

Together, Creating the Best Soil and Feed on Earth

Ballance Primary Growth Partnership Programme

Clearview Innovations

Final Report Summary

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Gary Monk

Programme Chair's reflections

It gives me a great deal of pleasure to contribute to the final report of the Ballance Agri-Nutrients Clearview Innovations PGP Programme, which I have had the privilege to chair for the past two years.

My earliest observations of the Programme Steering Group (PSG) was that it was most ably led by Programme Manager Warwick Catto, and MPI's Investment Manager, Rob Miller.

The PSG has also been well served by Suzanne Young, Sheena Henderson, Jamie Blennerhassett, Naomi Parker and Guy Tapley who took over from Rob in the Programme's final year.

Highlights of my time as Chair have been to see the unveiling of MitAgator[™] at the Field Days in 2017, and the rapid adoption of SpreadSmart[™] as the safety of our pilots remains paramount to the evolution of top dressing in New Zealand.

Having spent more than 40 years in New Zealand's primary export sector, I have a bias to ensure no

opportunity is lost on 'exporting' the benefits of our endeavours. Whilst the Programme officially finished at the end of October 2018, the benefits to farmers in New Zealand will live on for a long time.

We set out to take advantage of this innovative PGP Programme made possible by MPI co-investment and I'm proud to say we have delivered some wonderful success stories.

I congratulate all involved.

Gary Monk, ONZM

Chairman Clearview Innovations PGP Programme



Warwick Catto

Programme Manager's reflections

The success of the Clearview Innovations Programme is best assessed against the vision and delivery of products/services aspired to back in 2010/11.

The context of that time was a post Global Financial Crisis world where phosphate fertiliser prices had increased an unprecedented 400% and suddenly a drive for efficiency was imperative. The concept of water quality targets for Nitrogen and Phosphate nationally was not even being discussed.

Move forward to today and phosphate prices have returned to more normal levels and second generation regional council plans with a focus on environment are being rolled out across the country.

The Programme has created tools that the primary sector are now needing just in time e.g. MitAgator[™] a tool that envisaged managing sediment, bacteria, nitrogen and phosphate losses and slow release phosphate and nitrogen product concepts to minimise fertilisers' direct impact on the environment.

I would like to acknowledge the many who have served on the PSG, contributed science, product development, project management, skills, administration and the many other activities the Programme has invested in.

As you read this document I hope that you will feel inspired and recognise the positive impact that Clearview Innovations, the single largest investment in fertiliser innovation for the last 30 years, has had and will continue to have for farmer's and the nation.

Warwick Catto Programme Manager Clearview Innovations PGP Programme





Clearview Innovations Programme Steering Committee – from back left to right Guy Tapley, Gary Monk, Ian Tarbotton, Jamie Blennerhassett and Suzanne Young. Front left to right Warwick Catto, Gerald Rys and Naomi Parker

Executive Summary

The primary objective of the Clearview Innovations Primary Growth Partnership (PGP) Programme co-invested by Ballance Agri-Nutrients and the Ministry for Primary Industries (MPI) was to develop products and services that provided farmer's with options to increase productivity and/or reduce their environmental footprint. To achieve this the Programme developed a "toolbox" that allowed farmers from different sectors and regions to select the best tool to address their own needs. Embedded within this toolbox has been the extension capability framework that enables more efficient adoption to occur.

The Programme was novel in that it identified that both Nitrogen and Phosphorus losses needed to be addressed. This had not been done before. In addition the programme sought non-conventional, alternative approaches to fertilisers and pest control via biological solutions. This programme accelerated existing microbial interventions being pursued by Ballance.

The programme used a product development funnelling approach. This scoped and tested a range of initial concepts and ideas and focused on the "winners" which were then funded to completion to achieve the Programme's objectives. The Programme never sought funds to complete all concepts initially investigated, and clear stop/go points at each of the stage gates rigorously selected on project viability.

