



A Year in Review

July 2023–June 2024



HIGH-VALUE
NUTRITION



Ko Ngā Kai
Whai Painga

National
Science
Challenges

Contents

Final Words from the Directorate	3
Highlights	
Achievements in 2023–24	4
Achievements over the Life of the Challenge	5
Science Excellence	
Impact	6
Our Students	7
Contestable Projects Completed in 2023–24	8
Our Business	
Stakeholder Engagement	12
Vision Mātauranga	14
Public Awareness	15
Our Legacy	
Metadata Catalogue	16
Publications	17
References	18

Our Purpose

The core purpose of the High-Value Nutrition | Ko Ngā Kai Whai Painga National Science Challenge was to develop high-value foods with validated health benefits to drive economic growth for Aotearoa New Zealand.

Investing in science excellence and building collaborative relationships between research and industry to create new platforms, to build capabilities and to enable innovation were key to this purpose.

Final Words from the Directorate

It is hard to believe that High-Value Nutrition's (HVN) 10-year journey officially ended on 30 June. It has been great to have been part of such a unique programme globally, and we are very proud of what has been achieved.

We extend thanks to the HVN Board and to our hosts the University of Auckland/Liggins Institute for their support, especially through the challenging times of the COVID-19 pandemic. We also recognise the contribution of the many excellent science advisers who provided independent reviews of research proposals and advice and guidance for the direction of the programme. Likewise, the advice and comments from our Industry Advisory Panel was invaluable to the success of the programme.

Over the last decade, HVN has worked with businesses across the country to make discoveries that put New Zealand food on the world stage. An evaluation of business impacts has shown a wide range of benefits including impact on revenue, business strategies, employment opportunities, awards and PR activities leading to greater consumer interest in their products. Through the scientifically proven validation of health benefits and the development of new products, we have significantly boosted revenues.

With no new projects funded in HVN's final year, the focus has been on ensuring all projects finished well, with all clinical intervention phases being completed throughout the year. We have also ensured that data are available for future use, and that outcomes were published and communicated effectively. There remains a body of work to be done to analyse samples, data and results and it is envisaged publications and impact will continue over coming years.

Throughout the life of HVN there has been a healthy mix of projects focusing on indigenous or introduced species, with a wide range of industry partners, outcomes and impacts. While the details of future investment in food and health research, especially that which brings academia and commerce together, has yet to be decided (or at least made public), we sincerely hope there will be funding continuity for research in this area.



The HVN Directorate at Foodomics 2024: (l-r) Eleanor Surtida, Treena Brown, Helen Madden, Joanne Todd, Jane Mullaney, Richard Mithen.

Programme Highlights

Achievements in 2023–24

70

Media articles were published over the last year highlighting HVN projects and their findings

The He Rourou Whai Painga study reaching a significant milestone in June with the final 12-month visit from study participant 200 and their whānau. The visit marks the end of data collection for the study.

180

Delegates attended Foodomics 2024, the final conference of HVN, with **70** presentations highlighting HVN outputs and business impacts

Completion of the clinical phases of all research projects, with preliminary findings showing the positive benefits of NZ food and beverage (F&B) products on the health of consumers

2

Dietary studies (He Rourou Whai Painga and SYNERGY) having shown that consuming a diet comprised of predominantly NZ produced F&B can improve markers of metabolic health and wellbeing

46

Peer-reviewed publications have been published in the last 12 months, the majority in the upper quartile of Impact Factor for the journals in its field

Achievements over the Life of the Challenge

60

New Zealand businesses
have collaborated with HVN
on investigations into over

140

F&B products

\$9m

Has been invested
into HVN
capabilities by New
Zealand businesses

290

Peer-reviewed science
articles have been
published, many in the top
quartile of journals in the
relevant field

4

Patents have been
developed with the support
of HVN research as well as
many other intellectual
property outcomes for
businesses

Science Excellence

HVN is a science programme that champions combining excellent science with social, environmental, and economic impacts. The two major components to HVN – the Priority Research Programmes (PRPs) and the Contestable Fund Projects – differ in scientific emphasis. While both combine science excellence with impact, the PRPs have a greater emphasis on the adoption of innovative technologies, higher risk science of a more fundamental nature, and the development of new approaches and techniques; in contrast the Contestable Fund Projects have a stronger translational impetus in which value to the commercial partner is of paramount importance.

