

Legacy, active progress, and future value

Together

to innovate

Building on 16 years of Collaboration:
Climate-Smart Agricultural Innovation in
Latin America and the Caribbean



**Te Kāwanatanga
o Aotearoa**
New Zealand Government



FONTAGRO



Códigos JEL: Q16

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The Global Research Alliance on Agricultural Greenhouse Gases (GRA) is a collaborative initiative that supports international cooperation to improve the quantification and mitigation of agricultural greenhouse gas emissions while advancing productive, resilient, and sustainable food systems.

The Ministry for Primary Industries (MPI) of New Zealand supports the sustainability, productivity, and resilience of New Zealand's primary industries and contributes to international collaboration on agricultural innovation, climate resilience, biosecurity, and low-emission production systems.

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Prologue

For 16 years, FONTAGRO and the Government of New Zealand, through the Ministry for Primary Industries and in collaboration with the Global Research Alliance on Agricultural Greenhouse Gases, have supported agricultural innovation and climate resilience across Latin America and the Caribbean. The collaboration has helped build a regional body of work on greenhouse gas measurement, sustainable livestock systems, pasture management, soil carbon, biological inputs, digital agriculture, Indigenous and community-based innovation, and adaptation to increasingly variable climates.

This report presents the collaboration as a living record of accumulated capacity, current progress, and future opportunities. Closed projects are best understood through their legacy: the methods, networks, trained professionals, tools, and evidence they contributed. Active projects continue to generate new data, field validation, digital tools, protocols, and lessons for scaling. Early investments in emissions measurement, livestock research, and regional collaboration created the basis for newer work on methane mitigation, nitrogen management, satellite monitoring, soil carbon, silvopastoral systems, bioinputs, and resilient cropping systems. The portfolio demonstrates how long-term cooperation can move from measurement to management, from pilots to platforms, and from individual project outputs to shared regional capacity.

For New Zealand, this collaboration contributes to global agricultural climate action and strengthens scientific links with diverse pasture-based, mixed, tropical, subtropical, high-Andean, and dryland production systems. For Latin America and the Caribbean, it supports locally adapted innovation, capacity building, producer-facing tools, and evidence for sustainable development. For the GRA, it reinforces the value of international collaboration in addressing the dual challenge of food production and agricultural greenhouse gas mitigation.



A Message of Thanks from the FONTAGRO Technical Administrative Secretariat

FONTAGRO is pleased to present this 2026 update on its collaboration with the Government of New Zealand, through the Ministry for Primary Industries (MPI), and with the Global Research Alliance on Agricultural Greenhouse Gases (GRA). This edition reflects 16 years of shared work to promote climate-smart agricultural innovation in Latin America and the Caribbean. We would like to extend our deepest gratitude to all the individuals and organizations that have contributed to the success of this collaborative effort between MPI and FONTAGRO. First and foremost, we thank the MPI for its unwavering support and commitment to fostering agricultural innovation and sustainability in the region. Its vision and leadership have been instrumental in driving forward projects that address the critical challenges posed by climate change in our agricultural systems. We are also profoundly grateful to the GRA for its continued collaboration and support. Its contribution to advancing scientific research and promoting international cooperation has greatly enriched our collective work. Our appreciation extends to the FONTAGRO Board of Directors for its strategic guidance and ongoing support, which have been essential in steering FONTAGRO's mission toward impactful results. Its leadership has enabled FONTAGRO to be a catalyst for agricultural innovation across Latin America and the Caribbean. We would like to acknowledge the invaluable efforts of the scientists and researchers who have been at the heart of our projects. Their dedication to advancing scientific knowledge, developing innovative solutions, and promoting sustainable agricultural practices is the cornerstone of our achievements. Special thanks are due to the Inter-American Development Bank (IDB) for its support. The IDB's commitment to supporting sustainable development in the region has been crucial in enabling FONTAGRO to implement groundbreaking projects that address both local and global challenges. Finally, we extend our gratitude to the Inter-American Institute for Cooperation on Agriculture (IICA) for its support in enhancing agricultural development and innovation. Its collaboration has greatly contributed to strengthening capacities and fostering agricultural research and knowledge exchange across Latin America and the Caribbean. Together, these efforts demonstrate the power of partnership in achieving sustainable and impactful agricultural innovation. We look forward to continuing this journey of collaboration, learning, and growth with all our partners.

Finally, we would like to express our heartfelt gratitude to the former Executive Secretaries of FONTAGRO, Nicolás Mateo, Hugo Li Pun, Hayden Montgomery, and Terry Meikle, whose vision and leadership laid the foundation for this invaluable alliance. Their dedication and foresight were instrumental in shaping the collaborative efforts that continue to drive agricultural innovation and climate resilience in Latin America and the Caribbean. Their contributions serve as a lasting legacy, inspiring the ongoing work of researchers, policymakers, and institutions committed to advancing sustainable agricultural solutions in the region.



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Legacy, active progress, and future value



Legacy, active progress, and future value

This report presents a living record of the FONTAGRO-New Zealand collaboration. Closed projects are presented through their legacy contributions and continued relevance, whereas active projects are updated with new indicators, activities, and emerging results where available. In addition, the portfolio is reframed through cross-project lessons, accumulated outputs, and the continuing value of the partnership for New Zealand, GRA, and Latin America and the Caribbean.

The report is then organized around two complementary types of evidence. Projects 1-8 are completed and continue to contribute through their legacy: measurement capacity, technical methods, trained professionals, institutional

networks, producer platforms, and tools that informed later work. Projects 9-20 remain active and show how the collaboration continues to generate data, field trials, protocols, digital tools, training activities, and new pathways for adoption.

The portfolio evolved from greenhouse gas measurement and livestock research toward a broader platform that includes digital agriculture, soil carbon, nitrogen management, biological products, silvopastoral systems, Indigenous community resilience, and dryland crop adaptation. This evolution shows how continuity can become a source of innovation: early investments in methods and capacity now support a more integrated agenda for climate-smart agriculture.

Legacy / closed	Active - advanced implementation	Active - early implementation
Projects 1-8 Completed projects whose legacy remains visible in current methods, networks, trained capacity, and later project design.	Projects 9-16 Active projects with substantial progress, including datasets, protocols, tools, field trials, training, and emerging results.	Projects 17-20 Active projects in early implementation, with emphasis on baseline work, site selection, protocols, and the 2026 implementation agenda.

Countries and collaboration geography



- 1** Climate Change and Livestock
INIA, Uruguay
- 2** Developing competitive livestock production systems with low greenhouse gas emissions in Central America
INTA, Costa Rica
- 3** Improving animal production systems, with a focus on dairy farming, in a climate change context in the Andean Region
IICA, Peru
- 4** Livestock and climate change: applied research and knowledge
FONTAGRO
- 5** Sustainable intensification with legumes
Fundación ArgenInta/INTA, Argentina
- 6** Innovation for pasture management
INIA, Uruguay
- 7** Agtech for climate-smart dairy
Fundación ArgenInta/INTA, Argentina
- 8** Cattle productivity in the South American Chaco region
Fundación ArgenInta/INTA, Argentina
- 9** Organic-carbon sequestration in Latin American and Caribbean soils
INIA, Uruguay
- 10** Satellite monitoring of quantity and quality of available biomass in pastoral livestock systems
Fundación ArgenInta/INTA, Argentina
- 11** Innovations to reduce methane emissions in ruminants
AGROSAVIA, Colombia
- 12** Platform for the transfer and efficient use of biologicals on Latin American farms
CEAZA, Chile
- 13** Biological products for creating resilience to climate change
AGROSAVIA, Colombia
- 14** Sustainable livestock in the Peruvian and Ecuadorian Amazonia
UNAM, Perú
- 15** Climate change and indigenous communities
INTA, Argentina
- 16** Nitrogen Optimization
INIA, Chile
- 17** Resilient production to mitigate climate change
INTA, Argentina
- 18** Scaling Innovation in Pastoral Systems
INIA, Uruguay
- 19** Reducing GHG Emissions in Potato-Pasture Systems in Ecuador and Peru
INIAP, Ecuador
- 20** Sustainable Intensification of Production in Central America
INTA, Costa Rica

Main research themes

Theme	Portfolio expression
Livestock methane and nitrous oxide mitigation	Early work built measurement capacity; active projects now test sensors, additives, feeding strategies, nitrogen practices, and emission factors.
Pasture and forage monitoring	Early work developed and validated a digital decision-support system for pasture management; active projects now deepen satellite-based forage monitoring and scale its use through platform integration, advisory tools, and new modules for nutrition and emissions.
Soil organic carbon	Early work quantified soil carbon changes under legume-based sustainable livestock intensification; active work is generating regional soil carbon data, protocols, long-term experiment information, and sequestration opportunities.
Nitrogen management	The portfolio now includes 4R nutrient stewardship, N ₂ O and NH ₃ measurement, mitigation additives, and country-specific emission-factor development.
Biological inputs and bioproducts	Bioinputs, microbial traceability, beneficial fungi, drought tolerance, and reduced synthetic-input dependence are active innovation areas.
Silvopastoral and integrated production systems	New work evaluates integrated livestock-forestry practices, carbon stocks, carbon footprint, and resilience indicators.
Indigenous community resilience	Participatory innovation with Mapuche communities links livestock practices, food security, local knowledge, and climate resilience.
Conservation agriculture in potato-pasture systems	High-Andean systems in Ecuador and Peru are being evaluated through field plots and direct GHG measurement.
Sorghum and dryland resilience	Multi-environment genotype evaluation supports production-system resilience in water-limited regions, especially the Central American Dry Corridor.

Examples of output signals

Output category	Verified examples
Field sites and experiments	909 soil carbon sampling sites; 20 potato-pasture experimental plots; 15 Mapuche Innovation Units and 12 Experimental Units; nitrogen trials across participating countries; sorghum trials established in Argentina, Costa Rica, Peru, and the United States; 90 pilot sites in Chaco.
Producers surveyed or reached	284 Amazon livestock producers surveyed; 100 potato-pasture producers surveyed in Ecuador; 400 livestock farms used for baseline quantification in Central American; 2,595 Chaco producers trained; +12,000 people trained overall.
Researchers, technicians, students, and stakeholders trained or engaged	More than 1,100 technicians, producers, and students reached by the satellite biomass monitoring network; 275 beneficiaries in methane project events; 337 participants trained through the AlimenTro course; 71 participants in bioproduct workshops.
Databases, protocols, and analytical methods	2,879 encapsulated soil samples; more than 2,500 georeferenced forage records; a common GHG measurement protocol for nitrogen trials; more than nine standardized bioproduct protocols; microbial genomic and qPCR traceability work in the bioinputs platform.
Digital tools and decision-support systems	3RWeb and its new version under development; LECHECK.APP legacy; satellite biomass tools and web platforms; digital survey instruments; real-time sensor visualization for methane and ingestive behavior.



The partnership after 16 years

After 16 years of collaboration, the FONTAGRO-New Zealand partnership has become more than a sequence of individual projects. It has developed into an institutional platform for climate-smart agricultural innovation, connecting research institutions, public agencies, technical teams, producers, and international partners around a shared challenge: how to make agricultural systems more productive, resilient, and compatible with a low-emission future.

The first stage of the collaboration focused strongly on the quantification of agricultural greenhouse gas emissions, especially methane and nitrous oxide in livestock systems. That work was foundational. It strengthened technical capacity, created measurement experience under Latin American and Caribbean conditions, trained professionals, supported laboratory and field methods, and helped

participating countries generate evidence relevant to national greenhouse gas inventories and international climate commitments.

Over time, the portfolio expanded from measurement toward innovation systems. The partnership moved into low-emission livestock management, improved feeding strategies, pasture and forage decision tools, soil organic carbon, nitrogen optimization, biological inputs, silvopastoral systems, conservation agriculture, Indigenous community resilience, and dryland crop adaptation. This evolution reflects a practical understanding of climate-smart agriculture: mitigation and adaptation require credible measurement, but they also require technologies, management practices, institutions, and adoption pathways that work under real production conditions.

From measurement to integrated innovation

Stage of collaboration	Main contribution	Current value
Measurement foundation	Methane and nitrous oxide quantification, emission factors, laboratory capacity, and trained professionals.	Credible MRV capacity and stronger links to national inventories, GRA priorities, and policy dialogue.
Management and productivity	Low-emission livestock systems, improved feeding, pasture management, herd management, and producer training.	Evidence that mitigation can be aligned with productivity, resilience, and farm-level decision-making.
Digital and biological innovation	AgTech tools, satellite monitoring, bioinputs, bioproducts, traceability, and decision-support systems.	Scalable tools and methods that can support wider adoption and technical advisory services.
Integrated systems and resilience	Soil carbon, nitrogen management, silvopastoral systems, Indigenous community innovation, conservation agriculture, and sorghum adaptation.	A broader climate-smart agriculture agenda that links mitigation, adaptation, food security, and territorial resilience.

Why the partnership matters now

The value of the portfolio lies in its collaborative-comparative nature. Through international consortia, the projects generate evidence across temperate, tropical, subtropical, high-Andean, Amazonian, dryland, and pastoral production systems. This diversity allows methods and technologies to be tested under contrasting climates, soils, institutions, and management conditions. For Latin America and the Caribbean, this supports locally adapted innovation. For New Zealand, it provides comparative evidence, scientific relationships, and learning opportunities from production systems that face climate risks increasingly relevant to global agriculture.

The partnership also reinforces New Zealand's contribution to the Global Research Alliance on Agricultural Greenhouse Gases. Through FONTAGRO, New Zealand's

support helps generate regional datasets, harmonized protocols, trained research capacity, and practical mitigation options. These outputs strengthen the connection between international climate research and field-level agricultural innovation.

