fera

Original thinking... applied

Creating a Better Future:
Forward Thinking for the Whole Food System Science Strategy 2021-2026

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PROTECTING YOU, WHAT YOU EAT AND THE WORLD IN WHICH WE LIVE

Population growth, environmental change, food security, food safety and geopolitical uncertainty are impacting all areas of the agri-food chain worldwide and call for radical and disruptive innovation in food production and environmental conservation if humankind is to feed itself in the future whilst restoring the planet.

Fera applies **Original Thinking** to support sustainable global food production.

Our vision is to help partners to respond to these challenges through world-class science, proficient measurement and advice.

OUR PURPOSE

Original Thinking delivering a 'Whole Food System' approach for a better future

From farmers to processors, packers, formulators, retailers and hospitality the food chain is faced with unprecedented challenges - but also new opportunities.

There is no singular approach to delivering food systems fit for the future. As food ecosystems evolve, there is a wealth of emerging technologies to help organisations build new capabilities to address tomorrow's needs.

Whilst these technologies are individually powerful, it is the bringing together of people, ideas and resources to deliver products, processes, landscapes and services that build successful businesses and communities that will deliver the food systems of the future.

OUR STORY

At Fera, we bring a 100+ year track record, leading research and development capabilities including in biology, biotechnology, chemistry, ecology, social and data science, to deliver tailored expert services to respond to the most exacting challenges. We believe in collaboration with partners around the world to create positive change for the food system, consumers and the planet.

We are a socially responsible, expert scientific services business delivering world leading support to public and commercial sectors to address the most demanding UN Sustainable Development Goals for the benefit of humankind and our planet.

OUR SCIENTISTS SET THE AGENDA

Fera's science strategy is devised and delivered by our scientists. Across organic, step-out and strategic partnering initiatives, our science strategy maps out new growth opportunity at incremental levels of risk and ambition. Each present different challenges and profiles for talent development and recruitment.

In all cases, our efforts will be directed at ensuring our talent resourcing maximises ethnic diversity and inclusion by changing the way Fera reaches out into the regional and national market.
We will maximise the opportunities for **'in-house' progression of talent** and deploy a strategy of recruitment at the bench or in the field (via apprenticeships) and regional community engagement to construct a development pipeline providing attractive career progression to new joiners and building a solid level of resilience and delivery agility into Fera. We will also continue to engage interns with a view to recruitment upon graduation.

This will be supported by our ongoing investment to support collaborative PhD studentships and placements with academic partners, not just for the scientific outputs, but specifically with the aim of on-boarding such talent to help drive the agenda further and faster.
We are committed to promote an employer-stakeholder culture amongst all Fera staff:
"your hand on our success"
and we will continuously invest to solicit staff engagement at all levels.

Step-out growth:

Market-led, Science-driven.

Fera's science is responsive and market-led. Our cohort of scientists across multiple disciplines set the agenda, are agile and adaptive to the changing world.

As a translational science organisation, Fera is focussed on science for impact – for public good, commercial advantage or both. We invest in partnerships with leading academic institutes in the UK and worldwide to support early stage innovation and to nourish our own talent resource and ingenuity.

> We also participate in selected national and international applied research and development and evidence gathering programmes in this pursuit and to enrich our own pipeline of innovative value propositions for translation to market impact. This drives our successful commercial growth under a self-sustaining model.

Our science quality is measured not only by our commercial success, but also by a demanding set of bespoke key performance measures governed by Fera's Science Committee generating a strong cited publications record, an enviable catalogue of impact case studies and pipeline intellectual property and innovation for translation impact.

