

R&D spending



are we getting our fair share?

We put the matter of money under the microscope for this 50th issue of AgScience. The first issue – published in December 2000 – had recorded Government commitments to research and development in the primary sector. So what has happened since then and how much has the private sector chipped in? Consistent data to isolate agricultural and horticultural R&D investment from other R&D spending over the past decade and a half are not readily available. But here's what we can say. BOB EDLIN reports...

PROFESSOR JACQUELINE ROWARTH, then President of the New Zealand Institute of Agricultural Science, wrote the first article in the first edition of *AgScience* published in December 2000. She had taken note of a speech given to the Institute's Auckland Section by Pete Hodgson, who had assured his audience that "at last, you have a government that is on the side of science".

Dr Hodgson was Minister of Research, Science and Technology and of Crown Research Institutes in the Labour-led government elected a year earlier. The final words of his written speech said traditional agricultural and horticultural science would always be relevant. "Even with the fanciest molecular biology in the world, we still need to know how new crops will grow in different soil types, different climates and latitudes. We need to know how they will respond to different pests and management regimes."

"And so say all of us," a heartened Jacqueline Rowarth remarked in her article. She described the Minister's statement as "a mantra worth repeating" in the hope this view reached society in general, and the funding bodies and potential recruits to science in particular.

Dr Hodgson also said he had made a commitment to lift public investment in research and development to 0.8% of GDP by the year 2010. A start had been made in the 2000/01 Budget by increasing the total investment by about 10%, he said.

In dollar terms government spending has increased since then (see Table One) from \$393 million in 2000 to \$584m in 2008 (when the government in which Dr Hodgson served was replaced by John Key's National-led government) and \$622m in 2014.

By the time Labour left office, however, the government contribution had been trimmed from 0.36% of GDP in 2000 to 0.32% in 2008 although the higher education contribution increased from 0.33% to 0.36%. Under National-led coalitions the government contribution has slipped further to 0.27% while the higher education contribution has held at 0.36%.

Total R&D investment nevertheless has increased from 1% of GDP in 2000 to 1.2% in 2014 thanks to the business contribution, which has been lifted from 0.30% of GDP to 0.54%. But what's been happening to R&D investment in the agricultural and horticultural sectors?

For this 50th issue, we asked the Ministry of Innovation, Business and Employment if they could provide us with a useful set of figures to show trends in science spending with a farming/horticultural breakdown since 2000. They couldn't.

We were told the actual amount of combined investment made by government, the private sector, and universities into particular sub-sectors is hard to obtain. This dearth of detailed data is being addressed in a government project signalled in the Business Growth Agenda and National Statement of Science Investment to produce an annual science System Performance Report to help inform future investment and show trends.

GROSS EXPENDITURE ON R&D

Table 1 Source: Statistics NZ

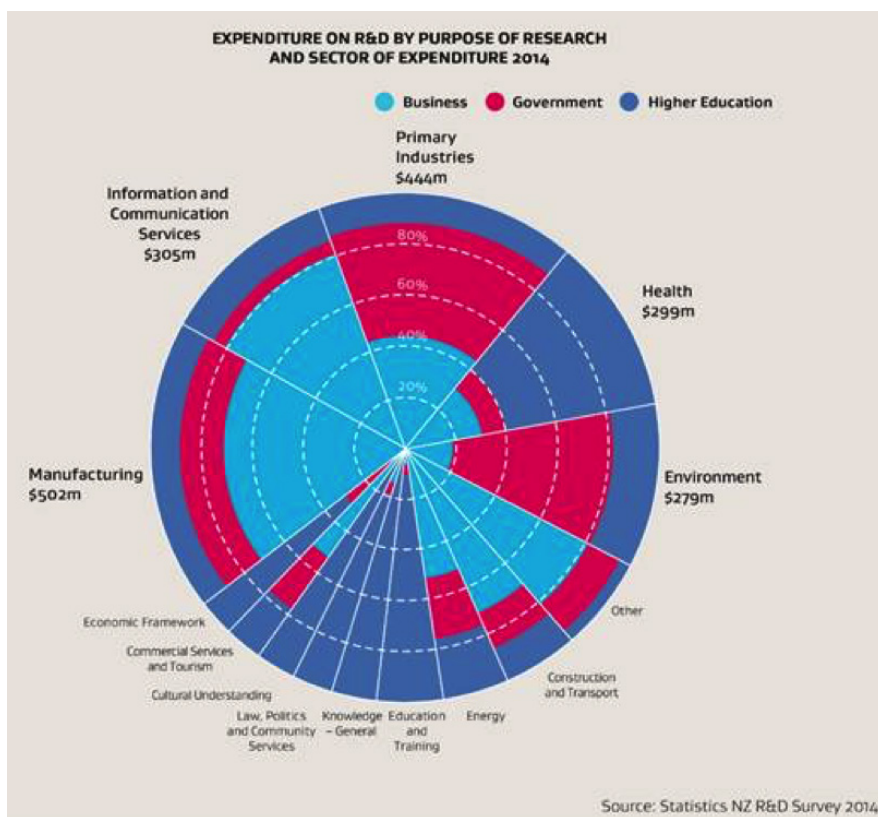
	Business	Govt	Universities	Total R&D	Total as % of gdp
	\$(million)				
2000	324	393	374	1091	0.99
2002	524	456	436	1416	1.14
2004	677	461	522	1660	1.19
2006	760	473	593	1826	1.16
2008	923	584	653	2161	1.19
2010	971	615	802	2388	1.26
2012	1193	596	836	2625	1.25
2014	1246	622	817	2685	1.17
Average annual % change since 2000	20	4	8	10	