For FONTAGRO, the collaboration demonstrates the role of regional cooperation in scaling agricultural research. FONTAGRO's platform makes it possible to coordinate multiple countries, connect research with producers and institutions, and adapt innovations to diverse realities. This is particularly important for climate-smart agriculture, where no single technology or production system can answer the full challenge.

Institutional value generated by the portfolio



Scientific credibility

Direct measurement, country-specific data, protocols, laboratory methods, and peer-reviewed outputs strengthen the evidence base.



Regional capacity

Training, workshops, graduate research, technical networks, and shared platforms expand the number of people and institutions able to work on climate-smart agriculture.



Practical innovation

Digital tools, decision-support systems, biological products, improved feeding strategies, and field trials connect research with producer needs.



Policy relevance

Emission factors, soil carbon evidence, GHG measurement, and mitigation scenarios support inventories, climate commitments, and agricultural policy dialogue.



Mutual learning

LAC countries and New Zealand exchange evidence across different production systems, creating value in both directions.

Seven areas of accumulated contribution

The contribution of the FONTAGRO-New Zealand partnership is cumulative. Individual projects generated specific outputs, but the broader value of the portfolio is the way those outputs combine into a regional climate-smart agriculture agenda. Across 16 years, the collaboration has strengthened measurement capacity, supported low-emission livestock systems, developed digital and biological innovations, advanced soil and nutrient management, and created platforms for scaling knowledge across countries and production systems.

	Area	Accumulated contribution	Examples from the portfolio
1	Measurement, reporting, and verification capacity	The portfolio strengthened the ability to measure methane, nitrous oxide, soil carbon, ammonia losses, and GHG fluxes under regional conditions.	SF6 methane measurement, static chambers, gas chromatography, emission factors, SOC sampling, nitrogen protocols, and potato-pasture GHG measurements.
2	Low-emission livestock systems	The collaboration linked emissions mitigation with productivity, feeding, pasture management, herd management, and farm-level decision-making.	Central American livestock systems, Andean dairy systems, Amazon dual-purpose systems, methane additives, ingestive-behavior monitoring, and feed-resource assessment.
3	Digital agriculture and decision-support tools	The portfolio advanced producer-facing and advisor-facing tools that translate data into management decisions.	3RWeb, LECHECK.APP, satellite biomass tools, digital surveys, real-time sensor visualization, and platform integration through APIs.
4	Soil carbon and nitrogen management	Projects are generating evidence on SOC stocks, sequestration opportunities, nitrogen fertilizer losses, mitigation additives, and 4R nutrient stewardship.	909 SOC sampling sites, 2,879 encapsulated samples, long-term experiments, N2O and NH3 field trials, and locally relevant emission-factor work.
5	Biological solutions for resilient crops	The active portfolio is testing microbial bioinputs, beneficial fungi, biological control, drought tolerance, reduced synthetic-input dependence, and traceability.	Bioinputs platform, qPCR traceability, beneficial fungi for maize, standardized protocols, genomic analysis, and field-validation pathways.
6	Community-based and Indigenous innovation	The collaboration has supported participatory approaches that place producers and communities at the center of adaptation and resilience.	Chaco pilot sites, Mapuche Innovation Units, FPIC agreements, community-defined priorities, forage and water management, animal health, and ecological restoration.
7	Scaling pathways and policy relevance	The portfolio connects research outputs with training, extension, producer networks, public-private platforms, national inventories, and climate-policy dialogue.	Technical networks, workshops, graduate theses, producer training, GRA links, emission factors, soil carbon evidence, decision-support tools, and future public-private scaling.

16 years of Collaborative Work

2010 -2016: Measurement capacity became the technical base for later MRV, nitrogen, methane, and GHG measurement projects.

2017 -2019: The portfolio moved from measurement toward management, platforms, producer engagement, and digital decision support.



Methane and nitrous oxide emission quantification in grazing cattle.



Developing competitive livestock production systems with low greenhouse gas emissions in Central America.



Improving dairy production systems with less emissions in the Andean Region.

Peru, Bolivia, Colombia, Ecuador

Total Amount: USD 868,000



Latin American and Caribbean platform for sustainable intensification of livestock farming.

Argentina, Bolivia, Chile, Colombia, Costa Rica, Ecuador, Spain, Honduras, Nicaragua, Panama, Paraguay, Peru, Dominican Republic, Uruguay, Venezuela.



Carbon sequestration opportunities in Latin American and Caribbean soils.

Uruguay, Argentina, Chile, Costa Rica

Total Amount: USD 80,000



AgTech for climate-smart dairy farming.

Argentina, Costa Rica, Honduras, Dominican Republic, Uruguay

Total Amount: USD 540,900

Digital innovations for smarter pasture management.

Uruguay, Argentina, Costa Rica, United States

Total Amount: USD 512,940

2010

New Zealand, Uruguay, Argentina, Chile, Colombia, Dominican Republic

Total Amount: USD 1,000,000

2014

Costa Rica, Honduras, Nicaragua, Panama

Total Amount: USD 857,500



Collaborative research networks on resilient livestock production systems.

United States, Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, Spain, Honduras, Mexico, Nicaragua, New Zealand, Panama, Paraguay, Peru, Dominican Republic, Uruguay, Venezuela

Total Amount: USD 139,318

2017

2018



Sustainable intensification of legume-based livestock farming.

Uruguay, Argentina, Chile, Costa Rica

Total Amount: USD 1,794,524

2019



Boosting cattle productivity in the South American Chaco.

Argentina, Bolivia, Paraguay

Total Amount: USD 657,285

2020 - 2022: Newer projects are generating datasets, protocols, tools, baseline information, field validation, and training.

2023 - 2025: The portfolio now covers mitigation, adaptation, resilience, digital agriculture, biological solutions, and dryland production systems.

2026: The partnership represents accumulated institutional value, not only a list of projects.



Soil organic carbon sequestration: opportunities and impact on the economy and the environment.



Satellite monitoring of quantity and quality of available biomass in pastoral livestock systems in LAC.



Innovations for reducing methane emissions in ruminants.

Argentina, Colombia

Total Amount: USD 633,609

Expanding the use of biologicals in Latin American agriculture.

Argentina, Colombia, Chile, Uruguay

Total Amount: USD 720,483



Optimizing nitrogen use for sustainable farming.

Chile, Argentina, Panama, Peru, Dominican Republic

Total Amount: USD 1,037,451



Building resilient agricultural systems to mitigate climate change.

Argentina, Uruguay, Chile, Brazil, Dominican Republic

Total Amount: USD 1,108,764



Integration of sorghum cultivation into production systems of Latin America.

Costa Rica, Argentina, Honduras, Panama, Perú, United States

Total Amount: USD 773,500

20 projects

Institutional value & impact

2020

Uruguay, Argentina, Chile, Colombia, Costa Rica

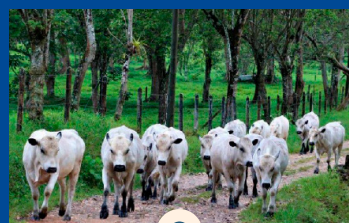
Total Amount: USD 1,460,240

2021

Argentina, Colombia, Costa Rica, Uruguay

Total Amount: USD 1,347,547

2022



Leveraging biological products to build climate resilience.

Argentina, Colombia

Total Amount: USD 668,500

Sustainable livestock farming in the Amazon of Peru and Ecuador.

Peru, Ecuador, Costa Rica

Total Amount: USD 600,000

2023



Climate-smart research and indigenous communities.

Argentina, Chile, New Zealand

Total Amount: USD 943,570

2024



Reducing greenhouse gas emissions in potato-pasture systems in Ecuador and Peru.

Ecuador, Peru

Total Amount: USD 900,000

2025

Scaling innovation in pastoral systems.

Uruguay, Argentina, Costa Rica

Total Amount: USD 902,790

USD 19.4 MILLION INVESTED

Cross-Project Lessons

Sixteen years of collaboration offer lessons that go beyond individual project results. The portfolio shows how climate-smart agriculture advances through sustained measurement, regional cooperation, practical tools, institutional pathways, and producer engagement.



Lesson 1. Measurement capacity is a durable output

Measurement capacity remains valuable after individual projects close. Equipment, field methods, laboratory protocols, trained professionals, and emission-factor experience continue to support active projects on methane, nitrogen, soil carbon, and GHG measurement in crop-livestock systems. The portfolio shows that credible measurement is not only a technical activity; it is a foundation for inventories, policy dialogue, international reporting, and practical mitigation.



Lesson 2. Climate-smart agriculture works best as a portfolio of complementary practices

No single technology can deliver mitigation, adaptation, productivity, and resilience across the diversity of Latin America and the Caribbean. The portfolio combines livestock management, pasture monitoring, soil carbon, nitrogen stewardship, biological products, conservation agriculture, silvopastoral systems, digital tools, and community innovation. Together, these approaches create a stronger response than isolated interventions.



Lesson 3. Regional diversity improves the value of evidence

The partnership generates evidence across temperate, tropical, subtropical, high-Andean, Amazonian, dryland, and pastoral systems. This diversity makes the evidence more useful because methods and technologies are tested under contrasting conditions. It also creates value for New Zealand by expanding comparative research opportunities and strengthening scientific relationships with production systems facing different forms of climate risk.



Lesson 4. Digital tools need institutional pathways for adoption

Digital platforms, satellite tools, apps, sensors, and decision-support systems become useful when they are embedded in advisory networks, producer training, public-private collaboration, and institutional ownership. The experience with pasture management tools, dairy good-practice apps, satellite biomass monitoring, and sensor-based methane work shows that adoption depends on usability, maintenance, trust, and clear roles for technicians and institutions.



Lesson 5. Biological solutions require standards, traceability, and field validation

Bioinputs and bioproducts offer important opportunities for resilient and lower-input agriculture, but their adoption depends on consistent methods, regulatory clarity, strain characterization, molecular traceability, and producer-relevant validation. The active portfolio is moving from promising laboratory and greenhouse results toward field evidence and knowledge-transfer pathways.



Lesson 6. Scaling requires more than successful pilots

Pilot sites, experimental plots, and innovation units are essential, but scaling also depends on extension systems, producer organizations, private-sector links, financing pathways, digital infrastructure, and policy alignment. The portfolio's strongest scaling experiences combine technical evidence with training, communication, and institutional partnerships.

Benefits to New Zealand, GRA, and Latin America and the Caribbean

The FONTAGRO-New Zealand partnership creates value for all participating audiences. Its benefit lies in the exchange of evidence, scientific capacity, field experience, producer engagement, and institutional learning that can inform agricultural climate action in both Latin America and the Caribbean and New Zealand.

A partnership with value in both directions

Audience	Value generated	Examples in the portfolio
	Comparative evidence from pasture-based, tropical, subtropical, high-Andean, Amazonian, and dryland systems; stronger scientific networks; and opportunities linked to AgTech, MRV, soil carbon, bioinputs, low-emission livestock, and adaptation.	Methane and nitrous oxide measurement, pasture monitoring, 3RWeb scaling, soil carbon protocols, bioinput traceability, silvopastoral systems, and community-based adaptation.
	Regional datasets, harmonized protocols, trained researchers, and field evidence for agricultural greenhouse gas mitigation in livestock and crop systems.	Emission factors, methane mitigation work, nitrogen trials, soil carbon sampling, GHG measurement protocols, and multi-country technical networks.
	Locally adapted innovations, capacity building, producer-facing tools, climate-resilient practices, and stronger regional collaboration.	Digital decision-support tools, producer training, Innovation Units, field trials, biological products, Conservation Agriculture, sorghum adaptation, and policy-relevant evidence.



Benefits for New Zealand

For **New Zealand**, the partnership strengthens its role as a long-term contributor to global agricultural climate action. The portfolio provides access to comparative evidence from production systems that differ from New Zealand's own context but face related challenges: pasture productivity, emissions intensity, soil carbon, nitrogen losses, water stress, biological inputs, digital advisory tools, and climate resilience. This comparative perspective is valuable for science, policy, and international engagement.

The collaboration also reinforces scientific networks between New Zealand and Latin American institutions. These networks create opportunities for joint research, methodological exchange, and future cooperation in areas such as MRV, low-emission livestock systems, remote sensing, bioinputs, silvopastoral systems, and adaptation to climate variability.

Benefits for GRA

For the **Global Research Alliance on Agricultural Greenhouse Gases**, the portfolio provides a regional platform for translating global mitigation priorities into field-level evidence. The projects contribute locally generated datasets, harmonized measurement protocols, trained researchers, and practical mitigation options for livestock and crop systems. By testing these approaches across tropical, subtropical, high-Andean, temperate, and dryland environments, the partnership broadens the evidence available to the Alliance and strengthens its relevance across diverse agricultural contexts.

These results can inform future research, monitoring and reporting frameworks, national strategies, and international efforts to develop productive, resilient, and lower-emission food systems.

Benefits for Latin America and the Caribbean

For **Latin America and the Caribbean**, the partnership supports locally relevant innovation. The projects generate tools, practices, datasets, and capacities adapted to regional production systems and institutions. They also strengthen collaboration among countries, create training opportunities, and help connect research with producers, extension agents, communities, and policymakers.

The portfolio's value is strongest where these benefits intersect: New Zealand's technical and financial contribution, GRA's scientific framework, and FONTAGRO's regional platform together create a mechanism for testing, adapting, and scaling climate-smart agricultural innovation.

Project profiles

The project profiles distinguish between completed projects and active projects. Completed projects are presented through their legacy contributions and continued relevance. Active projects are presented through their original purpose, verified 2025 progress, emerging outputs, and next steps.

Closed legacy projects

Projects 1-8 are completed projects. Their value in the 2026 edition lies in the capacities, evidence, tools, methods, and networks they contributed to the broader portfolio.