Initially starting with 27 project concepts, the Programme has launched 3 products – SpreadSmart[™], My Pasture Planner and MitAgator[™], with two other product concepts still under development. An independent AgFirst review of the Programme Benefits conducted in 2018, shows that based on an original investment of \$19.5 million, the net present value of projected benefits at 2025 would be \$220 million, and at 2040 \$596 million.

Other outputs arising from the Programme included: 4 patents, 3 trademarks, over 100 scientific papers/ reports and over 35 press releases. In addition the Programme delivered 32 Nitrogen Workshops, developed 23 podcasts, 6 E-learning modules along with numerous other fact sheets and supporting information for each of the products developed within the programme.

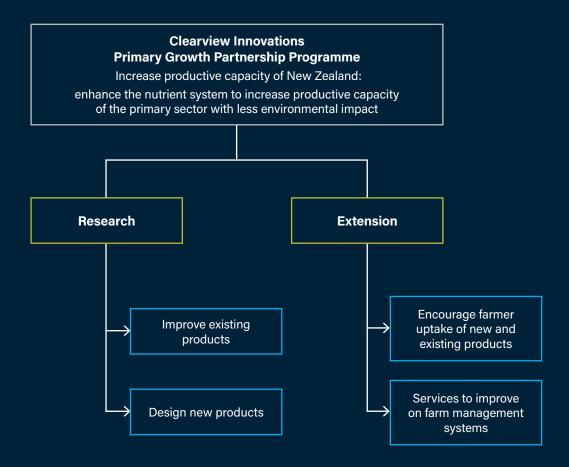
A highlight of the Programme was winning the New Zealand Spatial Excellence Innovation & Commercialisation Award for SpreadSmart[™] in 2016.

The ongoing legacy of Clearview Innovations will be the continued realisation of the Programme's benefits as increased adoption of the products occurs.

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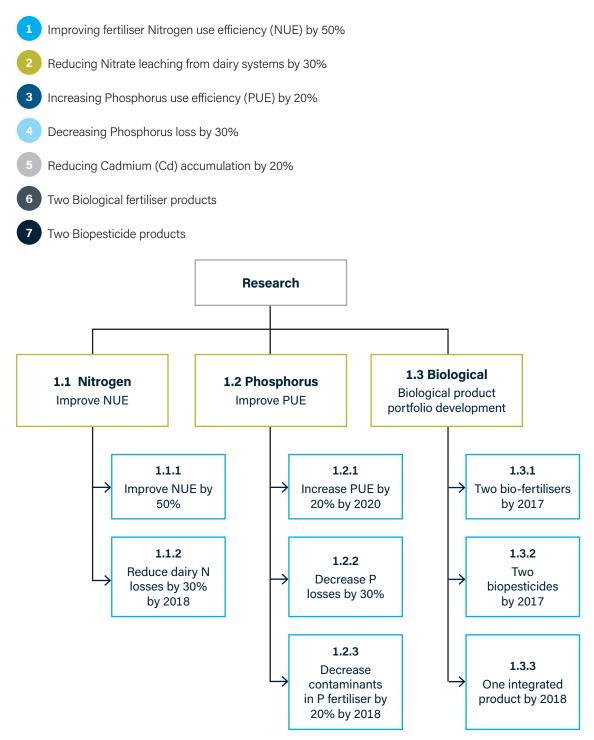
Objectives

The primary objective of the Clearview Innovations Programme was to develop products and services that provided farmer's options to increase productivity and/or reduce their environmental footprint. The intention of the programme was to develop a "toolbox" that allowed farmers from different sectors and regions to select the best tool to address their own needs. Embedded within this toolbox has been the extension capability framework that enables more efficient adoption to occur.



The Programme was novel in that it identified that both Nitrogen and Phosphorus losses needed to be addressed. In addition the programme sought non-conventional, alternative approaches to fertilisers and pest control via biological solutions. This programme accelerated existing microbial interventions being pursued by Ballance. The introduction and promulgation of second generation regional council plans establishing limits and targets for nitrogen, phosphorus, and sediment loss has realised a significant public benefit and return on the tax payers investment from the Programme's outputs.

