afbi Agri-Food and Biosciences Institute

AFBI RESEARCH IMPACTS

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Contents

FROM THE CHIEF EXECUTIVE

Dr Sinclair Mayne

I am delighted to present this Research Impacts Publication, which celebrates the importance and relevance of research undertaken by the Agri-Food and Biosciences Institute (AFBI).

This publication highlights some of our key achievements over the last 10 years, from our formation in 2006 following the amalgamation of DARD Science Service and the Agricultural Research Institute of Northern Ireland.

Both organisations had a long and proud history of providing world leading science to support the local agri-food industry and inform government policy development, and the examples included in this publication serve to illustrate that this remains a key priority for the Institute.

AFBI's vision is to Advance the Local and Global Agri-Food Sectors Through Scientific Excellence. In order to deal with the major global challenges of increased food demand, climate change and pressure on land use, we need to fundamentally change our food production systems, with sustainable intensification or producing more from less being just one example of this new approach.

The production environment is also changing given the impact of globalisation, reductions in subsidy support and a new generation of consumers with very diverse and conflicting demands. Whilst there are undoubtedly opportunities for the local agri-food sector to respond by producing healthy, versatile and safe food, this will require investment in science to generate new knowledge, drive innovation and improve competitiveness relative to our major competitors.

The research impacts profiled in this report are examples of our work across a wide array of scientific disciplines. I am pleased to acknowledge the excellence of our scientists and support staff within AFBI and also our wide range of national and international collaborators who have made an important contribution to the achievements presented in this publication.

Finally I wish to acknowledge the wide range of funding bodies that have supported the work presented here, particularly our core funder the Department of Agriculture, Environment and Rural Affairs and other funders including AgriSearch, Defra (GB), the European Union, DAFM (ROI), and commercial agri-food companies.

The quest for the perfect pig

The Pig Grading Information System - PiGIS.

PiGIS®
Pig Grading Information System

Over 99% of slaughtered pigs in Northern Ireland now have their data automatically uploaded into the award-winning PiGIS benchmarking tool, designed so that both processors and farmers can measure and benchmark pig carcase quality.

The AFBI-developed system is underpinned by robust quality-assured statistical methods, allowing farmers to make informed management decisions and identify how changes in genetics, health status or feed stocks could be affecting carcase quality.

PiGIS profiles carcase quality by weight and fat depth, benchmarking farmers against Northern Ireland's top producers and showing the proportion of carcases falling within the factory ideal range using the Golden Box feature.

Farmers are not required to enter the information themselves as it is uploaded directly from processing plants to the PiGIS database, and can be viewed securely over the internet using a computer or mobile device. Data for pigs sent to slaughter can even be sent out via SMS text message the next day.

PiGIS is useful to farmers enabling them to chart changes in carcase quality and to processors who can identify the suppliers whose animals best meet retail standards.

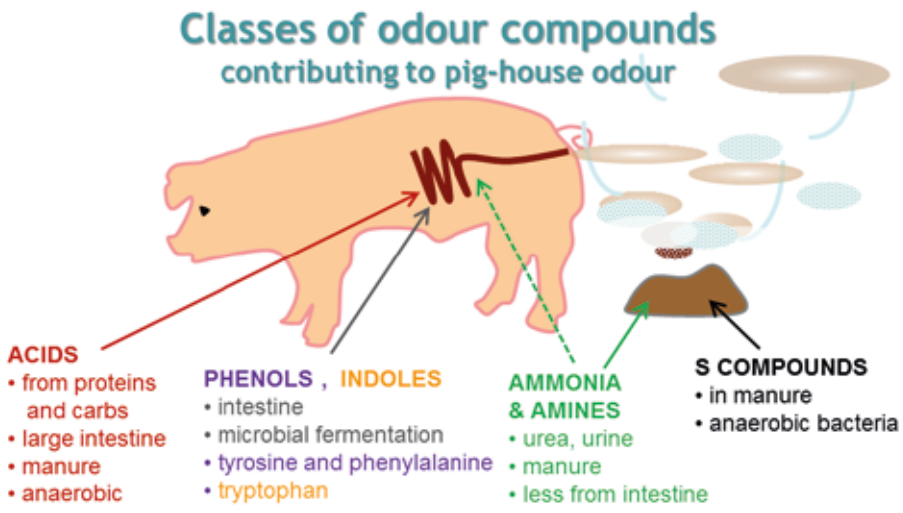
It also provides government departments with up-to-date information on pig production trends thus helping to formulate strategy.