The PRPs took an approach to build translational programmes that developed and utilised novel methodologies, technologies and analytical methods. While they operated separately, each PRP used a systems biology approach, which recognises that there are multifactorial influences to health outcomes. Such recognition enhanced collaboration across the PRPs, with each programme developing methods that could be used to analyse multiple health outcomes from one clinical study. This led to trans-disciplinary projects, across research fields, together with industry input, utilising a co-design approach. Scientific capabilities now exist in NZ that have evolved throughout HVN.

Over the last 12 months, 46 papers were published following stringent external peer review describing research that was supported through HVN. The majority of publications were in the top quartile for their relevant discipline which is testament to the quality of the science. Eleven of these publications reported results of human dietary intervention studies with different F&B products manufactured by New Zealand companies with a focus on metabolic and digestive health.

The use of innovative technologies was particularly evident within the Digestive Health PRP which combined physiome technologies including body surface gastric mapping (BSGM), sensors for abdominal distension, magnetic resonance imaging (MRI) of digestive processes and Atmo gas-sensing technology with multi-omic analyses of gut microbiota and human tissue samples. Within the Metabolic Health programme, the acquisition of experimental data sets from many individuals is now enabling the team to adopt a machine learning approach to develop an algorithm to predict a personalised post-prandial glucose response. This is in line with trends to develop a more personalised approach to nutrition

Science excellence is also evidenced by presentations on HVN-supported science at international science conferences. During the reporting period, key-note presentations, invited talks and posters were accepted at several major conferences including:

- NuGO week, September 2024, Ghent, Belgium
- 14th Federation of European Nutrition Societies Conference (FENS), November 2023, Belgrade, Serbia
- United European Gastroenterology Week, October 2023, Copenhagen, Denmark
- 19th International Congress of Nutrition and Dietetics, June 2023, Toronto, Canada
- Metabolomics 2024, June 2024, Osaka, Japan
- Gordon Research Conference on Immunometabolism in Health and Disease, June 2023, Rhode Island, US

In addition to invitations to international science conferences, the HVN Foodomics Conference in March 2024 enabled the wider HVN programme to be presented to an audience of NZ and invited international scientists, all of whom complimented the HVN leadership on the science excellence and innovation of the HVN programme. The innovation, ambition and execution of the He Rourou Whai Painga study received particular praise from external review. While community-based intervention studies have been undertaken in other regions, the novelty of including whānau in the experimental design, the inclusion of social science analyses, and the use of a diet based upon predominantly New Zealand food products was recognised as being unique.

Throughout HVN there has been a strong focus on supporting students and early career researchers. In total, there have been 47 PhD students and 39 Masters or Honours students (of these 8 were scholarships for Māori students), and 42 interns supported through the Pūhuru STEMM Academy. All students have brought fresh perspectives into established teams, ensuring a future workforce to support the F&B industry.

Although funding has now ended, the core Science Leadership Team (Distinguished Professor Harjinder Singh, Professor's Nicole Roy and Clare Wall, Associate Professor Jennifer Miles-Chan, Doctors Denise Conroy and Olivier Gasser, together with Dr Jane Mullaney – Vision Mātauranga lead) have committed to continue working together on publications, grant applications and projects that will continue to support the F&B industry. The team will use the well-established High-Value Nutrition branding and are in the process of creating a new website (www.highvaluenutrition.ac.nz). They will also utilise the current HVN LinkedIn page for future communications. These activities will be unfunded, but this is a very powerful outcome of HVN which speaks highly to the collaborations formed and the commitment to continue programmes of work to benefit the food industry.



The HVN Science Leadership Team will continue to work together as High-Value Nutrition (pictured with HVN Director Joanne Todd and Associate Professor Fiona Lithander).

Contestable Projects Completed in 2023–24

Native plants

Kānuka O Te Taihū

Kaikaiāwaro Charitable Trust (charitable arm of Te Rūnanga o Ngāti Kuia)

Project type: Development grant

Outcomes: Project has completed and data providing evidence for provenance related claims.

Te Wai o Rongoā

Macorja Group Limited

Project type: Development grant

Outcomes: Bioactive and safety analyses completed, informing options for future product development.

Tūhauora (Kawakawa)

Wakatū Incorporation; Chia Sisters

Project type: Clinical trials

Outcomes: Publications concerning chemical composition of kawakawa, human metabolism and effects on biomarkers of glucose homeostasis.