The Programme's KPIs were:

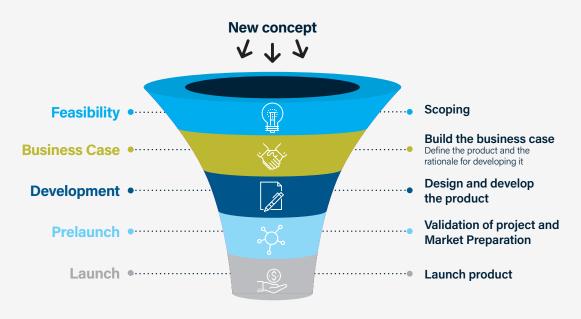


Enhanced international Application of improved solutions in non-pastoral Demand from consumers and farmers for alternatives to chemical fertilisers Models good practice extension methods for nutrient management adoption of integrated emulation within the nutrient science and and jobs created in for the sector and investment in new Enabling broader Catalyst to further farming sectors management to biological R &D New capability primary sector New Zealand reputation for environmental excellence in management non-pastoral bio-pesticide Additional benefits farming farming and pesticides **Outcome Logic for Ballance Clearview PGP Programme 2011 - 2018** Evidence of environmental benefits from new and Increasing uptake of more efficient Develop a best practice extension strategy and 10. Recruit and train staff with the right mix of skill 11. Collaborate with other nutrient providers, PGP nutrient products and services in service which accelerates the rate of adoption by enabling monitoring of nutrient Build capability to deliver an effective extension Changing needs, knowledge and A farm benchmarking system farmers of new nutrient products and services skill sets required for nutrient improved nutrient products and services benefits of the programme pastoral farming sector Pastoral farming makes an increased, sustainable contribution management advice programmes and local government to New Zealand's primary sector economic growth Extension and Capability Building: 12. Knowledge management implementation plan Potential for productivity increases sets and costs savings from increased nutrient advisors) accelerating the Increased profitability for farmers An effective best practice extension programme (with trained/certified uptake and effectiveness of new nutrient products and services from increased nutrient use nutrient efficiency efficiency and pesticide products to improve plant growth Evidence of efficiencies in fertiliser use from new and improved nutrient products and services Accelerated research into new nutrient alternatives Develop two bio pesticide products ready for 5. Test a range of potential biological fertilisers Develop two bio fertiliser products ready for and management processes, which reduce farm Demonstrate products with proven efficacy, system losses to the environment and improve safety and commercial prospects efficiency of fertiliser use Biological Product development: \leftarrow \leftarrow ← Fertiliser costs New nutrient products and services vays and losses to the atmosphere reduce nutrient leaching to water available with proven efficacy to increasing Farmers have additional options to comply with environmental regulations while remaining reducing its environmental footprint and enhancing profitability market use market use Transformation of the New Zealand pastoral farming sector by economically viable 2 ം ø management on farms may affect Increasing regulation of nutrient viability of some farms Develop new variable application technology to reduce N and P loss to the waterways and air Improved Nutrient Products and Management: Early adoption of new and improved nutrient Develop decision support tools to optimise Demonstrate products with proven efficacy, 1. Test a range of new product alternatives to Government and private co-investment in primary products and services by farmers improve nutrient application efficiency nutrient placement and effectiveness More efficient nutrient products and services available enabling fertiliser safety and commercial prospects industry innovation activity Reduced adverse environmental cost savings and/or improved impacts on farms from use of and improve its use efficiency pasture productivity fertiliser impacts from nutrient losses Adverse environmental from farms с. 4 Problems and Opportunities **Medium term Activities and** 2021 - 2024 Enablers & Long term outcomes outcomes Outputs Inputs 2025 -

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Research and development approach

The Programme has used a product development funnelling approach. This approach involved scoping and testing a range of initial concepts and ideas and focusing on the "winners" which were then funded to completion to achieve the Programme's objectives. The Programme never sought funds to complete all concepts initially investigated, and clear stop/go points at each of the stage gates provided rigorous selection on project viability.