PiGIS has won multiple awards, including the RASE Oxford Farming Conference 'Practice with Science' award in 2012.

Research Leads: Erica Chisholm, Mark Browne,
Research partners: CAFRE, working with stakeholders
Funding: DARD Vision Funding

Pig-house odour – what is that smell?

AFBI research has identified key odour compounds from pig houses



Researchers from around the world have discovered up to 500 volatile organic compounds in the odour emitted from pig houses.

However, AFBI scientists have determined the compounds most responsible for the characteristic pig-house smell by calculating the 'Odour Activity Value' (OAV) – the concentration of a single compound divided by its odour threshold concentration (i.e. when it becomes detectable to 50% of the population). OAVs were calculated using published odour detection thresholds, which had been selected for consistency of their methods of determination. Compounds with the highest OAV are likely to contribute most to the overall odour.

This work has shed new light on results in the published literature reporting the concentrations of volatile compounds from pig-houses. AFBI found that the most important odour compounds are short chain acids, sulphur compounds, phenols, indoles (e.g. skatole) and amines. Individually, these compounds have the highest odour activity values and often have pungent and offensive odours.

Most of these compounds are formed by the action of microbes in the gut. Importantly, ammonia, while a contributor and an important greenhouse gas, was not found to be a major cause of pig-house odour.

These methods have also been used to review the effectiveness of mitigation factors to reduce the concentrations and odour impact of these compounds and advise government and the pig industry on ways to reduce odour from pig facilities.

Research Leads: Linda Farmer and Elizabeth Magowan
Funding: DAERA and pig industry

A double-edged sward

AFBI research challenge to EU environmental legislation boosts grassland profitability.

The Northern Ireland Nitrates Action Programme (NAP) first introduced in 2006 aims to protect waterways from nutrient losses from agriculture.

However, farmers were concerned that the phosphorus (P) recommendations for grassland soils had been set at too low a level, and that the availability of P in organic manures had been fixed at 100% - double what it actually is.

This meant that farmers were often unable to fully meet nutrient demands for grass-growing on low-phosphorus soils.

Thanks to research carried out by AFBI on 12 dairy farms, the EU agreed to split the P index 2 range for grassland soils into 2- and 2+, and to increase P recommendations in the 2- range. They also agreed to revise slurry P availability to 50% on low-phosphorus soils. This means farmers are now allowed to spread enough manure and fertiliser P on poor soils to improve grass quality and quantity.

The revised NAP regulations should prevent up to £10 million worth of lost grass production which would have been the consequence of inadequate P availability.

AFBI was also able to show that dairy farms using more of the improved grass and forage are able to cut their concentrate P inputs, while boosting milk yields.

AFBI have estimated that applying this research can potentially boost profitability of intensively managed grassland by more than £50 million a year, while also reducing P runoff to waterways.

Research Lead: John Bailey
Research partners: 12 Northern Ireland dairy farmers
Funding: DAERA and European INTERREG IVB funding

Tackling a changing climate

AFBI research helping to quantify, contextualise and minimise the carbon footprint of NI agriculture.

The Northern Ireland Executive aims to cut greenhouse gas (GHG) emissions by 35% by 2025 compared to 1990 levels - and large reductions in agricultural emissions will be needed to meet that target.

AFBI has teamed up with nine leading UK and Irish research institutes to develop IPCC Tier 2 and Tier 3 regional-specific emission factors for nitrous oxide, allowing GHG emissions from different farming practices to be assessed.