PROJECT 1

Methane and nitrous oxide emission quantification in grazing cattle

Field	Project information
Status	Closed legacy project
Implementation period	2012-2016
Countries	Uruguay, Argentina, Chile, Colombia, and Dominican Republic
Core theme	Measurement of methane and nitrous oxide emissions in grazing cattle
Legacy	Measurement foundation for later work on methane, nitrous oxide, emission factors, GHG protocols, and climate-smart livestock systems



Original challenge

Livestock systems in Latin America needed stronger technical capacity to quantify greenhouse gas emissions under grazing conditions. Countries required locally relevant information on methane and nitrous oxide emissions to improve national inventories, support climate-policy dialogue, and identify mitigation options compatible with livestock productivity.

Main contribution

The project strengthened regional capacity to measure methane emissions using the SF6 tracer technique and nitrous oxide emissions using closed static chambers. It trained more than 20 professionals and technicians, installed new gas chromatographs in Argentina and Uruguay, and implemented measurement methodologies across different climatic and geographic conditions.

Field measurements generated country-specific emission factors, especially for nitrous oxide, with values below default IPCC factors in several participating countries. The project also evaluated mitigation options, including high-quality pastures and nitrification inhibitors, and disseminated findings through scientific publications, workshops, seminars, and international conferences.

Legacy effects in the active portfolio

The legacy of Project 1 is visible in several active projects. Project 11 builds on the methane-measurement agenda by testing remote sensors, machine learning, anti-

methanogenic additives, and fecal NIRS. Project 16 extends nitrous oxide measurement into nitrogen fertilizer and mitigation trials in crops and pastures. Project 19 applies direct GHG measurement with static chambers and gas chromatography in high-Andean potato-pasture systems. Project 14 uses the emissions-intensity framing for supplementation and methane-assessment work in Amazon dual-purpose livestock systems. Project 17 builds on the need to quantify net GHG balances, carbon stocks, and carbon footprints in livestock systems, while Project 18 links improved grazing management with future methane-emission assessment.

Continued relevance in 2026

Project 1 remains relevant because measurement capacity is a durable output. The equipment, technical skills, field methods, laboratory experience, and emission-factor logic developed through this project continue to support the portfolio's movement from emissions quantification toward integrated mitigation and adaptation.

Benefit to New Zealand, GRA, and LAC

For Latin America and the Caribbean, the project improved regional capacity to report and interpret agricultural greenhouse gas emissions. For GRA, it contributed to comparable evidence and trained technical capacity in member countries. For New Zealand, it created scientific links with Latin American institutions and generated comparative evidence from grazing livestock systems relevant to international work on low-emission pastoral agriculture.

Benefits to New Zealand agriculture

- ✓ Enhancing Emission Quantification – Improves the accuracy of methane and nitrous oxide emission factors applicable to New Zealand's livestock sector.
- ✓ Supporting Policy Development – Provides robust data that can be used to refine New Zealand's agricultural GHG reporting under the UNFCCC.
- ✓ Advancing Livestock Emission Mitigation – Helps develop best practices for reducing enteric methane emissions in pastoral farming systems.
- ✓ Strengthening Scientific Networks – Connects New Zealand researchers with Latin American institutions for ongoing climate change studies.
- ✓ Improving Feed Efficiency Research – Contributes insights into pasture-based livestock feeding strategies that optimize productivity while reducing emissions.



ARGENTINA



CHILE



URUGUAY



COLOMBIA



REP. DOMINICANA



Country	N ₂ O Emission Factor
Chile	0.07
Colombia	< 0.002
Uruguay	0.28-0.55

Source: Project images of the field experiments.

PROJECT 2

Developing competitive livestock production systems with low greenhouse gas emissions in Central America

Field	Project information
Status	Closed legacy project
Implementation period	2014-2018
Countries	Costa Rica, Honduras, Nicaragua, and Panama
Core theme	Low-emission livestock management and farm-level carbon footprint evidence
Legacy	Bridge between GHG measurement and practical livestock management for lower emission intensity



Original challenge

Central American livestock farms faced the double challenge of improving productivity while reducing greenhouse gas emission intensity. Many less intensified systems relied almost entirely on grazing, had limited supplementation and pasture management, and generated higher methane emissions per unit of milk or meat.

Main contribution

The project identified and validated good livestock practices that reduce emissions under local conditions, including feeding strategies, forage banks, supplements, pasture management plans, soil analysis, technical fertilization recommendations, rest periods, appropriate stocking rates, and improved grass and legume use.

The project reported a 15% reduction in greenhouse gases, generated baseline information for 400 farms, trained 74 professionals, and supported seven undergraduate and graduate theses. It also showed that more intensified and better managed farms can produce more milk per cow while reducing methane emissions per litre of milk.

Legacy effects in the active portfolio

Project 2 created a practical management pathway that is visible in active livestock and forage projects. Project 14 applies the same productivity-plus-emissions logic to dual-purpose Amazon livestock systems using locally available

agro-industrial by-products. Project 18 develops decision support for pasture and supplementation decisions. Project 10 responds to the need for affordable forage monitoring. Project 11 deepens the mitigation agenda through additives and enteric methane technologies. Project 16 extends farm-level mitigation into nitrogen management, while Project 20 connects Central American resilience with drought-tolerant crops and mixed production systems.

Continued relevance in 2026

Project 2 remains relevant because it showed that mitigation becomes actionable when linked to productivity, feeding, pasture management, and farm decision-making. This lesson continues to guide active projects that seek practical low-emission pathways rather than isolated technical measurements.

Benefit to New Zealand, GRA, and LAC

For LAC, the project generated farm-level evidence and training for more competitive and lower-emission livestock systems. For GRA, it supported applied mitigation work linked to producer realities. For New Zealand, it provided comparative insight into pasture-based livestock intensification, feed efficiency, and emission intensity under tropical conditions.

Benefits to New Zealand agriculture

- ✓ Optimizing Farming Intensification – Provides comparative insights on intensification strategies to reduce emissions without compromising productivity.
- ✓ Enhancing Carbon Efficiency in Dairy – Findings can be applied to improve emissions intensity per liter of milk produced in New Zealand.
- ✓ Supporting Sustainable Dairy Practices – Helps refine pasture management strategies for climate-smart dairy farming.
- ✓ Capacity Building in Carbon Footprint Analysis – Strengthens methodologies for assessing the carbon footprint of different dairy farming models.
- ✓ Promoting Efficient Grazing Systems – Offers insights on the impact of rotational grazing and supplementary feeding on methane emissions.



Source: Project images of the field experiments.

PROJECT 3

Improving dairy production systems with less emissions in the Andean Region

Field	Project information
Status	Closed legacy project
Implementation period	2015-2018
Countries	Bolivia, Colombia, Ecuador, and Peru
Core theme	Low-emission dairy systems, methane and nitrous oxide capacity, and mitigation scenarios
Legacy	Andean dairy platform linking productivity, economics, emissions measurement, and policy relevance



Original challenge

Andean dairy systems needed locally relevant emissions data and mitigation strategies that could improve productivity while reducing methane and nitrous oxide emissions. The region also needed stronger capacity to position national evidence within IPCC and climate-policy processes.

Main contribution

The project characterized dairy production sites, measured methane and nitrous oxide in traditional and improved production systems, evaluated feeding strategies, developed mitigation scenarios, and built research capacity. It established methane and greenhouse gas quantification facilities at AGROSAVIA in Colombia and UNALM in Peru.

The project trained 51 professionals, supported six graduate theses, and showed that improved systems produced more milk per lactation at lower cost and with lower methane emissions per litre of milk than traditional systems.

Legacy effects in the active portfolio

Project 3 continues to shape active work in Colombia, Peru, Ecuador, and related livestock systems. Project 11 builds on Colombian methane-measurement capacity and advances toward remote sensors, additives, machine learning, and digestibility

prediction. Project 14 inherits the Peru institutional base and productivity-emissions logic for Amazon livestock systems. Project 18 extends dairy management through the 3RWeb diet module and grazing decision support. Project 19 continues the Andean mitigation pathway in Ecuador and Peru through GHG measurement in potato-pasture systems. Project 16 connects to the regional need for locally relevant emission factors and nutrient-management practices.

Continued relevance in 2026

Project 3 remains relevant because it connected emissions mitigation with farm performance. Its legacy is the shift from lower emissions as an isolated technical goal toward lower emission intensity with better productivity, lower costs, and stronger institutional capacity.

Benefit to New Zealand, GRA, and LAC

For LAC, the project strengthened dairy emissions capacity and generated mitigation evidence. For GRA, it expanded technical capacity and policy-relevant data in the Andean region. For New Zealand, it provided comparative evidence on dairy systems, feeding strategies, and methane intensity in climates and production systems different from New Zealand's own.

Benefits to New Zealand agriculture

- ✓ Improving Dairy Farming Resilience – Research on milk productivity under changing climatic conditions benefits New Zealand dairy farms.
- ✓ Developing Low-Emission Diets – Identifies dietary strategies that can be adapted to reduce enteric methane emissions in New Zealand livestock.
- ✓ Enhancing Climate Change Adaptation – Helps develop mitigation strategies to main-tain production stability amid climate fluctuations.
- ✓ Supporting Pasture Management Innovations – Provides data on pasture compositions that improve milk yield and lower emissions.
- ✓ Facilitating Research Collaboration – Strengthens international partnerships in dairy and livestock research.



Production according the system

	Traditional system	Improved system	Comparison
Milk yield, kg/lactation	1990	2369	
Average production, liters/day	6.86	8.2	
Cost of production, \$/kg	0.29	0.21	
Methane emission, kg/year	100	85	
Methane emission, g/kg milk	44	29	

Source: Project images of the field experiments.

PROJECT 4

Collaborative research networks on resilient livestock production systems

Field	Project information
Status	Closed legacy project
Implementation period	2017-2019
Countries	Regional platform across Latin America and the Caribbean
Core theme	Networks, methodology harmonization, training, and regional collaboration
Legacy	Institutional backbone for multi-country climate-smart agriculture projects



Original challenge

Climate-smart livestock research required coordination across countries, institutions, and disciplines. Before this type of platform, research efforts were often fragmented, making it harder to standardize methods, compare evidence, share technical support, and build regional capacity.

Main contribution

The project created a livestock and climate-change network to exchange information, standardize methodologies, provide mutual technical support, and promote collaboration. It linked at least 450 people from 25 countries through a platform and trained 30 scientists from 14 countries in research methods for sustainable livestock systems.

The project also supported graduate and undergraduate research, CLIFF-GRAD scholars, publications, workshops, field days, webinars, technical meetings, and dissemination through institutional and mass-media channels.

Legacy effects in the active portfolio

Project 4 provides the collaboration model behind much of the active portfolio. Projects 9, 10, 11, 14, 15, 16, 17, 18, 19, and 20 all depend on regional



coordination, protocol harmonization, technical exchange, and capacity-building architecture. Project 9 uses the platform model for soil carbon sampling and laboratory harmonization. Project 10 mirrors the network approach through a regional monitoring network. Project 15 extends the model into intercultural innovation, and Project 17 begins with baseline compilation, shared protocols, and cross-country training.

Continued relevance in 2026

Project 4 remains relevant because its main contribution was a way of working. It showed that regional platforms can transform national efforts into comparable evidence and shared innovation capacity.

Benefit to New Zealand, GRA, and LAC

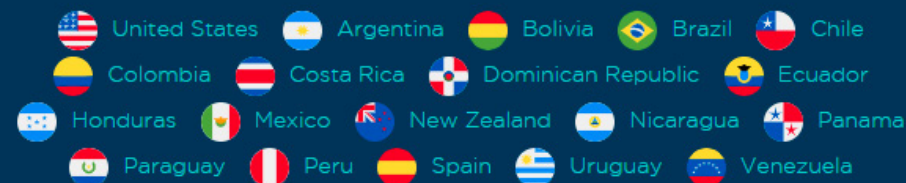
For LAC, the project strengthened the human and institutional infrastructure for climate-smart livestock research. For GRA, it expanded regional scientific capacity. For New Zealand, it created durable research links and a platform for knowledge exchange with a broad set of Latin American and Caribbean institutions.

Source: Project images of the field experiments.

Benefits to New Zealand agriculture

- ✓ Scientific and Technological Direct Applications – Strengthens New Zealand's leadership in climate-smart livestock farming.
- ✓ Improving GHG Measurement Tools – Introduces standardized methodologies applicable to New Zealand's pastoral systems.
- ✓ Enhancing Training Programs – Contributes to knowledge-sharing initiatives for sustainable livestock farming.
- ✓ Increasing Access to Emission-Reduction Strategies – Facilitates the adaptation of effective methane and nitrous oxide reduction practices.
- ✓ Developing Digital Decision Support Tools – Advances monitoring technologies that can be integrated into New Zealand farming systems.
- ✓ Policy and Regulatory Insights – Generates science-based policy insights that can inform New Zealand's own regulatory frameworks.

Participating countries:



PROJECT 5

Sustainable intensification of legume-based livestock farming

Field	Project information
Status	Closed legacy project
Implementation period	2018-2022
Countries	Argentina, Brazil, Chile, Ecuador, Nicaragua, Paraguay, Dominican Republic, and Uruguay
Core theme	Legumes, forage quality, biological nitrogen fixation, methane reduction, and soil carbon
Legacy	Forage-quality and nutrient-cycling legacy for climate-smart livestock systems



Original challenge

Livestock systems across Latin America and the Caribbean often have low productivity, low forage-use efficiency, and high emission intensity. Many countries have legume species adapted to local environments, but before the project there was limited regional evidence on the contribution of legumes to extensive pasture systems.

Main contribution

The project established a regional platform for cooperation on fodder legumes in livestock systems. It highlighted the role of legumes in biological nitrogen fixation, improved diet quality, reduced enteric methane, and increased soil carbon stocks in the upper soil layers.