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Key factsProgramme startLengthPGP funding:
\$9,749,671Total spent
\$19,499,33920111VEARSBallance funding:
\$9,749,668Commercial partners:
Ballance Agri-Nutrients Ltd

Estimated economic benefits = \$220 million by 2025*

*AgFirst Independent Analysis

Programme Benefits

Clearview Innovation's PGP Outcomes and Benefits Independent AgFirst Calculation: 2018 Update

Summary

An updated analysis has been carried out based on the latest information and assumptions, projecting the value to New Zealand farmers of products developed by the Clearview Programme. The market for these products was assumed to be Ballance Agri-Nutrients' current market share.

The review concentrated on likely or already commercialised products, as outlined in the Table below, and discounted the net benefits back to a 2018 value, at a 6% discount rate.

Likely or already commercialised products NPV values (\$ million)

Products		My Pasture Planner Sp		readSmart™	MitAgator™	
In Market	2025	\$134.3	\$11.6		\$43.8	
Products still under		Product A		Product B		
development	2025	\$24.0		\$5.9		

This shows that based on an original investment of \$19.5 million, the net present value at 2025 is \$220 million. This figure represents an 11 fold return on the initial investment.

In the 2016 Independent review conducted by AgFirst, the estimated economic benefit of the products either in market or with commercial potential was stated as \$56 million per year by 2025. In the updated Independent Review conducted by AgFirst in 2018 they re-confirmed that the estimated economic benefit of \$56 million per year by 2025 still holds.

Estimate of Efficiency and/or Environmental Gains

The following are estimates of efficiency and/or environmental gains, at a farm level, for the range of products, taken from an Independent Review conducted by AgFirst in 2016. These were confirmed by AgFirst in 2018.

The efficiency gains relate to improved pasture uptake of the nutrient/improved pasture growth, whereas the environmental impact reflects a reduction in N or P loss from the farm system as a result of the use of the product.

Products In Market		Product	Efficiency gain	Environmental Impact
	Nitrogen	My Pasture Planner	15%	5%
	Total		15%	5%
	Phosphorus	SpreadSmart™	5%	2.5%
		MitAgator™	-	10%
	Total		5%	12.5%
		Product	Efficiency soin	Environmental Impact
		Product	Efficiency gain	Environmental Impact
Products still under development	Nitrogen	Product A	5%	12.5%
	Total		5%	12.5%
	Phosphorus	Product B	15%	15%

15%

15%



Total

Assumptions

In order to calculate the benefits of the programme (overall economic and efficiency and environmental gains), Agfirst (2016 & 2018) had to make a range of educated assumptions, which are based on:

- Outcomes of the research reports from trials conducted within this programme, and modelled data using industry accepted tools such as OVERSEER.
- The information gained from interviews, with a range of staff from across the hierarchy of Ballance's organisational structure, and the same for Regional Councils across NZ.
- Expert opinion from scientists from AgResearch and DairyNZ.
- Expert opinion from the AgFirst authors (Phil Journeaux, Tafi Manjala, Kim Leigh-Mackenzie and Graeme Austin) based on similar analyses carried out*
- Estimates of Ballance Agri-Nutrients' marketshare
- Statistical facts and figures, which are often two or more years behind the current time.