AFBI has also collaborated with research institutions across 10 European regions to compare emissions from Northern Irish farms with their counterparts across Europe. This has revealed that GHG emissions from dairy farms in NI are the second lowest in Europe, thanks to higher milk yields per cow and lower numbers of replacement animals per cow place.

AFBI's research has also shown that Northern Ireland can markedly cut nitrous oxide emissions while maintaining current grass production levels by replacing Calcium Ammonium Nitrate (CAN) with stabilised urea.

Recent research findings from a long-term grassland experiment at AFBI Hillsborough, indicate that grassland soils can act as significant carbon sinks. It was estimated that the accumulation of carbon within the top six inches of grassland soils may help offset between 9 and 25% of GHG emissions associated with intensive livestock farming.

AFBI research has provided policymakers with potential strategies to help the UK meet its 2035 emission reduction targets and allows Northern Ireland's livestock sector to market its meat and milk as produced under low carbon footprint conditions.

Research Leads: Dario Fornara, Rachel Carolan and John Bailey
Research partners: Teagasc, Sustainable Agriculture Initiative (SAI) Platform; Wageningen University; Institut de l'Elevage; Instituut voor Landbouw- en Visserijonderzoek (ILVO); Provincie Antwerpen (Hooibeekhoeve); Lycée Technique Agricole, Aberdeen University, ADAS, Centre for Ecology and Hydrology (CEH), The Met Office, North Wyke Research (NWRes), Rothamsted Research (RRes), Scottish Agricultural College (SAC),
Funding: DAERA and European INTERREG IVB funding

Tracking the spread of TB

Bovine TB molecular epidemiology.

AFBI is at the forefront of the fight to eradicate bovine tuberculosis (TB), a disease which costs Northern Irish taxpayers up to £30 million a year.

If the disease is to be controlled, scientists first need to investigate how the pathogen is maintained and spread.

AFBI has developed high-resolution DNA fingerprinting techniques which allow scientists to identify and track genetically distinct molecular types of the pathogen *(Mycobacterium bovis)* so that they can trace the links between confirmed cases and identify herds involved in outbreaks.

These molecular typing tools have been widely adopted by TB investigators in other countries.

Data gathered in Northern Ireland have yielded valuable new evidence for epidemiologists and have confirmed that TB is a locally-driven epidemic, with strongly localised pathogen types found in cattle and wildlife.

This peer-reviewed and published work has also been highly cited and used worldwide by scientists tracking human TB infections.

AFBI has also teamed up with disease modelling specialists at the University of Glasgow in a project that used pathogen whole-genome sequencing for the first time to investigate bovine TB transmission dynamics at the farm scale.

This confirmed that there is an ongoing interaction between infected local cattle herds and infected badgers, a key contribution to what is currently a vigorous debate over the approach to bovine TB disease control.

Research Leads: Robin Skuce and Adrian Allen
Research partner: Universtiy of Glasgow
Funding: DAERA, the EU, the BBSRC, the Wellcome Trust

Breeding the ideal grass

Grass Breeding Programme.

Grass-breeding is one of AFBI's most successful long term research programmes having been established in 1952.

AFBI offers a portfolio of more than 30 grass varieties, which are available through their commercial partner Barenbrug and these grasses are widely used on farms in the UK, Ireland and parts of continental Europe.

Data from 26 years' of trials at Loughgall shows a steady increase in total grass yield of 0.3% per annum has been achieved through improved grass breeding at Loughgall – in other words today's varieties on average produce 8% more grass yield per ha than varieties bred 26 years ago. New varieties, including Fintona, Moira and Glenarm, have set new high standards for herbage production, disease resistance and nutritional quality.

AFBI's programme involves more than 10 hectares of grass trials in 3,000 plots, while further testing of new varieties and breeding lines is carried out by commercial partner Barenbrug on sites in the UK, Europe and Ireland.