Native aquatic

Blackfoot Pāua

NewFish

Project type: Development grant

Outcomes: All data analyses are complete, providing new nutritional insights on pāua composition.

Greenshell™ mussels for osteoarthritis

Sanford Ltd

Project type: Clinical trials

Outcomes: Projects provided further evidence from human studies that diets rich in Greenshell™ mussel extract can reduce inflammation, improve recovery of muscle damage after exercise, and reduce pain associated with osteoarthritis.

Mussel with fucoidan

Beyond Capital MedTech Management Ltd

Project type: Clinical trial

Outcomes: Clinical trial completed. Data analysis ongoing.

SeaDragon

SeaDragon

Project type: Clinical trial

Outcomes: Clinical trial completed. Data analysis ongoing.

Native honeys

Native Mono-floral Honeys

Te Pumautanga o Te Arawa Trust

Project type: Chemical and sensory evaluation

Outcomes: Sensory studies completed. Chemical analysis ongoing.

SOOTHE

Comvita Ltd

Project type: Clinical trial

Outcomes: Feasibility study has indicated Mānuka Honey could offer effective and natural relief for those experiencing the heartburn, pain and discomfort of indigestion (functional dyspepsia).

Meat, dairy and derived products

Collagen

Southern Pastures

Project type: Clinical trial

Outcomes: Interventions completed. Data analysis ongoing.

NIG Nutrition Goat Milk

NIG Nutritionals Limited

Project type: Clinical trial

Outcomes: Clinical trial completed. Data analysis ongoing.

Non-native plants

Ārepa – Gut Brain Axis

Alphagen

Project type: Clinical trial

Outcomes: The studies on the effect of Ārepa beverage on mood and cognition, showed the primary measure of stress reactivity was not changed, but secondary measures of mood and cognition were significantly improved.

Ārepa – Nootropic powder

Alphagen

Project type: Clinical trials

Outcomes: Clinical trials completed. Data analysis ongoing.

BerriQi

Anagenix

Project type: Clinical trials

Outcomes: Interventions completed. Data analysis ongoing.

Our Business

Stakeholder Engagement

Foodomics 2024: 19–24 March 2024



The final Foodomics conference was held in March 2024 at the Tākina Events Centre in Wellington. This was well attended, with over 180 people registered. It was a very successful event and as per previous years, feedback indicated that combining research and business presentations worked well to enhance audience engagement.

A strong emphasis was placed on encouraging doctoral students to present their work, giving many of them their first opportunity to present to a wide and supportive audience.

One of the highlights was a session in which Māori HVN scholarship recipients presented work from their theses. This session clearly demonstrated how integration of mātauranga can bring diversity and value to projects.

Early career researchers and graduate students were also provided an opportunity to present their work in a poster format, and businesses and research organisations were invited to set up display stands so that attendees could visit these during the breaks.

There was a strong sense of pride of what has been achieved by HVN throughout the three days.

Industry Workshops

Stakeholders from business, research and governmental communities were invited to two workshops held in September and November in Wellington and Auckland, respectively. There were approximately 30 attendees at each workshop.

Insights from the PRP leaders and industry partners were shared, giving attendees an opportunity to think about how HVN type activities could be incorporated into their own future strategies.

In addition, representatives were invited from Callaghan Innovation, MPI, MBIE, NZTE and the Food Innovation Network to share how they may support businesses in the future.

Engagement over the Life of the Challenge

Over the 10-year funding period, HVN has built a substantial network of stakeholders and collaborators across research, business and governmental communities. The HVN Challenge made substantial headway in fostering linkages with Māori-owned F&B businesses, Māori Trusts, and other Māori and non-Māori stakeholders (e.g. Pūhoro STEMM Academy). All stakeholders have demonstrated their support of HVN's mission via commitments of cash co-funding, time and expertise.

With the end of HVN funding it is hoped that the networks developed will continue to operate and grow, building on the many successes from HVN.

Vision Mātauranga

In the final year of the Challenge no new projects were initiated. However, HVN continued to embed and support its Vision Mātauranga (VM) strategy through the completion of projects with Māori business partners, and through the support of Māori students.

The focus areas that formed the core of HVN's VM strategy were

- “Ngā uara”, a focus on values recognising that many Māori businesses are whānau or family collaborations that, as well as having economic goals, are largely driven by social, cultural and environmental objectives.
- We aimed for effective engagement with Māori F&B stakeholders, strengthening one-on-one relationships with aligned Māori F&B entities that had the scale and ability to engage directly with HVN.
- We aimed to strengthen Māori research capacity and capability, this meant prioritising opportunities for Māori-led research and to facilitate career development and leadership pathways, leading to researcher retention and effective succession planning.