* Howarth, S., Journeaux, P., 2016. Review of Nitrogen Mitigation Strategies for Dairy Farms - is the method of analysis and results consistent across studies? In: Integrated nutrient and water management for sustainable farming. (Eds L.D. Currie and R.Singh). http://flrc.massey.ac.nz/publications.html. Occasional Report No. 29. Fertilizer and Lime Research Centre, Massey University, Palmerston North, New Zealand. 13 pages

Journeaux, P. 2015. Valuation of the Benefits of the OVERSEER® Nutrient Budget Model. http://overseer.org.nz/whats-new

Journeaux, P., Van Reenen, E., Howarth, S., Praat, J.P., Handford, P., 2016. The Economic Impact of Greenhouse Gas Mitigation Strategies on the NZ Pastoral Agricultural Sector. Unpublished report to MPI

Ledgard (1989). Pasture responses to N fertiliser cited in Using Nitrogen: What is Best Practice? South Island Dairy Event (SIDE) Proceedings, Lincoln University, June 2005

Ledgard et al 1999. Nitrogen Losses from a Dairy farmlet study done with Dexcel/DairyNZ (unpublished)

McDowell, R.W., Nash, D.M., Robertson, F. (2007) Sources of phosphorus lost from a grazed pasture soil receiving simulated rainfall. J. Environ. Qual. 36:1281-1288 cited in http://www.boprc.govt.nz/media/99964/the_efficacy_of_strategies_to_mitigate_the_loss_of_phosphorus_from_pastoral_land_use_in_the_catchment_of_lake_rotorua.pdf

McDowell and Wilcock 2008. Cited in - A review of contaminant losses to water from pastoral hill lands and mitigation options Dodd, M., McDowell, R.W., Quinn, J.M. Hill Country – Grassland Research and Practice Series 16: 137-148 (2016) cited http:// grassland.org.nz/publications/nzgrassland_publication_2775.pdf

Newman, M., Muller, C., 2016. The impacts of reducing N leaching and P loss on Southland dairy farms. Article in September issue NZIPIM Journal.



Impact of the PGP Programme on Ballance

With the completion of the PGP Programme, the business transformation within Ballance will continue.

At its peak, the Clearview Innovations PGP Programme tripled Ballance's historic annual spend and as a consequence this led to the business transformations required to manage a product development pipeline of that breadth and depth. Equally an investment of this magnitude has resulted in significant changes in terms of accelerating the business transformation from a fertiliser company to a nutrient management company, as well as the customer insights, the thought leadership and capability to implement the outcomes of the product development process. The outcome of this programme has been the successful commercialisation of world leading novel products; the award winning SpreadSmart[™], My Pasture Planner and MitAgator[™].



Product development process - gating process for new products

A Product Development Manager role was created as part of this Programme in order to develop and implement a comprehensive new product development process.



Capability - 3 additional staff employed

A Science Extension Specialist role along with two other Science Extension roles were created as part of this programme. In addition digital and E-learning platforms have been created.



Customer led market insights

The customer insights gleaned from the development of the Clearview Innovation Programme's Products will inform future products and services developed by Ballance.



Fertiliser company to nutrient management company

Ballance has moved from transacting fertiliser based from a fertiliser recommendation, to a company providing nutrient management and fertiliser advice within the constraints of farming within limits. Tools such as MitAgator will underpin this transformation.



Thought leadership

The investment of the Programme provided opportunity for Ballance Agri-Nutrients to develop their thought leadership and for the business leaders to engage more broadly within the primary sector to expose and be exposed to other thought leaders. The Programme has enabled consistent industry messages for nutrient management to be developed and communicated. This has been particularly successful through the "Know your number" Programme designed for Dairy Farmers.



Awards for SpreadSmart™

Winner: NZ Spatial Excellence Awards Finalist: Safeguard NZ Workplace H&S Awards GIS specialist Andrew Old receiving the NZ Spatial Excellence Award

Nutrient Products and Services

The Clearview Innovations Programme focused on producing new products and services to be used on-farm to optimise production outputs from minimal nutrient inputs. Three products and services developed within the Clearview Innovations PGP Programme have been launched. These include:



My Pasture Planner

Launched in 2014, My Pasture Planner (previously called N-Guru) is a decision support tool for nitrogen. It is a proprietary software programme for use by nutrient advisors to identify the nitrogen needs of a farm in order to guide where and how much nitrogen should be applied to meet the dual goals of optimal pasture production and farming within limits. Version 2 of the software is due for release in 2019.