The breeding focus is on total yield under silage and grazing, early spring growth, disease resistance, herbage quality and winter hardiness.

Genetic material comes from very diverse backgrounds to deliver high-performing grasses with wide environmental adaptability. It includes winter-active material from New Zealand, winter-hardy varieties from Eastern Europe and disease resistant lines from France.

AFBI is undertaking new research in the more fundamental aspects of plant breeding, including use of digital imaging for disease assessment and the possible adoption of molecular techniques for Genetic Marker Technology.

Research Lead: David Johnston
Research partner: Barenbrug
Funding: DAERA and Barenbrug

Projecting the future

Sectoral Modelling: FAPRI-UK Project.

AFBI has developed a series of comprehensive models that capture the dynamic inter-relationships between the variables that impact on supply and demand in the main agricultural sectors in this UK-wide project.

FAPRI-Northern Ireland began in 1997 and was replaced by FAPRI-UK in 2005. The economic analyses generated under the scheme have been widely used to underpin decision-making within the agricultural administrations of England, Wales, Scotland and Northern Ireland.

The dairy, beef, sheep, pig, poultry, wheat, barley, oats, rapeseed and biofuel sectors are examined through sub-models which are designed to generate projections of agricultural activity - production, trade, prices and consumption – all key pieces of information needed by decision makers to assess the impacts of policy changes. FAPRI-UK generates annual agricultural commodity projections which provide a medium-term outlook for the agricultural sector.

The outlook projections are also used as a basis to generate Defra's greenhouse gas projections for the UK agricultural sector.

Agricultural and trade policies are modelled in explicit detail so that realistic policy impact analyses can be conducted. For example, the models have been used to assess the implications of WTO negotiation proposals, including export subsidy elimination and increased market access.

FAPRI-UK also undertook a wide range of impact analyses on behalf of the UK agricultural administrations as part of their evidence base for supporting CAP reform policy decisions.

Research Lead: Myles Patton
Research partners: FAPRI at the University of Missouri; the FAPRI-Ireland team within Teagasc; stakeholders in key UK commodity sectors
Funding: DAERA, Defra, the Welsh & Scottish governments.

Rapid response to disease outbreaks

Pandemic H1N1 2009 in pigs.

More than 500,000 people across the globe died as the result of the H1N1 'swine flu' pandemic which appeared in the spring of 2009.

This novel strain of influenza spread rapidly within the human population leading to the declaration of an influenza pandemic. AFBI was the first laboratory in Europe to report the virus infection in pig populations, possibly as a result of spread from humans.

The virus was detected in Northern Ireland in September 2009 when respiratory symptoms were reported in a pig herd of around 5,000 animals. AFBI performed post-mortem examinations and collected tissue samples from four six-week-old piglets and these tested positive for influenza A. Follow-up analysis of their lung tissue confirmed the presence of pandemic H1N1 2009.

The virus was also found on two other premises in Northern Ireland, from herds that had no epidemiological links to the others, suggesting all three outbreaks had occurred independently. Gene sequencing suggested a strong link with other pandemic H1N1 viruses isolated from humans. The account was published in the peer-reviewed 'Veterinary Record'.

The effective response to the outbreak shown by AFBI demonstrates that the organisation is in a strong position to deal with incursions of new notifiable diseases, in terms of response time, infrastructure and high-quality trained staff. Rapid response to disease outbreaks is essential to protect the local livestock industry from major disease epidemics.

Research Lead: Mike Welsh
Research partner: Weybridge Laboratories (OIE, FAO, EU Community Reference Laboratory for Influenza)
Funding: DAERA; Epizone (WP 6.2: Field Epidemiology & Surveillance of AI and APMV)

The battle against parasites

Parasitology.

Scientists at AFBI have confirmed that gastrointestinal nematode infections and liver fluke infection in sheep in Northern Ireland have developed resistance to the drugs most commonly used to treat them.