With some caveats, the ministry could isolate key government investments in agricultural industries through different government appropriations to show a total and a trend over the past five years. They provided us with Table Two (we have placed it the end of this article because of its size) showing funding from the Ministry for Business, Innovation and Employment, the Ministry for Primary Industries and the relevant Centres of Research Excellence.

The ministry acknowledged the shortcomings in what they had sent us: the data are “indicative only” for several reasons. For example, a number of research organisations participate in agricultural research but they haven’t been included because the bulk of their work is in other areas (such as NIWA and GNS, the Allan Wilson Centre and the Maurice Wilkins Centre). Similarly some agricultural research institutions conduct a limited amount of research work in other (non-agricultural) areas.

The table provided by the ministry shows the annual Ministry of Business, Innovation and Employment, Ministry for Primary Industries and Centres of Research Excellence spending on agricultural research has risen from \$260.1m to \$334.6m over the past five years – a growth of 29%. But “this will understate the total amount funded by government,” the ministry said.

The ministry also provided us with a pie chart (pictured here) showing expenditure on R&D by purpose of research and sector of expenditure in 2014. This placed agricultural and environmental research in the context of New Zealand’s total research investment.



The critical figure for our readers is that the total spend on research for primary-industries purposes was estimated at \$444m. Government agents and the university sector together were by far the majority funders of research in the sector.

Further help from the ministry came in the form of a table setting out figures from Statistics New Zealand’s two-yearly R&D surveys. This showed the sectors where research expenditure has been carried out in primary industries and compared 2008 with 2014.

The table (which we have expanded to create Table Three) did not show who paid for or invested in the research. But the “government” sector mostly means Crown Research Institutes.

“Primary industries” include fishing and mining as well as agriculture, horticulture and forestry.

The figures showed a total increase of 12% in agricultural research over the six years from 2008 to 2014. These figures did not include environmental research which totalled an additional \$279m annually, a significant amount of this being related to the primary sector (such as research into nutrient management and freshwater management).

The table encouragingly showed that the annual amount of agricultural research conducted in the business sector had risen by 45% over the six-year period, while the amount conducted in the university sector had risen by 12%. The amount of research conducted in the government sector had decreased by 10%.

The ministry said this indicated a growing preference for New Zealand agricultural companies to conduct more of their research within their own companies rather than contracting it out to government agencies.

The table showed that despite this shift, an unusually high proportion of primary sector research continued to occur in government agencies compared to other industry sectors (except for environmental research).

Finally, the ministry provided data (Table Three) recording total revenue reported by Crown Research Institutes in 2008/09 and 2013/14. These figures aren’t for agricultural research alone but AgResearch, Plant & Food Research and Scion operate almost exclusively in the agricultural and forestry sectors and Landcare Research crosses over the agricultural and environmental sectors.

As well as the current funding the ministry reminded us there are three new National Science Challenges which provide around \$85m in funding over the next five years to agricultural or biological research: “New Zealand’s Biological Heritage”, “Sustainable Seas”, and “Our Land and Water”. But Table One suggests those three challenges account for about \$10m of this expenditure.

Overall, the ministry said, the government’s investment in science and innovation has risen by more than 70% in the past seven years from \$850m in 2007/08 to around \$1.5 billion in 2015/16. But let’s not forget this has been less than growth in GDP.