SpreadSmart[™]

SpreadSmart brings together aerial mapping and GPS technology, proprietary software and a specially created automated hydraulic system. This award-winning technology enables the delivery of precise variable rate fertiliser application from the air, across different areas of the farm. A key feature of this technology is the ability to avoid environmentally sensitive areas such as waterways, and native bush. Launched at the Mystery Creek Fieldays in 2015, SpreadSmart is now the default delivery system for SuperAir aircraft.





MitAgator[™]

MitAgator is a world-first software tool, which combines home-grown technology with decades of verified research to give an overview of farm risk areas for all four contaminants (Nitrogen, Phosphorus, E.coli and Sediment) and provides mitigation options. Delivered through Ballance's Farm Sustainability Services Team, MitAgator offers farmers more control, greater certainty and the ability to farm within limits for many years to come.

Products still under development

Two products concepts are still under development, these concepts are focusing on nutrient use efficiency. Trial work for these concepts is underway to test whether they are efficacious and economically viable options to bring to market.

My Pasture Planner case study

Owl Farm

Owl farm is St Peter's School and Lincoln University's demonstration dairy farm. As a demonstration farm, Owl Farm strives for best practice, and its trends and outputs receive a lot of scrutiny.

They were early adopters of My Pasture Planner, incorporating it into management practices in 2015.

My Pasture Planner highlighted variability of the total soil nitrogen across Owl Farm. It ranged from 0.56% to 0.77% This insight was valuable because it suggested the site was a good candidate for a variable rate of nitrogen fertiliser application as opposed to the same amount of nitrogen being applied to all pasture.

Owl farm chose to use My Pasture Planner to see if they could increase their productive and economic gains while using the same quantity of fertiliser. They could also have chosen to use the tool to reduce their levels of nitrogen while aiming to maintain the same levels of production.

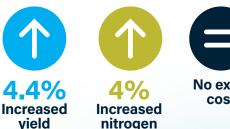
"I'm proud that Owl Farm still uses My Pasture Planner as the basis for its nitrogen decisions to this date"

Ian Tarbotton Ballance Science Extension Manager

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They achieved both an increase in dry matter growth and nitrogen response rate by using My Pasture Planner, and were able to reduce the risk of nitrate leaching because My Pasture Planner showed some areas would not benefit from any application of nitrogen.



response

No extra cost

SpreadSmart™ Case study

Tutamoe station

Tutamoe's owner, Pāmu has a performance and quality framework for farming smart, with care and consistency across all its farms.

Tutamoe Station is a 1,966 ha property 50 km inland from Tolaga Bay. Tutamoe is an extensive, high performing medium to steep hill country station.

Station managers have historically had trouble effectively tracing where and how much nutrient was being applied to the land through traditional aerial top-dressing. They put SpreadSmart™ in place for the 2017/18 growing season. SpreadSmart's GPS guidance and tracking systems were able to keep track of the area of the farm where the manager wanted to avoid fertiliser. These exclusion zones included roads, gullies, swamps, holding paddocks and other areas which were either sensitive or had low productivity.

The technology allowed proof of placement of the exact locations of nutrient application (ie proof that no fertiliser was spread in native planting or waterways) and reduced the overall amount of fertiliser used on-farm.

Pāmu highlighted the speed and ease of application using SpreadSmart[™] and the safer aircraft operation as benefits along with cost-saving and protection of sensitive areas.

"SpreadSmart™ allows us to continually progress as greats stewards of the land we farm"

Roo Hall Farming Innovation Specialist, Pāmu





down



6.5% Tonnes fertiliser used down





Enhanced Extension

Ballance now has a team of extension specialists in soil dynamics, farm systems, precision agriculture, arable systems, sustainability extension practice, and animal health who are able to share insight and give support around the developments and demands of agricultural systems.

At the beginning of the PGP Programme we had a goal of building capability and collaboration.