AFBI research has shown that since the 1990s the anthelmintic drugs used by farmers in Northern Ireland to control gut parasitic worms and liver flukes have become progressively less effective in preventing disease, leading to poor productivity and welfare issues in sheep.

The Parasitology section of Veterinary Sciences Division at AFBI set up a research programme with Queen's University Belfast to examine the phenomenon, and together the research teams have developed and improved tests which are now used widely in the UK, Ireland and Europe to enable definitive diagnosis of drug resistance in parasite populations.

The work has also revealed that climate change is the most likely explanation for changes in the distribution of gut worms that affect sheep. Furthermore, there is evidence that some Northern Ireland sheep farmers are not following best practice treatment to avoid resistance build-up. Widespread worm and fluke resistance was found, along with deficiencies in current management practices in recognising and controlling the build-up of resistance, despite the existence of well-established laboratory diagnostic facilities and clear management guidelines from SCOPS the industry led group "Sustainable Control of Parasites in Sheep".

AFBI research suggests that the industry is likely to experience significant losses in productivity and decline in stock welfare in the near future, due to predicted milder winters and wetter summers that favour parasite survival, and that change to current management regimes are required to deal with the challenges ahead.

Research Lead: Bob Hanna
Research partner: Queen's University, Belfast
Funding: Queen's University, Belfast

Controlling one of the world's most important cattle diseases

BVD Research.

Bovine Viral Diarrhoea (BVD) is one of the world's most economically important endemic cattle diseases. Advances in knowledge about the disease and the developments of cost effective diagnostic methods now make control and eradication possible.

Infection in cattle can cause failure to conceive, abortions, malformed foetuses, stillbirths and the birth of persistently infected calves.

Many calves that survive infection during early pregnancy will develop a fatal condition called mucosal disease in the first two years of life.

AFBI has carried out research to address knowledge gaps in relation to BVD control that were critical in order to implement a systematic disease control programme in Northern Ireland.

The results have been applied to inform decisions on the most appropriate BVD control programme model prior to the establishment of the BVD control programme for Northern Ireland. A bulk tank milk study and a seroprevalence study carried out in 2010-11 and 2011-12 respectively, also provided a benchmark to assess the success of this programme.

Expertise in BVD diagnostics and on-farm investigation tools has been developed in AFBI through research and diagnostic work, we have developed and adopted the latest technologies and quality systems to provide the local industry with the most affordable and reliable diagnostic tools.

Knowledge and skills from these programmes have also been used to provide scientific advice for the BVD eradication programmes of the Republic of Ireland and Northern Ireland through participation in the Animal Health Ireland Technical Working Group.

AFBI's research also demonstrated that BVD eradication has the potential to bring both financial and environmental benefits, particularly in relation to reduced greenhouse gas emissions.

Research Lead: Maria Guelbenzu
Research partner: Animal Health & Welfare NI, Agrisearch
Funding: Research Challenge Fund, DAERA, Agrisearch

The power to resist

Bovine TB genetics.

Scientists at AFBI are playing a vital role in the battle to eradicate bovine tuberculosis (TB) from the cattle herd.

The AFBI team has carried out a major collaborative study of dairy cattle which has revealed that variations in the genetic makeup of the host animal can result in differences in its resistance to bovine TB.

In particular, selection of dairy sires can, to various degrees, influence disease resistance and these differences can be exploited by using genetic selection as a tool.

AFBI scientists have predicted that if lower risk TB sires are genetically selected, this can help to cut levels of the disease in Northern Irish herds, if used along with traditional control measures.

The team has used detailed molecular genetics research to locate and map the genetic variations linked to bovine TB resistance and susceptibility. This work has revealed that genetic gain could be accelerated further by using genomic selection.

