding % of Gross</th>
<th>Private Rents % of Gross</th>
<th>NPV Producer Benefits</th>
<th>Total Research Intensity</th>
<th>Benefit-Cost Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat Canada</td>
<td>0.32%</td>
<td>0.12%</td>
<td>0.02%</td>
<td>0</td>
<td>8.28%</td>
<td>0.46%</td>
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<td>Wheat Australia</td>
<td>0.50%</td>
<td>1%</td>
<td>0.50%</td>
<td>0.00%</td>
<td>36.00%</td>
<td>2.00%</td>
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<td>Canola Canada</td>
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<td>0.04%</td>
<td>1.30%</td>
<td>9.60%</td>
<td>19.92%</td>
<td>1.64%</td>
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<tr>
<td>UK Wheat</td>
<td>0.20%</td>
<td>0</td>
<td>0.16%</td>
<td>0.37%</td>
<td>6.09%</td>
<td>0.36%</td>
<td>18.00</td>
</tr>
<tr>
<td>SPG pulse</td>
<td>0.20%</td>
<td>1.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>21.60%</td>
<td>1.20%</td>
<td>18.00</td>
</tr>
</tbody>
</table>