This was broken down into 6 sub-goals, all of which have been achieved or exceeded.

Goal	Achievement				
2 e-learning modules for use by rural professionals Goal 2	13 E-learning training modules 2 modules in late stage development Achieved 13 with two more pending				
Consistent Industry Messages via Nutrient Management Roadshows	To date we have presented to over 580 people Achieved 32 Workshops				
Initiate Sheep and Beef Nutrient Management Show	Collaboration in place with Beef & Lamb NZ for Nutrient Management Training				
Build Capability across PGP Programme	In addition to e-learning, we have provided facilitation and best practice information to Industry partners Farmer groups Rural professionals (internal and external) Achieved 60⁺ separate facilitations/ presentations				
Nuffield Scholarship completed on Collaborative Management	Team Member Rebecca Hyde completed her Nuffield Scholarship in 2017 and is in demand as a speaker and presenter https://m.youtube.com/watch?v= fW-T7j7Yb0w&feature=youtu.be				
Digital/ Webinar	 Podcast platform hosting 23 agri-science podcasts https://soundcloud.com/ballance_sci Webinar on the 5 factors of N loss 10 short training videos Twitter feed @BallanceSci Achieved 33 digital packages to date 				



Extension benefits

The benefits of changes to Science Extension under the Clearview Innovations PGP Programme include.



Increased outreach and new network creation

By sharing information with a wide range of audiences across the sector, we have been able to develop a groundswell of understanding of essential nutrient information (eg the causes of nitrogen loss) with diverse groups.



Greater engagement within Ballance and with external and industry partners

By raising our profile through training/presentations, digital extension and social media, we have increased our industry profile and awareness.



Collaboration on extension projects with industry partners

As well as trial and project work with other industry players (eg AgResearch), we have collaborated with industry experts in our digital extension (eg Lincoln AgriTech and Plant & Food research in a podcast on Catch Crops)



Creation of learning tools that cater to different learning styles

Visual and auditory learners are now catered to with video and audio training material. E-learning packages allow a learn-as-you-go approach as well as providing reinforcement for face-to-face training and support for remote or sole workers across the regions.

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A train-the-trainer approach to facilitation and collaborative working across the industry

Science Extension specialists are in demand to facilitate workshops and conferences on potentially-problematic areas which need an understanding of change management, the grief cycle, principals of adult learning etc. Ballance collaborates with other industry bodies, eg Dairy NZ to maintain a high level of best-practice extension for the benefit of the broader sector.



A shift from one-to-few to one-to-many information-sharing

Audio-visual and online training tools give greater efficiency and effectiveness and allow us to share established knowledge and findings with a greater number of people.



Increased consistency in messaging and understanding across the industry

We have established and shared a number of basic nutrient information presentations (eg the five factors of nitrogen loss on farm) which we freely share with industry partners and interested groups. This helps to grow a 'common footing' of established knowledge and shared understanding. Our publications (eg the Ballance Nutrient Handbook, Nitrogen Management Workbooks) are in demand from agricultural training organisations as well and we share them freely. These publications are based on verified science and are produced as reference and training documents independent of sales and marketing publications.

Financial Summary

The budgeted spend for the life of the programme was \$19.5 M (refer to table below). The final programme spend was \$19,499,338.

The Programme used financial years ending 30 June.