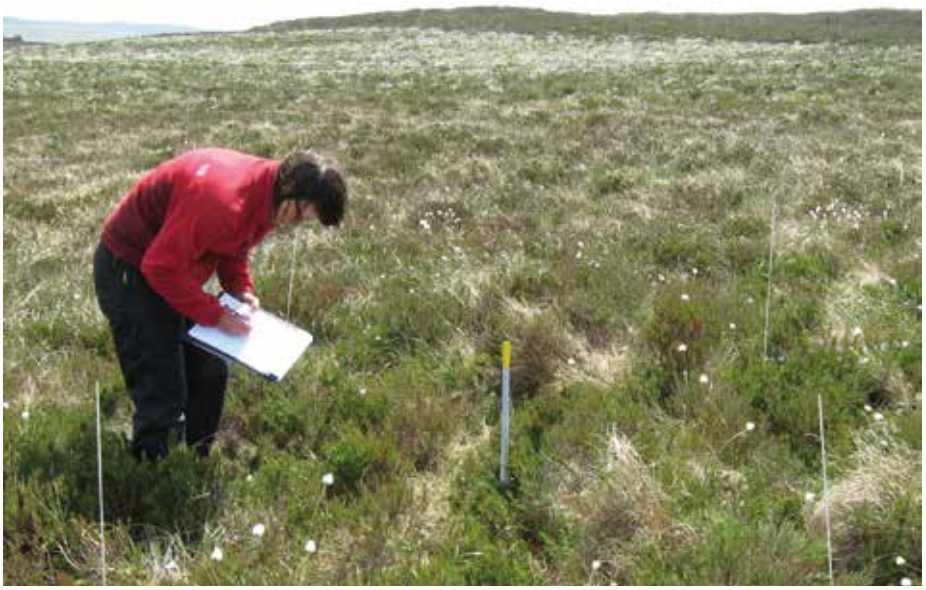
The research findings have supported the industry launch of breeding indexes for dairy sires which was launched in January 2016.

Led at AFBI by Dr Robin Skuce, Dr Adrian Allen and Dr Stanley McDowell working with world-leading quantitative animal genetics experts at the University of Edinburgh's Roslin Institute and the Scottish Rural College, this study has been highlighted in high-profile peer-reviewed publications.

Research Leads: Robin Skuce, Adrian Allen and Stanley McDowell
Research partners: University of Edinburgh's Roslin Institute, The Scottish Rural University College
Funding: BBSRC

Life in the hills

Enhancing land management in the hills through science.



AFBI provides the science underpinning the Glenwherry Hill Regeneration Project (GHRP), an innovative scheme set up at the CAFRE Greenmount Hill Farm.

This promotes sustainable upland management - including livestock farming and grouse moor - whilst benefiting nature conservation interests.

A partnership between AFBI, CAFRE, RSPB, Irish Grouse Conservation Trust, and other organisations, the project was set up in 2009 with the primary aim of enhancing habitats, in particular heather moorland.

AFBI mapped vegetation types and determined habitat condition on the farm in 2009 and has undertaken monitoring over the past eight years to determine the impacts of controlled burning and livestock grazing on upland habitats. AFBI also carries out annual monitoring of the Irish Hare, a priority species in Northern Ireland.

Future work will investigate peatland restoration following forestry removal and drain blocking. The GHRP has demonstrated what is necessary to achieve efficient, profitable and sustainable livestock production while simultaneously supporting a range of other benefits from the hills including a more diverse flora and fauna.

A review of the initial five-year phase showed that many of the project objectives had been achieved. During that time, the project has demonstrated impressive improvements in the condition of priority habitats and populations of priority species, supporting the delivery of the EU Habitats and Birds Directives.

The project has been used to raise awareness and demonstrate best practice to students, hill farmers and other land managers.

Research Lead: Mel Flexen
Research partners: CAFRE, RSPB and the Irish Grouse Conservation Trust (IGCT). Scientific support is provided by AFBI, Northern Ireland Raptor Study Group (NIRSG), NIEA and DAERA Countryside Management Delivery Branch.
Funding: DAERA

Into the deep

Fisheries science in support of a sustainable fishing industry.

AFBI is carrying out crucial fisheries research in Northern Ireland coastal waters to ensure long term sustainability of Northern Ireland's fishing industry at a time of significant change in the management of our marine resources.