Strategy:

Strategic Science – collaborate with Fera

Bridging the gap between research and impact across the whole food system

1 National and international research funding

2 Investing in academic collaboration for Fera's science outputs and talent development

3 Whole Food System scientific (knowledge based) change drivers:

- Protecting
- Growing
- Supplying
- Consuming
- Replenishing

PROTECTING

CHEMICAL SAFETY STEWARDSHIP

A team of expert scientists delivering regulatory studies from one of the strongest platforms in the country which has been further bolstered by the recent addition of a comprehensive aquatic offering including a unique fully flowthrough mesocosm facility and state of the art flow through laboratories. Able to conduct all aquatic studies required to OECD test guidelines and responding to recent regulatory changes that bring endocrine disruption (ED) to the forefront of chemical assessment. Strategic priorities continue in **environmental fate, metabolism, terrestrial ecotoxicology, pollinators, aquatic ecotoxicology** and **analytical chemistry** with near term growth opportunities in plant protection, animal health and pharmaceuticals in the environment. Over the next 5 years, Fera will focus investment in the following areas:

- **Environmental Fate** – support emerging needs such as Aged Sorption and determining biodegradability of materials like biobased packaging
- **Terrestrial Ecotoxicology** - expanding our services to address pharmaceuticals in the environment (PIE) and to support biopesticide registration requirements
- **Pollinators** - supporting pollinator health and biopesticide registrations
- **Aquatic Ecotoxicology** - expanding our capability to target PIE, growing amphibian expertise to expand current ED offering
- **Analytical Chemistry** - continued expansion of our stand-alone chemistry service lines into areas such as counterfeit pesticide formulation testing, Storage Stability and Animal Health Formulation Testing
- **Field Trials** - developing our offering in terrestrial, pollinator, environmental fate and product efficacy studies.
- **Government support** - develop formulation testing to further support the regulator, producing evidence-based science for policy change, refine methodologies and react to emerging needs in suspected wildlife poisoning incidents, delivering internal and external training programmes and providing additional Contingency Response/ Surge Capacity (eg; for Livestock/ Wildlife support)

LAND USE, BIODIVERSITY AND NATURAL CAPITAL

Research scientists at Fera have a long track record of supporting government and policy in monitoring and evaluating agri-environment schemes designed to support environmental sustainability in agriculture and food production.

Fera works closely with farmers, landowners and industry to provide surveillance, remote sensing, spatial analysis, mapping, monitoring and evaluation studies for biodiversity and to provide advice on influencing sustainable land management. Whilst our focus has historically been on the delivery of public goods, with the introduction of environmental land management (ELM) and biodiversity net-gain (BNG) impacting UK land management Fera will invest in its scale and scope over the next 5 years to respond to greater engagement between the public and private sectors in areas including:

- **Natural Capital assessment** - measuring and monitoring, validating outputs and methodologies, developing new methods for both public and private schemes covering a range of habitats from tree canopy to soil biodiversity.
- Working with land managers to develop and implement ELM offering
- Working with landowners, responsible food brands and retailers in delivering 'the restoration economy'- by demonstrating capabilities and mobilising them to move from agricultural produce to carbon sequestration and biodiversity, whilst protecting and strengthening food supply chains - including offering new incentives for land managers to participate.
- Increasing the depth and breadth of Fera's remote sensing capability, soil and water analysis, carbon life cycle and life cycle analysis.

GROWING

PLANT HEALTH

Fera has a world leading Plant and Bee Health capability and our diagnostic development and delivery is critical to the UK's biosecurity and protection of both the agricultural and natural environments. Our scientists have an in-depth knowledge of pest and disease epidemiology enabling the provision of R&D and advice alongside our diagnostics. Fera will build on this platform to:

- Develop innovative detection and diagnostic techniques
- Develop and support diagnostic capability away from Sand Hutton
  - EU Exit requirements for Fera labs at point of entry
  - In-house capability at large scale production facilities
  - Supporting pre-border checks in exporting countries
  - In-field diagnostic tests
- Partner with the Industry and Governments
  - Seed production issues / Seed certification schemes
  - 'Production line' infection and detection
- Provide consultancy on where and how to utilise these approaches

... and we will introduce a **Plant Clinic Members' scheme** providing an augmented suite of services support.