	Actual 2011/12	Actual 2012/13	Actual 2013/14	Actual 2014/15	Actual 2015/16	Actual 2016/17	Actual 2017/18	Actual 2018/19	Total	Budgeted
In kind	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ballance	\$1,985,403	\$2,210,720	\$1,360,542	\$760,933	\$765,322	\$831,718	\$1,478,531	\$356,500	\$9,749,668	\$9,750,000
PGP	\$1,985,403	\$2,433,220	\$1,569,663	\$717,995	\$672,374	\$803,916	\$1,210,600	\$356,500	\$9,749,671	\$9,750,000
Total	\$3,970,806	\$4,643,940	\$2,930,205	\$1,478,928	\$1,437,696	\$1,635,634	\$2,689,130	\$713,000	\$19,499,338	\$19,500,000
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7		Total	Total
1: Nitroge	en									
In kind	\$0	\$0	\$0	\$0	\$0	\$0	\$0		\$0	\$0
Ballance	\$977,535	\$1,102,892	\$454,759	\$108,397	\$201,407	\$60,239	\$186,118	\$176,608	\$3,267,955	\$3,284,751
PGP	\$977,535	\$1,325,392	\$663,880	\$65,459	\$108,460	\$32,436	\$0	\$176,608	\$3,349,770	\$3,284,752
Total	\$1,955,070	\$2,428,284	\$1,118,639	\$173,857	\$309,867	\$92,675	\$186,118	\$353,216	\$6,617,725	\$6,569,503
2: Phospl	horus									
In kind	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ballance	\$497,449	\$578,647	\$227,576	\$173,230	\$99,821	\$238,867	\$952,752	\$0	\$2,768,342	\$1,747,427
PGP	\$497,449	\$578,647	\$227,576	\$173,230	\$99,821	\$238,867	\$870,939	\$0	\$2,686,529	\$1,747,427
Total	\$994,898	\$1,157,294	\$455,152	\$346,460	\$199,641	\$477,734	\$1,823,691	\$0	\$5,454,870	\$3,494,853
3: Biologi	cals									
In kind	\$0	\$0	\$0	\$0	\$0	\$0	\$0		\$0	\$0
Ballance	\$490,523	\$405,102	\$541,647	\$180,125	\$81,340	\$78,160	\$25,669	\$25,669	\$1,828,234	\$2,624,272
PGP	\$490,523	\$405,102	\$541,647	\$180,125	\$81,340	\$78,160	\$25,669	\$25,669	\$1,828,234	\$2,624,272
Total	\$981,046	\$810,204	\$1,083,294	\$360,249	\$162,679	\$156,319	\$51,338	\$51,338	\$3,656,468	\$5,248,543
1-3: Prod	uct Develop	ment								
In kind	\$0	\$0	\$0	\$0	\$0	\$0	\$0		\$0	\$0
Ballance	\$1,965,507	\$2,086,641	\$1,223,981	\$461,752	\$382,567	\$377,266	\$1,164,539	\$202,277	\$7,864,530	\$7,656,449
PGP	\$1,965,507	\$2,309,141	\$1,433,102	\$418,814	\$289,620	\$349,463	\$896,608	\$202,277	\$7,864,532	\$7,656,450
Total	\$3,931,014	\$4,395,782	\$2,657,083	\$880,566	\$672,188	\$726,729	\$2,061,147	\$404,554	\$15,729,062	\$15,312,899
4: Extens	ion									
In kind	\$0	\$0	\$0	\$0	\$0	\$0	\$0		\$0	\$0
Ballance	\$19,896	\$124,079	\$53,625	\$218,837	\$330,252.14	\$375,543	\$262,339	\$139,997	\$1,524,568	\$1,790,615
PGP	\$19,896	\$124,079	\$53,625	\$218,837	\$330,252.14	\$375,543	\$262,339	\$139,997	\$1,524,568	\$1,790,615
Total	\$39,792	\$248,158	\$107,250	\$437,674	\$660,504	\$751,086	\$524,677	\$279,994	\$3,049,136	\$3,540,541
5: Progra	mme Manag	gement								
In kind	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ballance	\$0	\$0	\$82,936	\$80,344	\$52,502	\$78,910	\$51,653	\$14,226	\$360,571	\$302,936
PGP	\$0	\$0	\$82,936	\$80,344	\$52,502	\$78,910	\$51,653	\$14,226	\$360,571	\$302,936
Total	\$0	\$0	\$165,872	\$160,688	\$105,004	\$157,819	\$103,306	\$28,452	\$721,141	\$646,560

Acknowledgements

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