Examples of Māori being appropriately involved in decision-making through governance and management roles in the Challenge are the appointment of Dr Meika Foster early in the challenge in the VM leadership role, followed by Arohaina Owen and then Dr Jane Mullaney. Each of these leaders has contributed to the VM strategy, as well as supporting the Directorate and Science Leadership Team in their own learning journeys.

Māori Capability Building

HVN has continued to support the career development of Māori researchers, including leadership mentorship for Māori scientists and PhD students. There have been eight HVN scholarships awarded to Māori graduate students or interns. In addition, this year a Māori student was enrolled as a PhD student under the supervision of Professor Jeremy Krebs to work on data from the He Rourou Whai Painga study, specifically to evaluate the interactions between a NZ diet for metabolic health and the gut microbiome.

Cross-NSC Activities

HVN supported the formation and activities of Rauika Māngai. In the past year the focus has been on supporting the development of a book describing the Te Tiriti journeys of each Challenge. HVN has supported this financially and through attendance at workshops. This will provide an important resource for future research collaborations.

[Read Te Tiriti O Waitangi Partnerships Enhances Research, Science and Innovation: National Science Challenges Share their Experiences](#)

Public Awareness

Public communication has been key to HVN raising awareness of our research activities and engaging the public in HVN's science. This has enabled us to share results that help the public to make healthy dietary choices and support our industry partners by raising awareness of research results.

In the past year, communications have had a strong emphasis on finishing well, with a focus on five areas: continuing to share research results; telling the story of the impact of HVN's research over the lifetime of the Challenge; raising awareness of what is being lost to New Zealand's economy, F&B industry and scientific landscape with the closure of the Challenge; ensuring that our outcomes and findings are accessible post-June 2024, and raising awareness of these resources.

HVN engaged a creative agency, together with their PR partner, to create an engaging campaign highlighting HVN's activities and profiling some case studies.

The campaign, 'Facts with Impact' was launched in June 2024 and generated high media interest.

The HVN Director was interviewed on *RNZ* and for *Farmers Weekly*, and an article was published in the *New Zealand Herald*. Content was also shared widely through other channels.



Our Legacy

HVN Metadata Catalogue

Through the excellent work carried out by the University of Auckland's Centre for eResearch team, a freely accessible 'metadata' catalogue has been assembled. This will ensure that information about all the projects HVN had supported is publicly available.

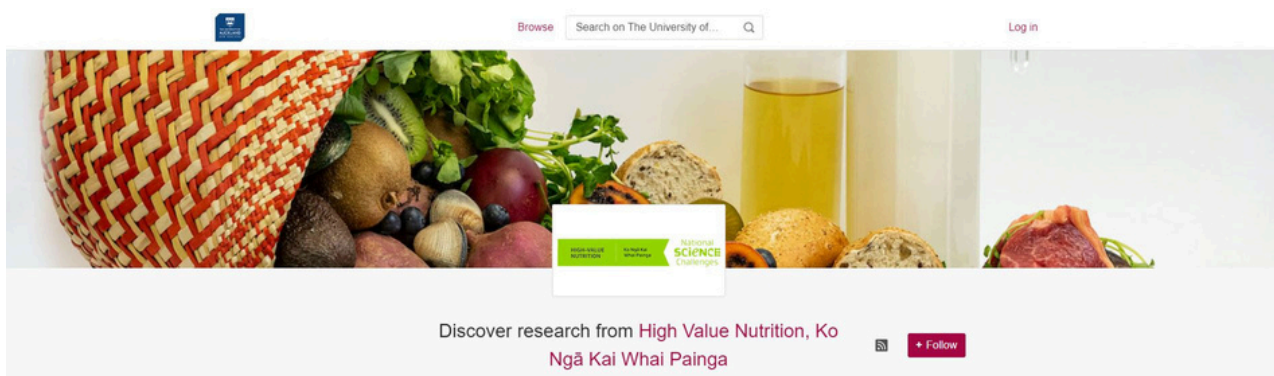
The metadata catalogue is a key legacy item and provides information about all HVN clinical trials and projects along with how interested parties can access data for future research. The HVN metadata site also provides details of all peer-reviewed publications, annual reports, patent landscape insights and regulatory and consumer insights reports.