Working onboard AFBI's research vessel RV Corystes and in partnership with industry, scientists carry out research to monitor marine resources, develop new methodologies and apply state of art techniques.

Activities include marine fisheries stock assessment, biological oceanography and marine environmental monitoring, coastal zone science and freshwater fisheries stock assessment. This work not only supports sustainable fisheries but monitors how human impacts and climate changes may affect marine habitats and natural processes.

As a result of robust scientific research provided by AFBI, Northern Ireland's negotiating team at the annual fisheries negotiations in Europe were able to support an uplift in the Nephrops quota for 2017 which was worth an additional £1.4 million to the Northern Ireland fleet. AFBI scientists have been working with the International Council for the Exploration of the Sea to develop a new method to allow the fisheries to take advantage of the current abundant Irish Sea haddock stock.

Thanks to AFBI science on pelagic fisheries, the Irish Sea herring fishery has also won Marine Stewardship Council accreditation, a sustainability seal of approval which was first of its kind for a finfish fishery in the Irish Sea.

Research Lead: Pieter-Jan Schön
Research partners: Marine Institute, Galway and Cefas, Lowestoft
Funding: National and European funding through the European Maritime and Fisheries Fund (EMFF)

Beneath the surface

Support Tools for the Management of Aquaculture.

Demand for seafood globally is on the increase, and while the global aquaculture industry is growing at about 7% every year, the EU industry is stagnating.

Aquaculture research has become one of the priority areas for the International Council for Exploration of the Seas (ICES) as the industry expands to meet this demand.

However, aquaculture developments often have to compete for finite space and other resources with other users, both in marine and freshwater environments.

The Fisheries and Aquatic Ecosystems section of AFBI has teamed up with Norwegian project partners to build a tool for aquaculture planning as part of the Horizon 2020 Project AquaSpace.

The AkvaVis demonstrator model being developed for Carlingford Lough, adopts an ecosystem approach to planning, taking site selection, carrying capacity and conservation management into consideration.

Use of a spatially explicit GIS-based multi-use tool allows the programme to model cumulative risk assessments and conflict analysis.

The design of the interface is intuitive and end-user driven, allowing industry and policymakers to make more informed, evidence-based decisions.

Research into interactions between aquaculture and the environment has been given high priority in ICES Member States, so scientific advice on sustainable management approaches will increasingly be needed.

Research Lead: Matthew Service
Research partner: The Institute for Marine Research, the Christian Michelsen Research AS
Funding: EU H2020 Project AquaSpace

Improved feed rationing for cows

Development of new feed rationing systems for dairy cows (UK Feed-into-Milk Models).

AFBI research has shown that high-yielding dairy cows need 30-40% more energy to maintain their body activities than had been recommended through previous feed rationing systems.

That ground-breaking discovery was made using the indirect open-circuit respiration calorimeter chambers, a state-of-the-art facility which AFBI has been using to measure energy utilisation efficiencies of dairy cows since 1992.

As a result a new DEFRA-funded project called 'Feed Into Milk' was set up. A major objective was to develop a new energy rationing system using calorimeter data from dairy cows gathered by AFBI and the University of Reading.

The new energy rationing system is now used across the UK to formulate rations for dairy cows and has even been adopted as a reference programme to compare the production efficiencies of dairy systems throughout the EU.

'Feed Into Milk' is a valuable tool which dairy farmers can use to calculate the forage and concentrate needs for a dairy herd in a way that boosts production efficiency and also cuts environmental pollution - for example, through manure nitrogen and methane emissions.

The 'Feed Into Milk' models can even be used to develop carbon calculators for dairy cattle, so that farmers can estimate levels of greenhouse gases emitted by their production system and draw up emission-cutting strategies tailored to conditions on their own farm.

Research Lead: Tianhai Yan
Research partner: FiM project was managed by an academic partnership (SRUC, AFBI and ADAS) and an industrial consortium.
Funding: A range of funding bodies including DEFRA and DAERA.