The project directly benefited 2,532 people and involved 37 research institutes and 18 universities. It generated training, conference presentations, publications, student research, and knowledge dissemination through workshops, field days, webinars, and institutional channels.

Legacy effects in the active portfolio

Project 5 connects directly to several active themes. Project 9 continues the soil-carbon dimension through SOC sampling and sequestration opportunities. Project 16 links to

biological nitrogen fixation and reduced dependence on synthetic nitrogen. Project 17 builds on integrated forage, trees, carbon, nitrogen, and livestock questions. Project 10 and Project 18 extend pasture-use optimization through biomass monitoring and decision support. Project 11 carries forward the diet-quality pathway for methane reduction. Project 14 applies feed-quality and supplementation logic to agro-industrial by-products, while Project 15 includes forage production and feeding strategies in Mapuche communities.

Continued relevance in 2026

Project 5 remains relevant because it linked productivity, methane mitigation, soil carbon, and nitrogen management in one biological and management pathway. This integrated logic now appears across several active projects.

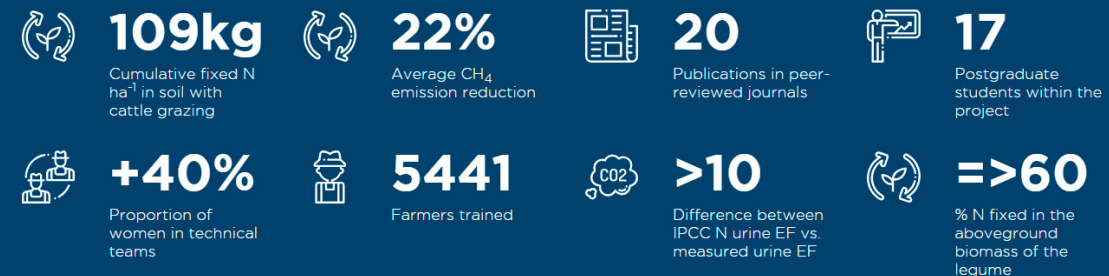
Benefit to New Zealand, GRA, and LAC

For LAC, the project strengthened knowledge on locally adapted forage legumes and sustainable intensification. For GRA, it contributed to mitigation pathways based on diet quality and nitrogen cycling. For New Zealand, it provided comparative evidence on legume-based pasture systems, biological nitrogen fixation, and livestock emission intensity.



Benefits to New Zealand agriculture

- ✓ Promoting Legume-Based Pastures – Supports the integration of legume crops into New Zealand's livestock sector for soil health and productivity.
- ✓ Reducing Dependence on Synthetic Fertilizers – Findings assist in reducing nitrogen fertilizer use through biological nitrogen fixation.
- ✓ Mitigating Enteric Methane Emissions – Identifies forage species that naturally reduce methane emissions from livestock.
- ✓ Enhancing Soil Carbon Sequestration – Improves soil health management practices for New Zealand's pasturelands.
- ✓ Expanding Alternative Feed Research – Provides additional options for optimizing livestock feed efficiency.



Source: Project images of the field experiments.

PROJECT 6

Digital innovations for smarter pasture management

Field	Project information
Status	Closed legacy project
Implementation period	2018-2022
Countries	Uruguay, Argentina, Costa Rica, and United States collaboration
Core theme	Digital grazing decision support, forage management, biomass estimation, and AgTech adoption
Legacy	Direct predecessor of the active 3RWeb scaling and satellite biomass pathway



Original challenge

Pasture-based livestock systems in Latin America and the Caribbean harvest far less forage than their potential. Producers and advisors needed practical tools to improve real-time decisions on grazing sequence, paddock subdivision, grazing time, forage conservation, and biomass measurement.

Main contribution

The project developed and validated a cloud-based decision-support tool for grazing management and forage conservation using a user-centered design approach. The tool supported decisions on paddock sequence, grazing time, subdivisions, forage reserves, and stocking management.

The project generated an API, worked on remote biomass estimation with drones, established a regional pastoral network, and trained technicians and producers. After closure, the system continued to increase users and monitored hectares, with 18,941 hectares affected, more than 200 direct beneficiaries, and approximately 4,200 indirect beneficiaries reported.

Legacy effects in the active portfolio

Project 4 provides the collaboration model behind much of the active portfolio. Project 6 is the direct predecessor of Project 18, which scales and improves 3RWeb,

adds dairy diet evaluation and beef decision flows, trains facilitators, validates the tool on commercial farms, and begins methane-emission assessment. Project 10 addresses the biomass-estimation bottleneck identified in Project 6 through satellite monitoring and ground-truth data. Project 11 shares the move toward digital monitoring and real-time information, while Project 17 can draw on digital grazing-management logic for integrated systems.

Continued relevance in 2026

Project 6 remains relevant because it shows how a closed project can continue through adoption and scaling. Its tool, design approach, and user base form a live bridge into the active portfolio.

Benefit to New Zealand, GRA, and LAC

For LAC, the project delivered practical decision support for pasture-based systems. For GRA, it supported management pathways that can contribute to lower emission intensity. For New Zealand, it generated comparative AgTech experience in grazing systems and helped link pasture management, productivity, and emissions mitigation.

Benefits to New Zealand agriculture

- ✓ Developing AgTech Solutions for Grazing – Introduces digital tools for monitoring pasture quality and availability.
- ✓ Improving Livestock Productivity – Increases pasture utilization rates, reducing reliance on imported feed.
- ✓ Enhancing Drought Resilience – Supports strategies to optimize pasture growth in variable climate conditions.
- ✓ Reducing Carbon Footprint – Enables precise pasture management to lower overall farm emissions.
- ✓ Facilitating Farmer Adoption of Digital Technologies – Promotes the use of web-based platforms for real-time grazing management.



Source: Project images of the field experiments.

PROJECT 7

AgTech for climate-smart dairy farming

Field	Project information
Status	Closed legacy project
Implementation period	2019-2023
Countries	Argentina, Costa Rica, Dominican Republic, Honduras, and Uruguay
Core theme	Climate-smart dairy management, digital tools, good practices, and public-private platforms
Legacy	Digital dairy and producer-facing adoption legacy



Original challenge

Dairy systems in Latin America and the Caribbean faced increasing demand for animal protein while also confronting climate variability, resource constraints, environmental regulations, and the need to reduce greenhouse gas emission intensity. Producers and advisors needed practical indicators and tools to support climate-smart dairy management.

Main contribution

The project built a public-private platform for the dairy sector and developed digital tools, including LECHECK.APP, based on a consensus document of good practices related to pastures and crops, milking hygiene, animal health, environment, reproduction, socioeconomic management, feeding, animal welfare, and climate events.

LECHECK.APP was validated for one year and reached 526 users across 508 farms, with 79,756 good practices surveyed in 12 countries. The project also involved cooperatives, associations, SMEs, professionals, students, milk processing companies, extension workers, and producers. It generated 11 scientific articles and 31 workshops.

Legacy effects in the active portfolio

Project 7 informs Project 18 through AgTech adoption experience in dairy systems, facilitator training, public-private platform building, and farm-level good-practice

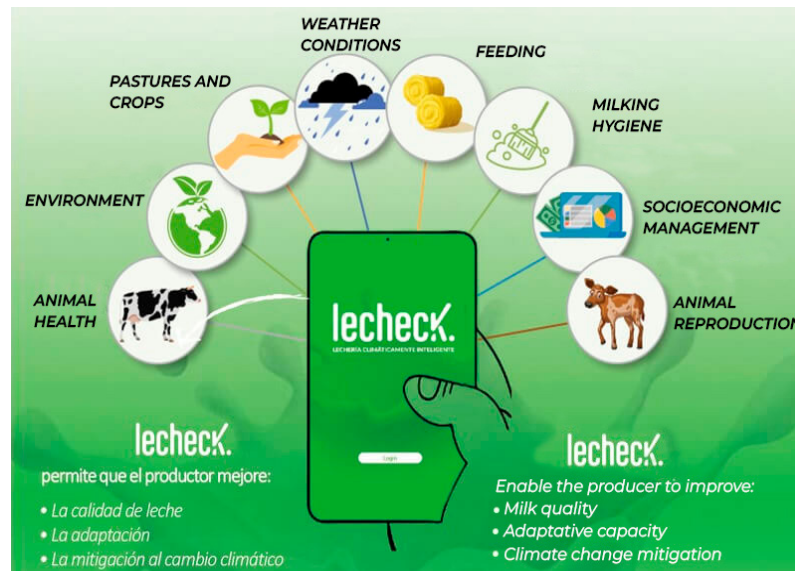
indicators. It complements Project 10 by reinforcing the need for forage information in climate-smart dairy management. It strengthens Project 11 through digital and indicator-based emissions management, Project 14 through producer-facing livestock tools, and Project 19 through good-practice framing for farm-system recommendations.

Continued relevance in 2026

Project 7 remains relevant because it showed that climate-smart agriculture requires both technical content and a delivery mechanism that producers and advisors can use. It moved the portfolio toward tools that organize complex farm information into practical decisions.

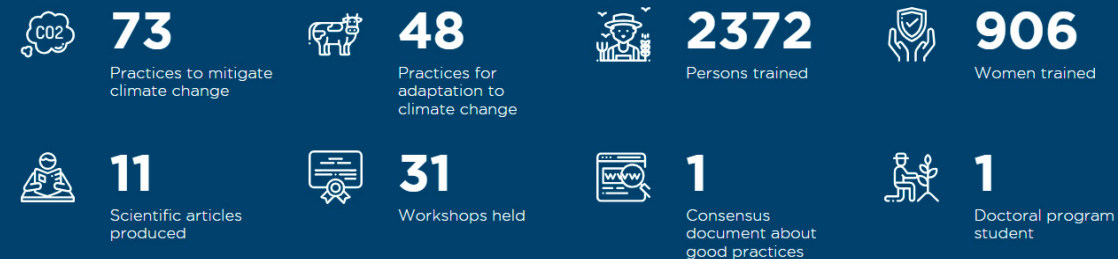
Benefit to New Zealand, GRA, and LAC

For LAC, the project supported dairy-sector capacity and digital adoption. For GRA, it connected farm management with mitigation and adaptation. For New Zealand, it generated comparative evidence on digital dairy tools and climate-smart management in diverse production systems.



Benefits to New Zealand agriculture

- ✓ **Scaling Digital Agriculture Solutions** – Provides tested smart farming technologies applicable to New Zealand dairy farms.
- ✓ **Enhancing Dairy Efficiency** – Develops digital tools that optimize milk production while reducing emissions.
- ✓ **Improving Animal Health Monitoring** – Integrates sensors and monitoring systems to enhance herd management.
- ✓ **Supporting Sustainable Milk Production** – Advances best practices for emissions reduction in intensive and extensive dairy farming.
- ✓ **Facilitating Climate Adaptation Strategies** – Identifies precision agriculture techniques that can help New Zealand's dairy industry adapt to climate shifts.



PROJECT 8

Boosting cattle productivity in the South American Chaco

Field	Project information
Status	Closed legacy project
Implementation period	2019-2023
Countries	Argentina, Bolivia, and Paraguay
Core theme	Family livestock resilience, participatory pilot sites, forage, water, animal health, and herd management
Legacy	Participatory scaling legacy for family and community livestock systems



Original challenge

Family livestock systems in the South American Chaco faced low productivity, climatic variability, limited forage planning, insufficient infrastructure, animal health constraints, and weak herd-management practices. Improving resilience required technologies selected with producers and adapted to local constraints.

Main contribution

The project created a farmer network of 90 pilot sites across Argentina, Bolivia, and Paraguay. Producers, extension agents, and researchers jointly identified critical technologies grouped around forage and feed, infrastructure and business management, animal health, and herd management.

The project conducted 124 training sessions for 2,595 producers, including more than 700 women, and 152 extension agents and advisors. Participating producers increased average calf weaning percentage from 54.5% to 61.9% and raised meat production by at least 10.06% in a challenging climatic context.

Legacy effects in the active portfolio

Project 8 directly informs Project 15, which applies a participatory and community-centered innovation model with Mapuche communities through Innovation Units, FPIC agreements, and intercultural knowledge exchange. It also connects to



Project 17 through livestock resilience and integrated management in extensive systems, Project 20 through dry-region adaptation logic, Project 14 through family-livestock improvement in sensitive regions, and Project 18 through the need for practical forage and herd-management decisions.

Continued relevance in 2026

Project 8 remains relevant because it showed that productivity and resilience gains are stronger when producers help define the problem, select technologies, and use pilot sites as training and demonstration spaces.

Benefit to New Zealand, GRA, and LAC

For LAC, the project strengthened family livestock systems and producer participation. For GRA, it demonstrated how mitigation and adaptation agendas can connect with resilience and productivity. For New Zealand, it provided insight into participatory livestock innovation under dry and variable conditions.



Benefits to New Zealand agriculture

- ✓ Building a Global Livestock Climate Network – Strengthens New Zealand's leadership in climate-smart livestock farming.
- ✓ Improving GHG Measurement Tools – Introduces standardized methodologies applicable to New Zealand's pastoral systems.
- ✓ Enhancing Training Programs – Contributes to knowledge-sharing initiatives for sustainable livestock farming.
- ✓ Increasing Access to Emission-Reduction Strategies – Facilitates the adaptation of effective methane and nitrous oxide reduction practices.
- ✓ Developing Digital Decision Support Tools – Advances monitoring technologies that can be integrated into New Zealand farming systems.



3

Characterisation of livestock systems and possible technologies for incorporation



86

Livestock producer groups



2595

Trained producers



851

Trained women



90

Pilot sites



385

SMEs receive technical assistance



117

Public officers trained



10

Institutions with strengthened capacities

Source: Project images of the field experiments.