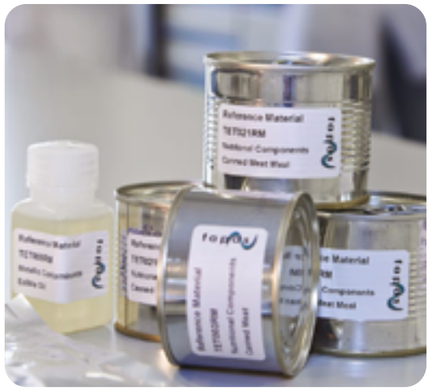
SUPPLYING

PROFICIENCY

Under the Fapas® brand, Fera leads over 400 internationally recognised proficiency tests (PT) annually involving more than 5000 individual laboratories in 140 countries. Our principal PT schemes cover Food Chemistry, Food Microbiology, GM Foods, Drinking Water and Environmental Chemistry and Environmental Microbiology. Fera also operates a catalogue of bespoke PTs for individual clients and partners.

Participants in Fera's PTs include a range of government, commercial, academic, national and international laboratories. Participants may be run independently or as part of a larger cohort in both food-manufacturing and third-party testing laboratories.

We are an international PT provider, with a recently published white paper on the benefits to laboratories of taking part in PT.



We will invest to grow the geographic reach of Fapas®, to enhance reporting flexibility and in new product development. Immediate priorities include:

- **Cross-Fera** - Developments in other Fera science areas.
- **Within Fapas®** - Flexible and fast reaction, long-term storage and longer transportation stability
- **International** - Balancing international versus national PT, maintain and increase international quality standards, safeguarding international food trade
- **Innovation** - Developing new PTs that are not reliant on physical samples such as image-based PTs. Enhancing data interpretation PT, calculation error PT, chemical form reporting, virtual sampling PT, virus PT and new non-food environment markets.

REPLENISHING

THE CIRCULAR ECONOMY

The carbon neutral circular economy aims at eliminating waste and the continual drain on natural resources. It takes into consideration the reuse, recovery and recycling of products and materials in order to strive for net zero carbon emissions. Fera will contribute through conducting applied research in areas such as insect bioconversion, anaerobic digestion, bio-renewables evaluation in all parts of the food system, including bio-based packaging materials.

Fera will invest to:

- Establish a specialist pilot platform facility for insect bioconversion to support contract and applied research and development work with partners for future integration of this technology in their local production or waste upcycling.
- Develop expertise to assess carbon savings and sustainability of technologies across agri-food sector ranging from regenerative farming practice to land management for optimum carbon sequestration
- Risk assess emerging technologies and products derived from - and for - the circular economy e.g. biodegradable packaging, novel foods
- Develop our opportunity to support vertical, urban and controlled environment farming in seed quality assurance, biosecurity, automation and energy cost reduction and for up-cycling of by-products.
- Form partnerships and collaborations for carbon and life-cycle analysis to develop and expand into these areas.

REPLENISHING

EXPANDING INSECT BIOCONVERSION

We will apply our expertise to support and advise clients to become effective producers of insect-derived products, establishing a forefront position with insect farming companies, waste operators, novel feed and food producers.

Engaging Fera for advisory and contract R&D, will enable you to...

1. **...realise the untapped potential in residues and by-products**
2. **...de-risk investment by leveraging our insect breeding/ rearing expertise & market knowledge**
3. **...accelerate revenue realisation by applying our expertise to establish a robust breeding and rearing and deploying our quality assurance and HACCP/ GMP expertise to create a market leading, high quality product, and**
4. **...access our science expertise and facilities to develop IP rich products (feed recipes, genetic strains of insects, new products).**
5. **...determine the most viable delivery and operational partners through our network and collaborators**

PACKAGING AND BIO-BASED PACKAGING

Fera sits at the forefront of the development and adoption of sustainably sourced and biodegradable 'bio-based' packaging materials. Responding to the global drivers for waste reduction and locally in the 25 Year Environment Plan for England - *eliminate avoidable plastic waste by 2042.* We support companies who are striving to meet Government targets to achieve net-zero carbon which call for a move away from fossil fuel derived plastics.