R&D FOR PRIMARY INDUSTRIES PURPOSES

Table 3 Source: Statistics NZ

	Business	Govt	Universities	Total	Proportion of total R&D
	\$(million)				
2006	151	145	37	333	18%
2008	134	213	52	398	18%
2010	137	214	51	402	16%
2012	194	213	50	457	17%
2014	195	192	58	444	17%
Average annual % change since 2006	4	4	7	4	

AgScience was keen to go back to 2000, not only because that's when Professor Rowarth had been so heartened by Pete Hodgson's commitments but also because the ministry's tables were confined to periods when the Key Government was calling the shots.

We turned to Statistics New Zealand, which gathers R&D survey data every two years. But the published survey results do not give breakdowns to show investment in agriculture and horticulture.

The best we could do was use survey data from 2006 to expand one of the tables provided by the Ministry of Business, Innovation and Employment (Table Three). This shows business, government and university investment for primary industries purposes over an eight-year period.

First, we can see R&D spending for these purposes has slipped from 18% to 17% of total R&D.

Second, growth in the university sector is greater (although much smaller in dollar terms) than in the business and government sectors.

Third, in the government sector it has shrunk by 10% since 2010.

And fourth, whereas total R&D spending shown in Table Two increased by 47% from 2006-2014, the sums put to primary industries purposes increased by just 33%.

We await with interest the results of the 2016 survey. Meanwhile, it's sobering to note that average R&D investment in the OECD increased from 2.2% of GDP to 2.4% in the 10 years to 2014. In this country it shrunk from 1.19% to 1.17%. 📉

INDICATIVE SELECTED SCIENCE EXPENDITURE RELATED TO PRIMARY INDUSTRIES

Table 2

		2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Vote Research and Technology/ Business, Science and Innovation		\$ thousands					
Contestable Funding	Biological Industries	167,962	108,869	106,452	94,693	94,918	92,153
CRI Capability Funding / Core Funding (10/11 numbers are Capability Funding)	Plant and Food	10,030	43,103	43,103	43,103	43,103	43,103
	AgResearch	11,700	38,889	38,889	38,889	38,889	38,889
	Scion	4,260	17,733	17,733	17,733	17,733	17,733
	Landcare	6,160	24,204	24,204	24,204	24,204	24,204
National Science Challenges New Funding Annualised estimate, does not include transferred contestable funding or CRI core funding	High Value Nutrition	0	0	0	0	0	3,060
	Biological Heritage	0	0	0	0	0	3,410
	Our Land and Water	0	0	0	0	0	3,410
Vote Agriculture and Forestry/Primary Industries							
PGP		24,221	38,532	37,591	55,805	56,850	69,877
Sustainable Farming Fund		8,976	10,450	9,300	8,941	8,291	8,311
Climate Change Research		8,600	9,200	8,472	7,819	4,836	2,384
Global Research Alliance on Agricultural Greenhouse Gases		4,094	4,025	5,635	9,284	6,000	14,772
Vote Tertiary Education							
Centres of Research Excellence (CoREs)	Agricultural CRI Partner						
Gravida, Host UoA	AgResearch	7,157	6,895	6,342	6,142	7,707	6,641
Bioprotection Research Centre, Host Lincoln	AgResearch, Plant and Food Research	3,723	3,838	3,952	4,166	2,974	3,326
The Riddet Institute, Host Massey	AgResearch	3,135	3,239	3,473	2,978	2,945	3,309
OVERALL TOTAL (NB the CoRE values are from calendar years; the others are from financial years)		260,017	308,977	305,146	313,756	308,449	334,581

Notes on Vote RS&T / BSI funding

- The biological industries funding numbers drop because some funding was pulled out of all contestable funds in 2011/12 to create core funding.
- Almost all AgResearch, PFR and Scion core funding expenditure is related to primary industries.
- Significant amounts of research related to primary industries supported by core funding occurs in other CRIs. For example, some environmental research.

Notes on Centres of Research Excellence

- The CoRE funding listed is contracted so is legally committed
- All CoREs have a mid-term review at which point the Crown/TEC could theoretically reduce funding if progress was deemed to be inadequate.
- Funding is not tagged to agribusiness.
- Funding is provided to support research themes and projects
- CoREs are designed to be investigator-led, **not** industry-driven research like MBIE funds.
- Some of these research projects will be done corroboratively with CRIs like AgResearch and will have end users in the primary sector as potential users of the research outputs.