PROJECT 9

Soil organic carbon sequestration: opportunities and impact on the economy and the environment

Field	Project information
Status	Closed legacy project
Implementation period	2019-2023
Countries	Argentina, Bolivia, and Paraguay
Core theme	Family livestock resilience, participatory pilot sites, forage, water, animal health, and herd management
Legacy	Participatory scaling legacy for family and community livestock systems



Original challenge

Soil organic carbon is central to climate-smart agriculture because it connects mitigation, soil health, productivity, resilience, and national reporting. This project was designed to contribute to land-use and land-management practices with high potential for soil organic carbon sequestration, generate locally derived coefficients for internationally accepted reporting, and build regional capacity for soil carbon quantification and monitoring.

Legacy links from closed projects

The project builds on earlier portfolio investments in measurement, regional platforms, and forage-based systems. Project 1 contributed the MRV logic that credible local measurement improves national reporting and policy relevance. Project 4 provided a model for multi-country coordination, protocol harmonization, and capacity building. Project 5 created a direct thematic bridge through evidence that improved pasture systems and legumes can increase carbon stocks in the upper soil layers.

Now - verified 2025 progress

By 2025, the project had consolidated a multi-country platform across Argentina, Chile, Colombia, Costa Rica, and Uruguay. A total of 909 sampling sites and 2,879 encapsulated samples were generated across participating countries. Of these, 338 sites correspond to 25 long-term experiments managed by research institutes in Argentina and Uruguay.



The project also advanced capacity building through workshops on soil organic carbon stock determination, monitoring changes over time, and simulation modelling. It reported 14 capacity-building activities, 10 participations in international congresses or symposiums, and three in-person workshops.

Emerging outputs

The project is generating a regional soil organic carbon database, shared sampling and laboratory protocols, harmonized technical criteria, long-term experiment information, and modelling capacity. It is also preparing the basis for identifying soil carbon sequestration opportunities and quantifying their economic and greenhouse gas impacts at farm and broader scales.

Next - expected 2026 contribution

The next phase will complete laboratory data integration, advance quantification of economic and greenhouse gas impacts of selected soil carbon sequestration opportunities, and strengthen modelling and decision-support components..

Benefit to New Zealand, GRA, and LAC

For LAC, the project builds local capacity to measure and monitor soil organic carbon. For GRA, it contributes evidence on carbon sequestration and agricultural mitigation. For New Zealand, it offers comparative information on soil carbon measurement and management across contrasting environments.

Benefits to New Zealand Agriculture

- ✓ Enhancing Soil Carbon Monitoring – Strengthens New Zealand's carbon sequestration measurement capabilities.
- ✓ Supporting Climate Mitigation Strategies – Provides best practices for increasing soil organic carbon levels.
- ✓ Improving Pasture Fertility – Helps develop land management techniques that boost pasture resilience.
- ✓ Reducing Soil Degradation – Offers regenerative agriculture insights that maintain soil health.
- ✓ Facilitating Policy Development on Carbon Farming – Supports carbon credit market opportunities in New Zealand.



30

Total technicians



23

% Women trained



28

Dissemination and training instances



+624

Sampling sites



+ 5

Technological solutions and innovations



+ 5

Technologies with lower emissions



3

Protocols generated



+ 34

Networked institutions

Source: Project images of the field experiments.

PROJECT 10

Satellite monitoring of quantity and quality of available biomass in pastoral livestock systems

Field	Project information
Status	Active project with 2025 progress update
Countries	Argentina, Colombia, Costa Rica, and Uruguay
Core theme	Remote sensing, forage biomass, forage quality, and grazing decision support
Current role in the 2026 report	Active digital infrastructure for forage monitoring and pasture-based livestock management



Original challenge

Pasture-based livestock systems need frequent, reliable information on forage biomass quantity and quality to improve grazing decisions, productivity, and emission intensity. Field measurement alone is costly and difficult to scale across farms, landscapes, and countries. This project was designed to reduce the cost of estimating available forage biomass in real time and with adequate accuracy through satellite-based tools.

Legacy links from closed projects

Project 10 extends the digital pasture-management pathway established by Project 6 and complements Project 18, which scales 3RWeb. It also builds on Project 5's focus on forage quality, Project 2's evidence that better pasture management reduces emission intensity, and Project 7's experience with producer-facing digital adoption.

Now - verified 2025 progress

By 2025, the project had consolidated a regional monitoring network involving more than 79 researchers and technicians. The project database surpassed 2,500 georeferenced field records of forage biomass across temperate and tropical pastures, natural grasslands, and annual forage crops.

Preliminary biomass estimation models were calibrated using Sentinel-1 and Sentinel-2 imagery. Average prediction errors ranged from 650 to 1,100 kg dry

matter per hectare, and integrating field observations with satellite data reduced prediction errors by up to 50% compared with remote sensing-only approaches.

The project developed two operational tools: a spatial simplification tool and a temporal simplification tool. It also reached more than 1,100 technicians, producers, and students through training and dissemination.

Emerging outputs

Emerging outputs include a standardized field sampling protocol, a regional ground-truth database, metadata and sampling platforms, satellite biomass models, spatial and temporal simplification tools, and validation activities in demonstration modules and commercial farms.

Next - expected 2026 contribution

The next stage will continue validating tools under real management conditions, expand the ground-truth database, improve model robustness across forage resources, and strengthen links with grazing decision-support systems.

Benefit to New Zealand, GRA, and LAC

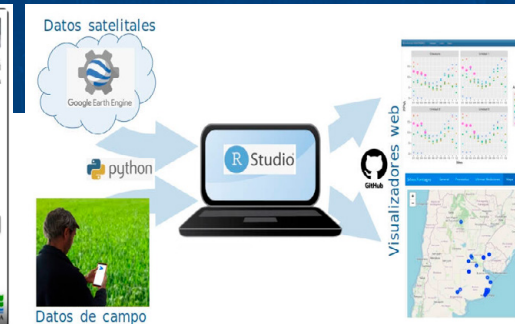
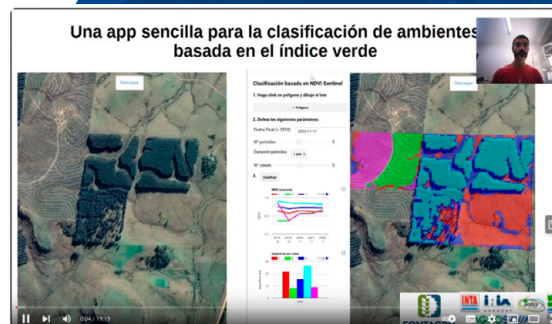
For LAC, the project improves access to affordable forage information for grazing management. For GRA, it supports mitigation through better pasture use and monitoring. For New Zealand, it provides comparative evidence on remote sensing for pasture systems and digital pathways for low-emission livestock management.

Benefits to New Zealand agriculture

- ✓ Enhancing Remote Sensing Capabilities – Advances real-time monitoring of pasture biomass availability.
- ✓ Supporting Precision Livestock Management – Provides a model for using satellite data in farm planning.
- ✓ Reducing Overgrazing Impacts – Helps optimize grazing strategies using real-time data.
- ✓ Improving Climate Resilience – Supports adaptation of grazing practices based on seasonal variability.
- ✓ Facilitating Data-Driven Decision-Making – Promotes smart farming through the integration of satellite analytics.



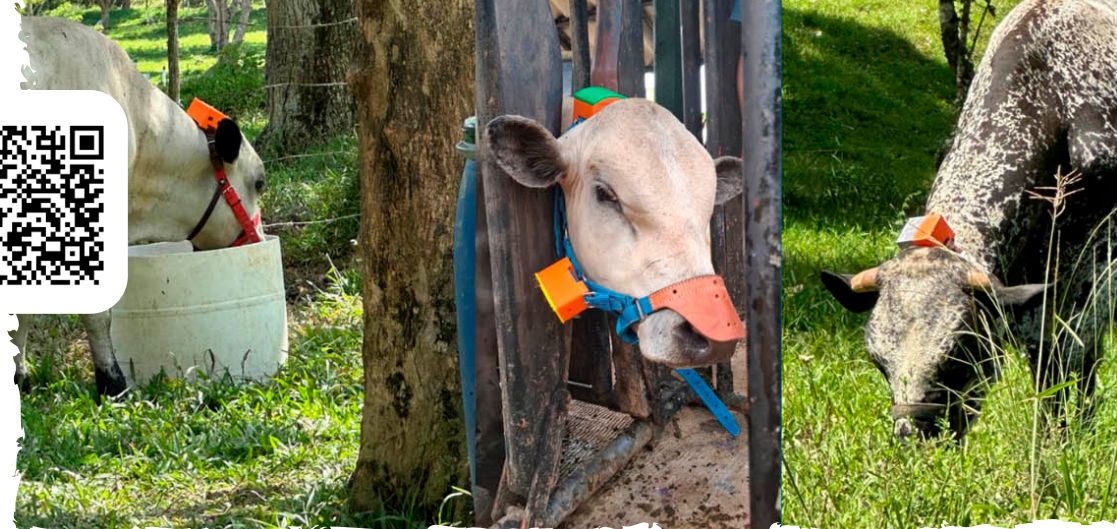
Source: Project images of the field experiments.



PROJECT 11

Innovations for reducing methane emissions in ruminants

Field	Project information
Status	Active project with 2025 progress update
Countries	Argentina and Colombia
Core theme	Enteric methane mitigation, sensors, additives, ingestive behavior, digestibility, and fecal NIRS
Current role in the 2026 report	Active project linking methane quantification technologies with practical mitigation options



Original challenge

Ruminant systems in Latin America and the Caribbean require technologies that can quantify and reduce enteric methane emissions under grazing conditions without compromising animal productivity. This project was designed to reduce emission intensity in bovine systems through innovations developed in Latin America for GHG quantification and mitigation.

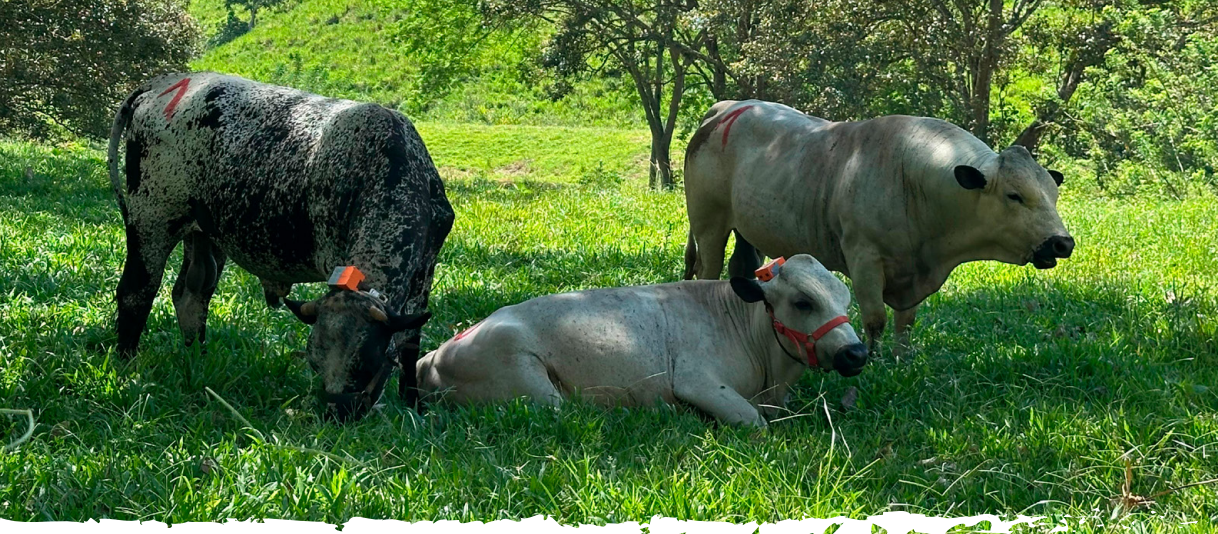
Legacy links from closed projects

Project 11 builds directly on Project 1's methane measurement foundation and Project 3's dairy-emissions capacity in Colombia and the Andean region. Project 2 informs the emphasis on feeding and management, Project 5 contributes the diet-quality pathway for methane reduction, and Projects 6 and 7 add the digital monitoring and indicator-based logic now reflected in sensors and real-time visualization.

Now - verified 2025 progress

During 2025, the project developed a Python interface for real-time visualization and analysis of signals captured by the remote sensor-based system for monitoring ingestive behavior and enteric methane emissions.

The additive formulation was optimized by reducing the carrier by 50% without modifying the dosage of active ingredients. Controlled evaluations reported methane reductions of 20-55% without compromising dry matter digestibility.



In vivo validation began at INTA Balcarce with Holstein calves. Preliminary results indicated no negative effects on feed intake or weight gain. The project also adapted and validated a UV-Vis colorimetric method for titanium dioxide quantification in tropical forages and feces.

Emerging outputs

Emerging outputs include a sensor-based monitoring system, machine learning models for ingestive behavior, additive validation data, titanium dioxide analytical methodology, databases, technical notes, dissemination events, a master's thesis, and training activities. Nine events reached 275 beneficiaries, webinars recorded 267 registrations and 1,444 views, and the AlimenTro virtual course trained 337 people.

Next - expected 2026 contribution

The next phase will continue in vivo validation of the additive, expand sensor-system evaluation, generate methane and digestibility datasets, advance fecal NIRS equations, and prepare technical recommendations for lower-emission feeding strategies.

Benefit to New Zealand, GRA, and LAC

For LAC, the project develops regionally relevant methane mitigation technologies. For GRA, it contributes practical evidence on enteric methane reduction. For New Zealand, it provides comparative research on grazing ruminants, sensor systems, feed additives, and emission-intensity reduction.

Source: Project images of the field experiments.