Each metadata record contains a set of fields developed with the science leaders to be meaningful in the context of HVN research; to describe, for example, the subject and scope of the project and associated data. For research including human health and clinical data, records also link to ethics approvals and clinical trial registry records, providing detailed, searchable information.

Importantly, each record includes contact information for individuals and organisations who are involved in the guardianship of the data, including kaitiaki and industry partners. In this way, it is possible to involve the appropriate people in future decisions around the data. In the NZ context, it was important that the metadata catalogue was flexible enough to make statements about project data in the context of Tikanga Māori; for example, where Māori assert kaitiakitanga over a particular species that is the subject of research. Initially intended to describe datasets for the Priority Research Programmes, the catalogue has expanded to include 69 projects, including Tranche 1 and 2 contestable projects.

As of July 2024, the records within the HVN subsite have had 20,000+ views and 4,600+ file downloads since July 2023. The HVN metadata catalogue provides a persistent record of the research produced by this National Science Challenge for future generations to refer to and build upon.

[Visit the Metadata Catalogue](#)



Publications

To date, HVN has led to the publication of over **290 peer-reviewed science articles** in international journals, the majority of which are in the upper quartile of journals in their respective fields. Further science articles will appear throughout the next few years.

[Browse the publication database on Figshare.](#)

These publications contribute to food and nutrition knowledge, and are of value to scientists, policy makers and informed consumers in New Zealand and elsewhere. Through this significant science contribution, it is relatively easy to assess ‘what we know now that we did not know before’.

For example:

- In the Tūhauora Kawakawa project supported by Wakatū Incorporation and the Chia Sisters, a comprehensive understanding of the chemical content of **kawakawa** leaves and how many of these compounds are metabolised and excreted by humans after drinking a kawakawa-based beverage has been obtained (Jayaprakash et al, 2022; 2024), along with an indication that the beverage may have beneficial health effects (Ramzan et al 2022).
- The projects that HVN NSC supported on **Greenshell™ mussels** (GSM) together with Sanford Ltd, provided evidence that regular consumption of a GSM powder can alleviate symptoms and improve functionality in those with osteoarthritis and reduce the rate of cartilage degradation (Abshrini et al 2021; Slade et al, 2024).
- A project on **kiwifruit** supported by Zespri International informed us that consuming kiwifruit can lead to a better night’s sleep and this may be related to changes in serotonin metabolism (Kanon et al 2023).

References

Abshirini, Maryam, et al. "Effects of Greenshell™ mussel intervention on biomarkers of cartilage metabolism, inflammatory markers and joint symptoms in overweight/obese postmenopausal women: A randomized, double-blind, and placebo-controlled trial." *Frontiers in medicine* 9 (2022): 1063336.

Jayaprakash R, Ramzan F, Miles-Chan JL, Foster M, Mithen RF, Pook C. Exploring the Chemical Space of Kawakawa Leaf (*Piper excelsum*). *Nutrients*. 2022 Dec 5;14(23):5168.

Jayaprakash R, Pook C, Ramzan F, Miles-Chan JL, Mithen RF, Foster M. Human Metabolism and Excretion of Kawakawa (*Piper excelsum*) Leaf Chemicals. *Mol Nutr Food Res*. 2024 Mar;68(6):e2300583. doi: 10.1002/mnfr.202300583. Epub 2024 Feb 22. PMID: 38389156.

Kanon AP, Giezenaar C, Roy NC, McNabb WC, Henare SJ. Acute effects of fresh versus dried Hayward green kiwifruit on sleep quality, mood, and sleep-related urinary metabolites in healthy young men with good and poor sleep quality. *Front Nutr*. 2023. doi: 10.3389/fnut.2023.

Ramzan F, Jayaprakash R, Pook C, Foster M, Miles-Chan JL, and Mithen R. Acute effects of Kawakawa (*Piper excelsum*) intake on postprandial glycemic and insulinaemic response in a healthy population. *Nutrients*. 2022.

Slade C, Kruger M, Miller M, Mazahery H, Beck K, Conlon C, von Hurst P. The Effects of Greenshell Mussel Powder (PERNAULTRA) on Physical Performance and Subjective Pain, Symptoms, and Function Measures in Knee Osteoarthritis: A 6-Month Randomized, Double-Blind, Placebo-Controlled Trial. *Curr Dev Nutr* 2024; 27(8): 102148