New products being developed to meet these targets require better consideration of food contact safety and/ or environmental impact upon their degradation. Such new materials need to be safety assessed prior to use in contact with food for dossier submission for regulatory approval

As the associated regulatory framework expands to provide specific measures for new material types and/ or guidance on safety testing, Fera will develop its science capabilities to expand our methodologies:

- to demonstrate safety (specific and overall migration testing, assessment for non-intentionally added substances (NIAS) and for shelf-life assessment)
- to demonstrate quality in respect of taint and odour
- to substantiate authenticity claims (viz; 'recyclable', 'compostable', 'biodegradable', 'biobased content')
- to demonstrate safe degradation in the natural environment (regulated E-Fate studies)
- for physical tests, e.g. pack strength, seal-ability, transport, barrier properties
- To assess resistance to infestation by insects

CONSUMING

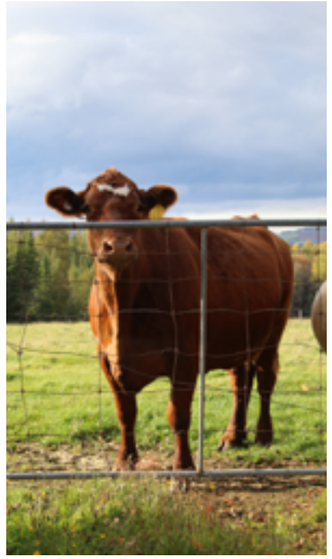
HM Government

FOOD AND FEED

Fera will capitalise upon its position as advisor to Government, to anticipate and thoroughly understand the drivers and mechanisms for regulatory change. We will continue to seek to develop the evidence base on behalf of Government through scientific research and development and desk-based review. We play a pivotal role acting as scientific conduit between UK Government and industry, advising on development of the evidence base whilst advising Government of the industry landscape to guide policy development. Fera will work with UK regulators and enforcement bodies to translate relevant policy into enforceable and fair regulation, reflecting requirements of the food industry whilst protecting consumer interests. In so doing Fera will develop testing and consultancy services to ensure that regulations can be effectively enforced which can ensure industry compliance. We will also maximise the value of data sets by spotting trends which highlight gaps that can be fed back to policy makers for refinements.

> We will continue to integrate newly developed testing capability with industry quality assurance and supply chain management programmes – ultimately leading to industry standards such as ISO, BS etc to support trade.

We will support 'good' by engaging in promotional activities which demonstrate quality through effective traceability leading to assurance marks.



NOVEL FOODS

'Novel Foods' are classified as foods which have no history of consumption and have not been consumed to a significant extent by humans in the UK or the EU before May 1997.

Sustainable, ethical food

Fera will continue to pioneer support for development and impact of sustainable and ethical foods which are increasingly sought by modern consumers and which respond to today's environmental factors which may lead to shortage of traditional food sources, Fera's science and research will be informed by circular economy principles drawn on the full breadth of Fera's capability.

Our science strategy will pursue:

- **R&D** – collaborative work to develop novel foods/ products/ processes – safety, nutritional value, shelf-life, tackling antimicrobial resistance (AMR), waste recycling, non-targeted studies to develop sustainable crops (e.g. Abstress), tracing markers of interest such as those for production methods e.g., organic/ conventional, fishing method, etc.
- **Support for industry** – development of novel foods/ products/ processes, authenticity, geographical origin, safety (including development of new methods and technologies)
- **Support for regulators** - authenticity, geographical origin, safety (also including development of new methods and technologies)

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QUALITY STATEMENT

All aspects of Fera's quality are critical to achieving our vision as an international centre-of-excellence and partner of choice. Data integrity is core to both the research and scientific services of Fera. We invest time and resources in achieving and retaining Accreditation and Certification to the following standards:

ISO 17025 Testing Laboratory
ISO 17043 Proficiency Testing Provider
ISO 9001 Quality Management System
ISO 14001 Environmental Management System
GLP Good Laboratory Practice
ISTA International Seed Testing Association
ORETO Official Recognition of Efficacy Testing Facilities or Organisations

Our scientific quality is assessed externally by a number of bodies, including the United Kingdom Accreditation Service (UKAS), the Good Laboratory Practice (GLP) Monitoring Authority and Lloyds Register Quality Assurance. Our Quality Policy provides our clients and partners with assurance that the services we provide are of the highest standard and that results issued are reliable, accurate and precise.

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