Benefits to New Zealand agriculture

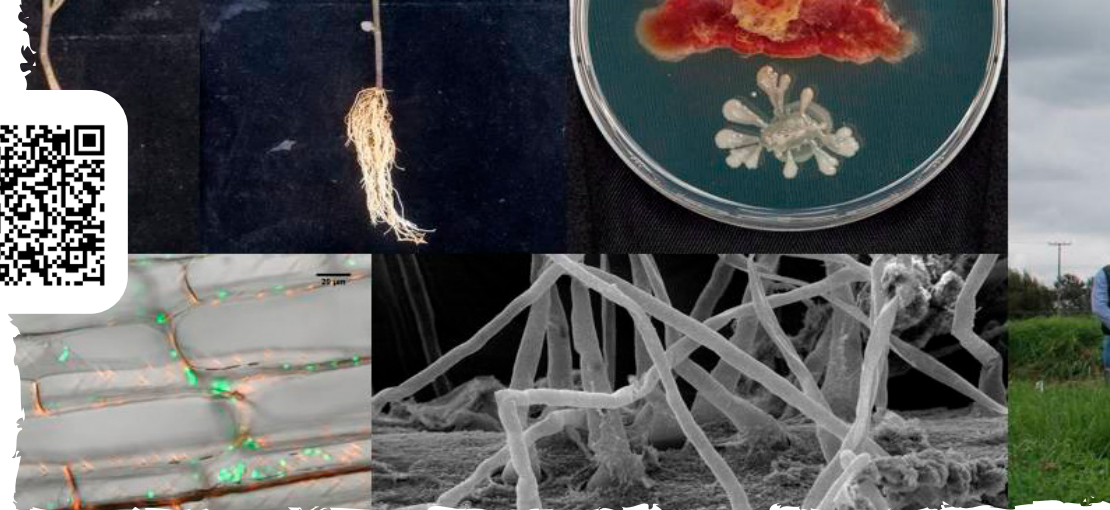
- ✓ Developing Methane Reduction Strategies – Provides validated approaches to lowering enteric methane emissions in grazing livestock.
- ✓ Enhancing Feed Efficiency Research – Identifies innovative feeding strategies to optimize nutrient intake while reducing GHG emissions.
- ✓ Supporting Smart Livestock Monitoring – Introduces digital and sensor-based solutions for measuring methane emissions in real-time.
- ✓ Scaling Sustainable Beef and Dairy Production – Offers replicable models for New Zealand's pastoral farming to improve sustainability.
- ✓ Advancing Research on Feed Additives – Supports the development of low-methane feed formulations for the livestock sector.



PROJECT 12

Expanding the use of biologicals in Latin American agriculture

Field	Project information
Status	Active project with 2025 progress update
Countries	Argentina, Colombia, Chile, and Uruguay
Core theme	Bioinputs, microbial characterization, regulatory gaps, field validation, and traceability
Current role in the 2026 report	Active platform for the transfer and efficient use of bioinputs on farms in Latin America



Original challenge

Bioinputs can improve agricultural sustainability, reduce dependence on synthetic inputs, and support crop resilience, but adoption in Latin America is limited by inconsistent field performance, regulatory fragmentation, lack of information, and uncertainty among producers and technicians. This project was designed to connect producers, technicians, and scientists to support development, transfer, and efficient use of bioinputs on farms.

Legacy links from closed projects

Project 12 builds on Project 4's regional platform and methodology-harmonization model. It also connects conceptually to Project 5 through biological nitrogen fixation, plant-microbe interactions, and soil health, even though Project 12 focuses on microbial bioinputs rather than forage legumes.

Now - verified 2025 progress

During 2025, the project consolidated technical cooperation across Argentina, Chile, Colombia, and Uruguay. Consultancies analyzed technological gaps and regulatory frameworks associated with bioinput registration, production, commercialization, and adoption.

The project established a Microbial Characterization Platform to standardize laboratory protocols for biofertilization, biostimulation, and biocontrol. It advanced genomic analysis of 12 microbial prototype strains, with 10 genomes annotated and five published in scientific literature.



Strain-specific primers were designed for qPCR traceability of microorganisms in soil and plant tissues. Project members presented 13 scientific papers at an international congress, informative activities in Colombia reached nearly 100 stakeholders, and seven students were incorporated into research activities.

Emerging outputs

Emerging outputs include a regulatory and technological gap assessment, standardized protocols, genomic characterization, molecular traceability tools, compatibility assays, drought-stress trials, field validation activities, scientific presentations, and stakeholder outreach.

Next - expected 2026 contribution

The next phase will strengthen field validation, producer-facing knowledge transfer, stakeholder networks, and adoption pathways in regulatory and production contexts that differ across countries.

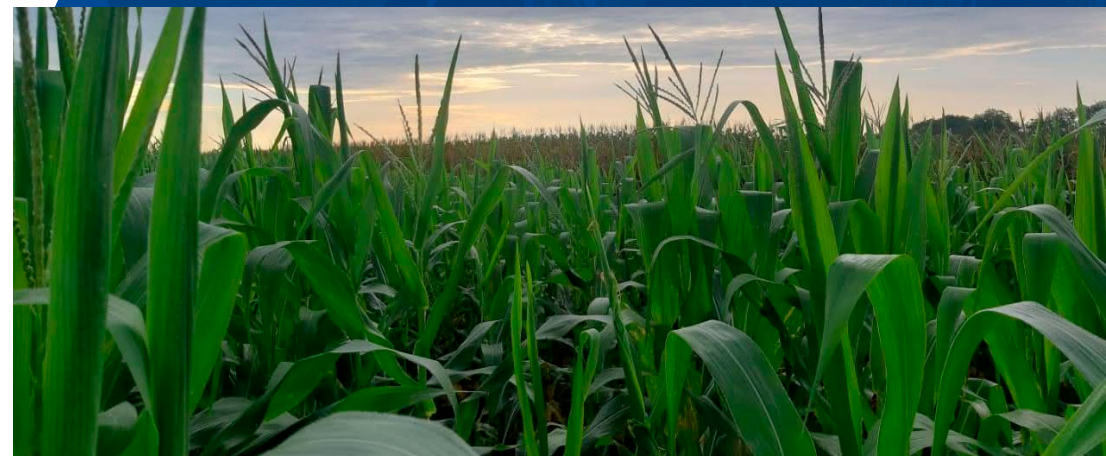
Benefit to New Zealand, GRA, and LAC

For LAC, the project supports more reliable use of bioinputs and stronger connections among science, producers, and regulation. For GRA, it contributes to sustainable input-use pathways. For New Zealand, it provides comparative evidence and scientific links in bioinputs, traceability, and low-input agriculture.

Source: Project images of the field experiments.

Benefits to New Zealand agriculture

- ✓ **Enhancing Soil Health and Fertility** – Provides insights into beneficial microbes that can improve soil productivity and sustainability.
- ✓ **Reducing Agricultural Chemical Use** – Supports New Zealand's regulatory and policy goals for reducing environmental impact from agrochemicals.
- ✓ **Developing Efficient Biofertilizers and Biocontrol Agents** – Promotes the integration of biologicals into mainstream farming.
- ✓ **Strengthening New Zealand's Biotech Sector** – Offers commercial opportunities for New Zealand-based biotech firms in the growing biologicals market.



PROJECT 13

Leveraging biological products to build climate resilience

Field	Project information
Status	Active project with 2025 progress update
Countries	Argentina and Colombia
Core theme	Beneficial fungi, maize resilience, biological control, drought tolerance, and soil carbon methods
Current role in the 2026 report	Active project linking bioproducts with climate resilience and reduced synthetic-input dependence



Original challenge

Maize production in Argentina and Colombia faces pest and disease pressure, water stress, high input costs, and climate variability. This project was designed to develop an integrated strategy to improve maize productivity and resilience through native beneficial fungi, including entomopathogenic fungi, antagonistic fungi, and arbuscular mycorrhizal fungi.

Legacy links from closed projects

Project 13 builds on Project 4's model of multi-institutional coordination and shared protocols. It connects to Project 5's broader biological-process legacy around soil health, nutrient cycling, and reduced dependence on synthetic inputs. It also extends the measurement culture created by Project 1 as the project moves toward soil carbon assessment.

Now - verified 2025 progress

During 2025, the project identified and evaluated native entomopathogenic fungi for pest control. Promising isolates included *Beauveria bassiana* Bv064, *Metarhizium robertsii* Mtcitol-2, and *Metarhizium anisopliae* Ma1.

Trichoderma isolates Th032 and Th406 reduced the impact of soilborne pathogens on maize biomass in plant assays. A soil physical fractionation and carbon measurement methodology was standardized with collaboration from AgResearch New Zealand.



Arbuscular mycorrhizal fungi, especially *Rhizophagus irregularis* and *Acaulospora mellea*, improved maize growth under water deficit and supported plant performance with 50% chemical fertilization. More than nine standardized protocols were consolidated, and three international workshops engaged 71 participants.

Emerging outputs

Emerging outputs include molecular identification, genomic analyses, bioassays, standardized protocols, soil carbon methodology, greenhouse evidence on drought tolerance, technical working documents, and preparation for field validation.

Next - expected 2026 contribution

The next phase will move from laboratory and greenhouse evaluations toward field validation, testing productivity, agrochemical reduction, drought resilience, and soil carbon outcomes under producer-relevant conditions.

Benefit to New Zealand, GRA, and LAC

For LAC, the project supports crop resilience and reduced synthetic-input dependence. For GRA, it contributes to mitigation and adaptation pathways linked to soil carbon and input efficiency. For New Zealand, it creates scientific exchange on bio-based solutions, maize resilience, and soil carbon measurement methods.

Benefits to New Zealand agriculture

- ✓ Increasing Crop Resilience to Climate Change – Develops biological solutions that enhance plant tolerance to drought and pests.
- ✓ Reducing Dependence on Chemical Inputs – Advances the use of fungal-based biofertilizers and biopesticides in sustainable agriculture.
- ✓ Enhancing Carbon Sequestration in Soils – Demonstrates the role of beneficial fungi in improving soil carbon capture.
- ✓ Scaling Sustainable Maize Production – Provides data on biological solutions that could improve New Zealand's corn and grain systems.
- ✓ Supporting the Development of Climate-Smart Agricultural Inputs – Strengthens research collaborations in the biologicals sector.



Source: Project images of the field experiments.

PROJECT 14

Sustainable livestock farming in the Amazon of Peru and Ecuador

Field	Project information
Status	Active project with 2025 progress update
Countries	Peru and Ecuador, with Costa Rica and New Zealand collaboration
Core theme	Dual-purpose livestock, agro-industrial by-products, circular feeding, productivity, and methane intensity
Current role in the 2026 report	Active project applying sustainable intensification and circular-economy feeding in Amazon livestock systems



Original challenge

Dual-purpose livestock systems in the Amazon regions of Peru and Ecuador are important for rural livelihoods and food security, but many remain extensive, with limited supplementation, moderate productivity, and environmental pressure. This project was designed to promote sustainable intensification through locally available agro-industrial by-products, better feeding strategies, improved resource-use efficiency, and lower greenhouse gas emission intensity.

Legacy links from closed projects

Project 14 builds on Project 2's evidence that improved feeding and management can reduce emission intensity while improving productivity. It also inherits Project 3's Peru and Andean institutional base, Project 5's focus on diet quality, Project 1's emissions-measurement foundation, and Projects 7 and 8's producer-facing and family-livestock approaches.

Now - verified 2025 progress

During 2025, the project completed Component 1 and established the technical and scientific baseline. A total of 284 producers were surveyed, including 103 in Peru and 181 in Ecuador.

Production systems were characterized as predominantly extensive, with limited strategic supplementation, low adoption of improved practices, milk yields of 5-7 litres per cow per day, and stocking rates typically ranging from 1.8 to 2.0 animals per hectare.



The project inventoried 46 agro-industrial enterprises and identified underutilized by-products such as rice residues, palm by-products, coffee husk, cocoa husk, broken rice, palm kernel meal, and maize screenings. Nutritional analyses identified energy- and protein-rich resources for future supplementation trials.

Emerging outputs

Emerging outputs include a validated baseline database, standardized methodological instruments, technical reports on livestock systems and by-products, nutritional characterization of feed resources, and preparatory work for supplementation trials, methane measurement, modelling, and life cycle assessment.

Next - expected 2026 contribution

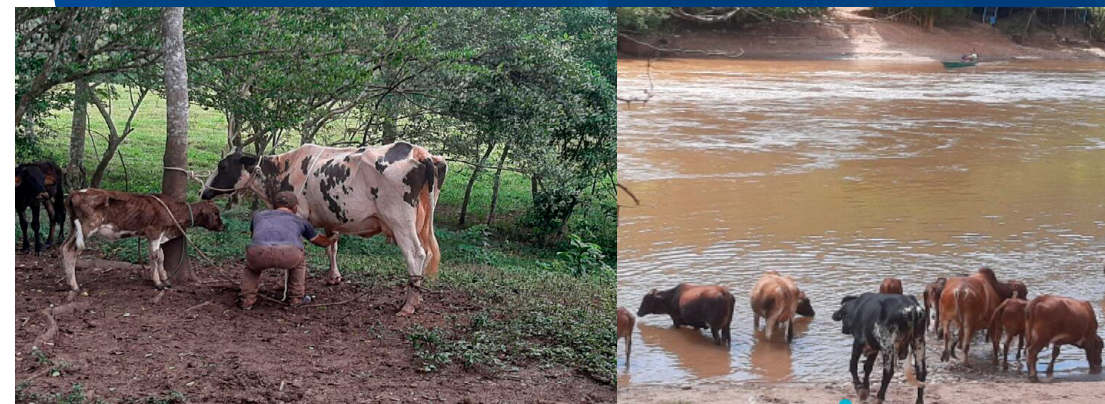
The next phase will launch supplementation trials and methane measurement, integrate results through simulation models and life cycle assessment, and develop producer-facing recommendations for circular feeding strategies.

Benefit to New Zealand, GRA, and LAC

For LAC, the project supports sustainable intensification in environmentally sensitive Amazon livestock systems. For GRA, it contributes evidence on enteric methane mitigation through feeding strategies. For New Zealand, it provides comparative research on tropical livestock, circular feed resources, and emission intensity.

Benefits to New Zealand Agriculture

- ✓ Developing Sustainable Dual-Purpose Livestock Systems – Provides models for integrating beef and dairy production under sustainable intensification.
- ✓ Optimizing Use of Agro-Industrial By-Products – Introduces strategies for incorporating food processing waste as an alternative cattle feed.
- ✓ Reducing the Carbon Footprint of Livestock – Supports climate-friendly production models applicable to New Zealand's grazing systems.
- ✓ Improving Nutritional Efficiency in Cattle – Enhances knowledge on feed supplementation strategies to optimize productivity.
- ✓ Strengthening Livestock Climate Adaptation Strategies – Supports sustainable intensification practices that improve resilience in vulnerable farming regions.



Source: Project images of the field experiments.

PROJECT 15

Climate-smart research and indigenous communities

Field	Project information
Status	Active project with 2025 progress update
Countries	Argentina and Chile
Core theme	Mapuche communities, participatory innovation, livestock resilience, food security, and intercultural knowledge
Current role in the 2026 report	Active project linking climate-smart livestock practices with Indigenous community resilience



Original challenge

Livestock production is central to livelihoods, food security, and cultural identity in Mapuche communities in southern Argentina and Chile. These systems face climate variability, forage and water constraints, fragile ecosystems, and limited access to adapted technologies. This project was designed to promote sustainability and food security through participatory climate-smart livestock practices that respect Indigenous governance and knowledge systems.

Legacy links from closed projects

Project 15 directly inherits Project 8's participatory pilot-site model and producer-defined technology packages. It also builds on Project 4's collaborative network and capacity-building model, Project 5's forage and feeding strategies, and Project 1's broader need to monitor emissions and resilience outcomes in climate-smart livestock systems.

Now - verified 2025 progress

During the first phase, the project worked with five Mapuche communities, four in Argentina and one in Chile. It established 15 Innovation Units in communities and 12 Experimental Units at INTA Bariloche.

Free, Prior, and Informed Consent agreements were established with all communities. Baseline assessments and indicator matrices were developed, and more than 18 climate-smart livestock practices were selected across forage production, livestock management and health, water management, ecological restoration, and organizational strengthening.



Implementation began across the Innovation Units, including forage and feeding strategies, water management, animal health interventions, reproductive and herd management, ecological restoration, and community infrastructure and organization. Knowledge management includes training, field days, intercultural exchanges, and scientific publications.

Emerging outputs

Emerging outputs include Innovation Units, Experimental Units, FPIC agreements, baseline indicators, selected climate-smart practices, community workshops, field validation activities, research on alternative feeds and water management, and intercultural exchange mechanisms.

Next - expected 2026 contribution

The next phase will continue implementation and monitoring, systematize effects on productivity, resilience, and GHG emission intensity, and advance international exchange, including planned engagement with Maori communities.

Benefit to New Zealand, GRA, and LAC

For LAC, the project supports Indigenous-led and community-based adaptation. For GRA, it connects climate-smart livestock research with social and territorial resilience. For New Zealand, it creates a meaningful bridge for exchange between Indigenous knowledge systems, including potential Mapuche-Maori dialogue around climate-resilient livestock systems.

Source: Project images of the field experiments.

Benefits to New Zealand agriculture

- ✓ Integrating Indigenous Knowledge into Climate Adaptation – Promotes traditional and local knowledge as part of climate-smart agriculture strategies.
- ✓ Strengthening Community-Led Sustainable Farming Models – Encourages participatory approaches for adaptation, applicable to Māori agricultural practices.
- ✓ Enhancing Smallholder Farming Resilience – Demonstrates successful interventions for improving productivity under extreme climate conditions.
- ✓ Promoting Sustainable Livestock Practices – Identifies low-impact grazing techniques that support biodiversity conservation.
- ✓ Supporting Cultural Preservation in Agriculture – Reinforces the role of indigenous leadership in sustainable farming initiatives.



PROJECT 16

Optimizing nitrogen use for sustainable farming

Field	Project information
Status	Active project with 2025 progress update
Countries	Argentina, Chile, Peru, Dominican Republic, and Panama
Core theme	4R nitrogen management, nitrous oxide, ammonia volatilization, mitigation additives, and emission factors
Current role in the 2026 report	Active project generating locally relevant evidence for nitrogen-use efficiency and lower environmental losses



Original challenge

Nitrogen fertilization is essential for crop and pasture productivity, but it also contributes to nitrous oxide emissions, ammonia volatilization, and other environmental losses. Latin America and the Caribbean need locally derived evidence to improve nitrogen management while maintaining productivity. This project applies the 4R nutrient stewardship framework: right source, right rate, right time, and right place.

Legacy links from closed projects

Project 16 builds directly on Project 1's regional experience with nitrous oxide measurement using static chambers and gas chromatography. It also connects to Project 5's nitrogen-cycling legacy through biological nitrogen fixation and reduced synthetic fertilizer dependence, Project 2's farm-level emissions perspective, and Project 4's protocol harmonization and regional scientific coordination.

Now - verified 2025 progress

During 2025, the project linked Argentina, Chile, Peru, the Dominican Republic, and Panama through a common platform. A unified GHG measurement protocol was agreed and published after hands-on training in Osorno, Chile.

Field trials were established or initiated in Argentina, Chile, Peru, the Dominican Republic, and Panama. These trials evaluate N₂O emissions, NH₃ volatilization, yields, fertilizer sources, and mitigation additives.



Preliminary results indicated higher cumulative N₂O under plain urea and UAN, with lower emissions under UAN + DCD and slow-release urea, although differences were not yet statistically significant. In the swine effluent trial, DCD was the most effective additive for reducing N₂O emissions, and zeolite improved maize yield.

Emerging outputs

Emerging outputs include a published common GHG protocol, field emission-factor trials, mitigation trials with inhibitors and additives, conference presentations, symposium publications, workshops, field days, and seminars.

Next - expected 2026 contribution

The next phase will continue field evaluations for at least one full year, expand mitigation experiments in Chile, Peru, the Dominican Republic, and Panama, and generate locally relevant emission factors and 4R recommendations.

Benefit to New Zealand, GRA, and LAC

For LAC, the project strengthens nitrogen-use efficiency and emission-factor evidence. For GRA, it contributes to agricultural nitrous oxide mitigation. For New Zealand, it supports comparative learning on fertilizer management, inhibitors, organic amendments, and field GHG measurement in diverse production systems.

Benefits to New Zealand agriculture

- ✓ Developing More Efficient Fertilization Strategies – Helps optimize nitrogen use to balance productivity and environmental protection.
- ✓ Reducing Nitrous Oxide Emissions – Provides emission factor data that can be applied to refine New Zealand's national GHG inventory.
- ✓ Improving Soil Nutrient Management – Supports the transition toward precision application of fertilizers in pastoral and arable farming.
- ✓ Enhancing Public Policy on Nitrogen Use – Offers science-based recommendations for nitrogen regulations in New Zealand agriculture.
- ✓ Supporting Regenerative Farming Practices – Provides guidance on sustainable nutrient cycling and soil restoration.



Source: Project images of the field experiments.

PROJECT 17

Building resilient agricultural systems to mitigate climate change

Field	Project information
Status	Active project with 2025 progress update
Countries	Argentina, Uruguay, Brazil, Chile, and Dominican Republic
Core theme	Silvopastoral systems, carbon stocks, carbon footprint, diversification, and resilience indicators
Current role in the 2026 report	Active early-stage project evaluating integrated livestock-forestry systems for mitigation and adaptation



Original challenge

Livestock systems in Latin America and the Caribbean face increasing climate pressures and are important sources of greenhouse gas emissions. Silvopastoral systems can increase carbon stocks, diversify production, improve animal welfare, and enhance resilience. This project was designed to evaluate integrated livestock-forestry practices across participating countries and strengthen knowledge on their mitigation and adaptation potential.

Legacy links from closed projects

Project 17 builds on Project 5's soil carbon, nitrogen cycling, forage systems, and livestock productivity legacy. It also connects to Project 8's experience with extensive livestock resilience and producer participation, Project 1's GHG and carbon-balance measurement foundation, Project 4's multi-country platform model, and Project 6's digital grazing-management experience.

Now - verified 2025 progress

Progress was made through virtual coordination and planning meetings, selection and characterization of experimental sites, baseline compilation, and assignment of responsibilities across participating countries.

Experimental sites were delimited and georeferenced. Preliminary soil carbon stock information was collected in a silvopastoral system in the semi-arid Chaco region of



Argentina. A first in-person workshop and training session was organized for March 2026 in Uruguay.

Emerging outputs

Emerging outputs include baseline compilation on silvopastoral systems, georeferenced experimental sites, preliminary soil carbon information, consultant-supported technical integration, and planned protocols for carbon sequestration, GHG emissions, net carbon balance, carbon footprint, and resilience indicators.

Next - expected 2026 contribution

The next phase will move from baseline and site selection to field-based evaluation of silvopastoral systems, shared protocol development, carbon-footprint assessment, resilience indicators, and cross-country technical training.

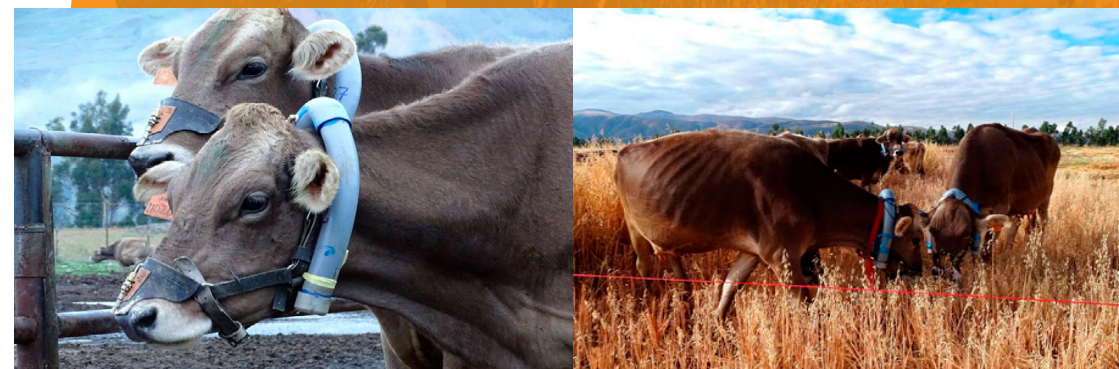
Benefit to New Zealand, GRA, and LAC

For LAC, the project supports integrated systems that combine livestock production, trees, carbon, and resilience. For GRA, it contributes to mitigation evidence in land-based livestock systems. For New Zealand, it provides comparative insight into agroforestry-livestock integration, carbon accounting, and resilience metrics.

Source: Project images of the field experiments.

Benefits to New Zealand agriculture

- ✓ Advancing Silvopastoral Systems – Supports New Zealand's efforts to integrate trees into grazing landscapes for climate resilience.
- ✓ Quantifying Carbon Sequestration in Agricultural Systems – Provides data for policy development around carbon farming initiatives.
- ✓ Enhancing Biodiversity in Livestock Farming – Promotes diversified farming systems that improve soil health and ecosystem resilience.
- ✓ Reducing Deforestation from Agricultural Expansion – Offers sustainable land-use practices that balance productivity with conservation.
- ✓ Strengthening Climate-Smart Livestock Research – Facilitates knowledge transfer in low-emission livestock intensification.



PROJECT 18

Scaling innovation in pastoral systems

Field	Project information
Status	Active project with 2025 progress update
Countries	Uruguay, Argentina, and Costa Rica
Core theme	3RWeb scaling, grazing decision support, commercial validation, and methane-emission estimation
Current role in the 2026 report	Active project scaling digital pasture-management innovation across commercial farms



Original challenge

Pasture-based livestock systems need practical tools to improve forage harvest, grazing decisions, supplementation, and emission intensity. Earlier digital tools showed promise, but scaling requires improved functionality, training, validation on commercial farms, and integration with biomass estimation and methane-assessment modules.

Legacy links from closed projects

Project 18 is the direct continuation of Project 6 through 3RWeb, user-centered design, API development, cloud-based decision support, and continued adoption after closure. Project 7 contributes climate-smart dairy AgTech experience and public-private platform lessons. Project 2 informs livestock-management and supplementation decisions, Project 5 contributes forage-quality logic, and Project 10 provides the sister remote biomass-estimation layer needed for scaling.

Now - verified 2025 progress

During 2025, the project initiated its first implementation phase, focusing on strengthening the regional innovation platform, improving 3RWeb, and building technical capacity.

New functionalities for 3RWeb v2.0 were defined through meetings with expert technicians and current users. A dairy diet evaluation module was designed, incorporating forage nutritional value, supplements, concentrates, and animal



requirements. Beef cattle decision-support flows were redesigned for temperate, subtropical, and tropical systems.

The project trained and certified 25 technical facilitators in Uruguay, reached more than 350 people through outreach, established associations with Marfrig and Minerva, and created synergies with the Time2Graze initiative.

Emerging outputs

Emerging outputs include 3RWeb v2.0 design, a dairy diet evaluation module, improved beef decision flows, facilitator training, outreach events, private-sector associations, and coordination with remote biomass estimation and methane mitigation initiatives.

Next - expected 2026 contribution

The next phase will implement the improved system in pilot farms, validate the AgTech solution in commercial farms, begin field-level data collection for methane-emission estimation, and expand training to Argentina and Costa Rica.

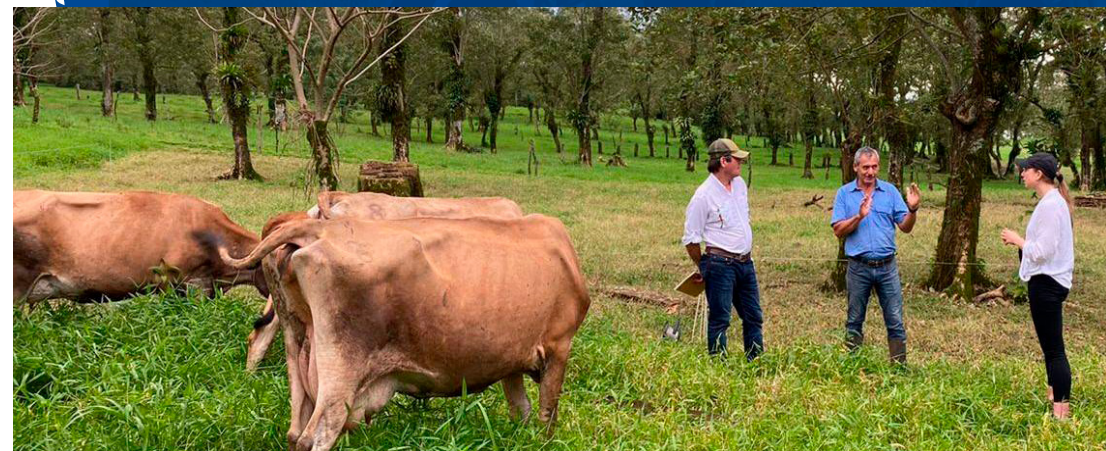
Benefit to New Zealand, GRA, and LAC

For LAC, the project supports scalable grazing decision support and technical advisory services. For GRA, it links pasture management with methane-emission assessment. For New Zealand, it provides comparative AgTech evidence for pasture-based systems and strengthens connections between digital tools, forage efficiency, and low-emission livestock.

Source: Project images of the field experiments.

Benefits to New Zealand Agriculture

- ✓ Expanding the Use of AgTech in Grazing Management—Introduces scalable technologies that optimize forage availability and utilization.
- ✓ Improving Grass Productivity – Helps increase pasture yields in New Zealand's dairy and beef farming systems.
- ✓ Developing Digital Tools for Farmers – Provides models for cloud-based farm management solutions.
- ✓ Reducing Greenhouse Gas Emissions in Pasture-Based Farming – Supports methane reduction strategies linked to better grazing efficiency.
- ✓ Enhancing Resilience of Grazing Systems to Climate Variability – Promotes adaptive management strategies based on real-time pasture data.



PROJECT 19

Reducing greenhouse gas emissions in potato-pasture systems in Ecuador and Peru

Field	Project information
Status	Active project with 2025 progress update
Countries	Ecuador and Peru
Core theme	Conservation Agriculture, potato-pasture rotations, high-Andean systems, and direct GHG measurement
Current role in the 2026 report	Active project generating field evidence on Conservation Agriculture and GHG emissions in high-Andean crop-livestock systems



Original challenge

Potato-pasture systems in the high Andes of Ecuador and Peru are important for rural livelihoods and food security, but conventional management can contribute to soil degradation, soil organic carbon losses, and greenhouse gas emissions. This project was designed to reduce GHG emissions through Conservation Agriculture practices in potato-pasture production systems.

Legacy links from closed projects

Project 19 builds directly on Project 1's methodological legacy in static chamber GHG measurement and gas chromatography. It also connects to Project 3's Andean emissions and institutional capacity in Ecuador and Peru, Project 4's methodology harmonization and training model, and Project 7's farm-system good-practice framing.

Now - verified 2025 progress

During 2025, baseline characterization advanced through secondary information, sampling design, and digital survey implementation. In Ecuador, 100 producers were surveyed in San Juan parish, Chimborazo Province, and the survey instrument was finalized for Peru.

A total of 20 experimental plots were established in Santa Isabel, Ecuador, and at IRD Sierra, Peru. The experimental design integrates tillage and residue management factors, and the first crop of the rotation, potato, was established.



Initial soil physical and chemical properties were sampled, and the first GHG measurement campaign was conducted using static chambers and gas chromatography for CO₂, CH₄, and N₂O. Training included a Peru workshop with 22 attendees and an Ecuador soil sampling and GHG measurement workshop with 50 farmers.

Emerging outputs

Emerging outputs include producer baseline data, experimental plots, soil physical and chemical data, direct GHG measurements, harmonized field protocols, training activities, and an analytical framework for comparing measured emissions with IPCC-based estimates.

Next - expected 2026 contribution

The next phase will complete data collection across the full crop rotation, compare measured GHG emissions with IPCC-derived estimates, and integrate productive, socioeconomic, and environmental data into models for extrapolation.

Benefit to New Zealand, GRA, and LAC

For LAC, the project supports sustainable high-Andean production systems and locally relevant mitigation evidence. For GRA, it contributes direct measurement of GHG emissions in crop-pasture rotations. For New Zealand, it provides comparative evidence on Conservation Agriculture, soil management, and GHG measurement in mountainous systems.

Source: Project images of the field experiments.

Benefits to New Zealand agriculture

- ✓ Enhancing Sustainable Potato Production – Introduces regenerative practices for potato farming, a key crop for New Zealand.
- ✓ Reducing GHG Emissions in Mixed Farming Systems – Provides low-emission strategies for diversified farming landscapes.
- ✓ Optimizing Nutrient Management in Pasture-Potato Rotations – Improves soil health and productivity through integrated cropping systems.
- ✓ Developing Low-Carbon Agronomic Practices – Supports efforts to decarbonize root and tuber production in New Zealand.
- ✓ Strengthening Resilience in Smallholder Farming – Offers climate adaptation strategies for high-altitude and marginal farming areas.



PROJECT 20

Integration of sorghum cultivation into production systems of Latin America

Field	Project information
Status	Active project with 2025 progress update
Countries	Costa Rica, Argentina, Honduras, Panama, Peru, and United States collaboration
Core theme	Sorghum adaptation, dryland resilience, genotype-by-environment evaluation, and decision support
Current role in the 2026 report	Active project supporting resilient crop options for water-limited production systems



Original challenge

Production systems in the Central American Dry Corridor and other water-limited environments face drought, climate variability, yield instability, and weak seed and technology-transfer systems. Sorghum is a strategic crop for these environments because of its abiotic stress tolerance, versatility, genetic diversity, and relatively low input requirements. This project was designed to identify adapted sorghum genotypes and support sustainable intensification of production systems.

Legacy links from closed projects

Project 20 builds on Project 2's Central American experience in sustainable intensification, productivity, and resilience under climate constraints. It also connects to Project 8's dry-region adaptation and family-production logic from the South American Chaco, Project 4's multi-country coordination and standardized protocol model, and Project 5's feed-system and diversification legacy.

Now - verified 2025 progress

During 2025, the project moved from planning to operational implementation. It completed a baseline and Target Population of Environments characterization, showing strong heterogeneity across countries in production scale, germplasm availability, institutional capacity, seed systems, and technology transfer.

Climatic characterization confirmed broad environmental diversity across selected sites, including temperate, humid subtropical, tropical lowland, and highland environments. A core set of 20 genetically diverse sorghum hybrids was selected through literature review, technical consultations, and collaboration with Corteva Agriscience.



Standardized protocols were developed for experimental design, agronomic management, and data collection. Multi-environment trials were established in Argentina, Costa Rica, Peru, and the United States, with Honduras and Panama scheduled after seed receipt. Preliminary results from Hastings, Florida, showed substantial phenological and morphological diversity among genotypes.

Emerging outputs

Emerging outputs include a technological baseline, environmental characterization, a core genotype set, standardized multi-environment trial protocols, initial field-trial data, and the basis for genotype-by-environment analysis and decision-support platform development.

Next - expected 2026 contribution

The next phase will complete multi-environment trials, quantify genotype, environment, and genotype-by-environment effects, identify stable and locally adapted genotypes, and build predictive models and an online platform for genotype recommendation and environment-specific yield estimation.

Benefit to New Zealand, GRA, and LAC

For LAC, the project supports dryland resilience and crop diversification. For GRA, it contributes to adaptation and sustainable intensification in climate-vulnerable systems. For New Zealand, it provides comparative evidence on crop adaptation, drought resilience, and decision-support tools in environments facing water stress.

Benefits to New Zealand agriculture

- ✓ **Developing Climate-Resilient Cropping Systems** – Offers models for increasing farm productivity while reducing environmental impacts.
- ✓ **Enhancing Water Efficiency in Agriculture** – Supports improved irrigation and soil moisture management techniques.
- ✓ **Reducing Agricultural GHG Emissions** – Identifies best practices for emissions reduction across multiple cropping and livestock systems.
- ✓ **Improving Carbon Balance in Farming** – Provides new data for refining New Zealand's sustainable farming policies.
- ✓ **Strengthening Science-Policy Interface** – Helps bridge the gap between research findings and policy decisions in sustainable agriculture.



Source: Project images of the field experiments.

Closing remarks

This report reaffirms the value of a long-term partnership dedicated to agricultural innovation, climate resilience, and low-emission development in Latin America and the Caribbean. Over 16 years, the collaboration among FONTAGRO, the Government of New Zealand, the Ministry for Primary Industries, the Global Research Alliance on Agricultural Greenhouse Gases, the Inter-American Development Bank, and regional partners has generated more than a collection of individual project results. It has built a shared platform of knowledge, technical capacity, institutional trust, and practical experience.

The portfolio shows how sustained cooperation can evolve with the needs of the region and the global climate agenda. The first projects focused on essential measurement capacities, including methane and nitrous oxide quantification in livestock systems. Those efforts helped strengthen laboratories, train professionals, generate locally relevant emission factors, and improve the ability of countries to participate in international reporting and policy dialogue. This foundation remains visible today in active projects that continue to advance methane mitigation, nitrogen management, soil carbon monitoring, and greenhouse gas measurement in crop and livestock systems.

At the same time, the partnership has expanded from measurement toward integrated climate-smart innovation. Current projects are testing and validating digital tools, satellite-based forage monitoring, biological inputs, beneficial fungi, circular feeding strategies, silvopastoral systems, conservation agriculture, Indigenous community innovation, and dryland crop adaptation. These efforts respond to the reality that climate-smart agriculture requires more than a single practice or technology. It requires a portfolio of complementary approaches that can increase productivity, reduce emission intensity, improve resilience, strengthen soil health, and support adoption by producers and institutions.

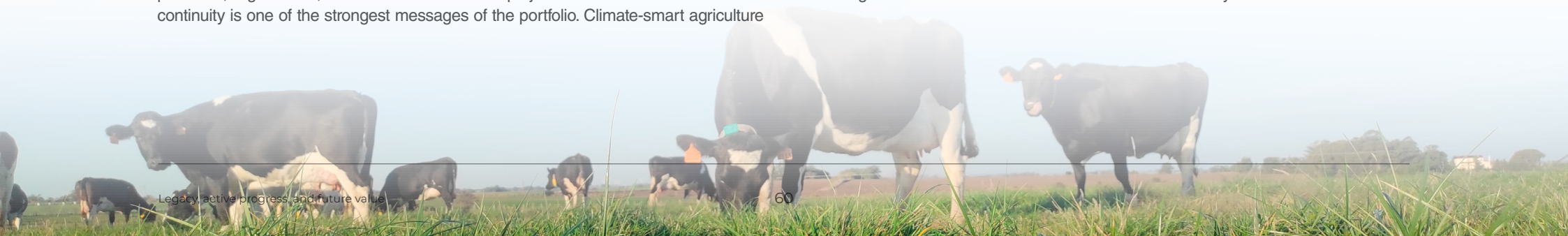
The report also highlights the importance of legacy. Completed projects continue to matter because they created methods, networks, trained professionals, producer platforms, digital tools, and evidence that later projects now use and extend. This continuity is one of the strongest messages of the portfolio. Climate-smart agriculture

advances through accumulated capacity as much as through new activities. Each stage of collaboration has created conditions for the next: measurement capacity enabled mitigation research; regional networks enabled harmonized protocols; digital tools enabled scaling; participatory projects enabled community-based adaptation; and active projects are now generating new evidence for future policy and investment.

For Latin America and the Caribbean, the partnership has supported locally adapted solutions across diverse agroecological and institutional contexts. For New Zealand, it has strengthened scientific collaboration, contributed to GRA objectives, and provided comparative evidence from production systems facing climate challenges of global relevance. For GRA, it has helped connect international research priorities with field-level innovation, trained capacity, and practical mitigation pathways. This mutual value is what makes the collaboration durable and strategic.

Looking ahead, the challenge is to continue moving from successful pilots and technical outputs toward broader adoption, policy relevance, and sustained institutional use. The active portfolio provides a strong base for that next stage. Its projects are generating datasets, protocols, tools, field trials, and partnerships that can inform future work on monitoring, reporting, and verification; low-emission livestock systems; soil carbon and nitrogen management; AgTech; biological solutions; resilient crops; and community-led adaptation.

After 16 years, the FONTAGRO-New Zealand partnership remains a concrete example of how international cooperation can help agriculture respond to climate change while supporting productivity, food security, rural livelihoods, and environmental sustainability. The work presented in this report is both a record of progress and a foundation for continued collaboration. Its value lies in what has already been achieved, in what active projects are now producing, and in the opportunities it opens for the future of climate-smart agriculture in Latin America and the Caribbean and beyond.





**Te Kāwanatanga
o Aotearoa**
New Zealand Government