Evidence from the grassroots

Protecting the environment and supporting intensive grassland based dairy systems.

In 2007, AFBI research was employed by the European Commission to support a decision to grant a derogation from the Nitrates Directive, allowing intensive farmers to maintain higher stocking rates.

The Commission insisted that a future renewal of this derogation would require Northern Ireland to demonstrate that the risk of nutrient losses from intensively stocked derogated farms was no greater than losses from less intensive non-derogated farms.

Specifically the Commission asked for nitrate leaching, denitrification emissions and phosphate losses to be measured on intensive grassland dairy systems.

To address this issue, scientists at AFBI Hillsborough examined three intensively stocked milk production systems, with varying concentrate inputs and milk outputs, over three successive years, and examined nutrient losses over two years within a replicated 'farmlet' site.

Nitrous oxide emissions averaged less than 1%, and nitrate leaching losses averaged less than 10%, of total N applied. The annual phosphorus (P) balance within all systems was less than 10 kg P/ha.

On the basis of the evidence from this and other AFBI research, Northern Ireland had its Nitrates Directive derogation renewed for three more years. This has allowed one of Northern Ireland's largest agri-food sectors to continue without detrimental restrictions being placed on it.

Research Lead: Conrad Ferris
Funding: DAERA and AgriSearch

Better diets for pigs

Revising the NAP in terms of N loading from pig slurry.

Scientists at AFBI discovered that reducing crude protein levels in pig feed could sustain animal performance whilst lowering nitrogen levels in the slurry.

The work also identified that nitrogen excretion from pigs was lower than that assumed in the original Nitrates Action Programme (NAP).

Working with two Northern Ireland feed industry partners, AFBI undertook a study to determine the impact of reducing the crude protein level of pig diets and determining the appropriate level of a critical amino acid (lysine) needed for finisher pigs.

Alongside an in-depth performance study, AFBI scientists determined the total tract digestibility of low crude protein diets and ultimately the amount of nitrogen excreted.

The results of the study were presented to and accepted by DAERA, DEFRA and EU policymakers. As a result the accepted level of Nitrogen excretion from pigs has been revised in the current Nitrates Action programme which led to a 20% reduction in the amount of land required to spread pig slurry in Northern Ireland.

Furthermore, the revised pig feed formulation has been adopted by feed companies across Northern Ireland and the UK and pigs fed on the new diets now excrete lower levels of nitrogen, which supports the environmental sustainability of pig production in NI and across the UK, whilst maintaining optimum performance.

Research Lead: Elizabeth Magowan
Research partner: John Thompson and Sons Ltd; Devenish Nutrition Ltd
Funding: DAERA; John Thompson and Sons Ltd; Devenish Nutrition Ltd

AFBI *stands ready to* ***protect NI...***

The Agri-Food and Biosciences Institute maintains a state of readiness to respond to emergencies such as major animal and plant disease outbreaks and threats to the food chain.

AFBI's scientific preparedness for emergency response includes analysis of microbiological, chemical and radionuclide contamination of food, food products, animal feeds and the environment. AFBI also contributes to the contingency plans of DAERA and other organisations.

Emergency response for epizootic diseases

AFBI provides an essential local emergency response for epizootic diseases of farmed animals to government. An epizootic disease is a disease event in an animal population, akin to an epidemic in humans, which is of major importance in the international trade of animals and animal products. Examples of epizootic disease include avian influenza, swine fever and foot and mouth disease.

Contingency plans are reviewed and exercised on a regular basis. The capability and capacity to deal with an epizootic disease outbreak is maintained from within the routine animal disease testing programmes carried out at AFBI.

Furthermore, in seeking to protect both the consumer and Northern Ireland's trade in food and animals, AFBI carries out a large volume of analytical work in detecting chemical residues, microbiological pathogens and toxins that pose a potential risk to human health. AFBI laboratories have been designated as "international reference laboratories" in several of these key areas.

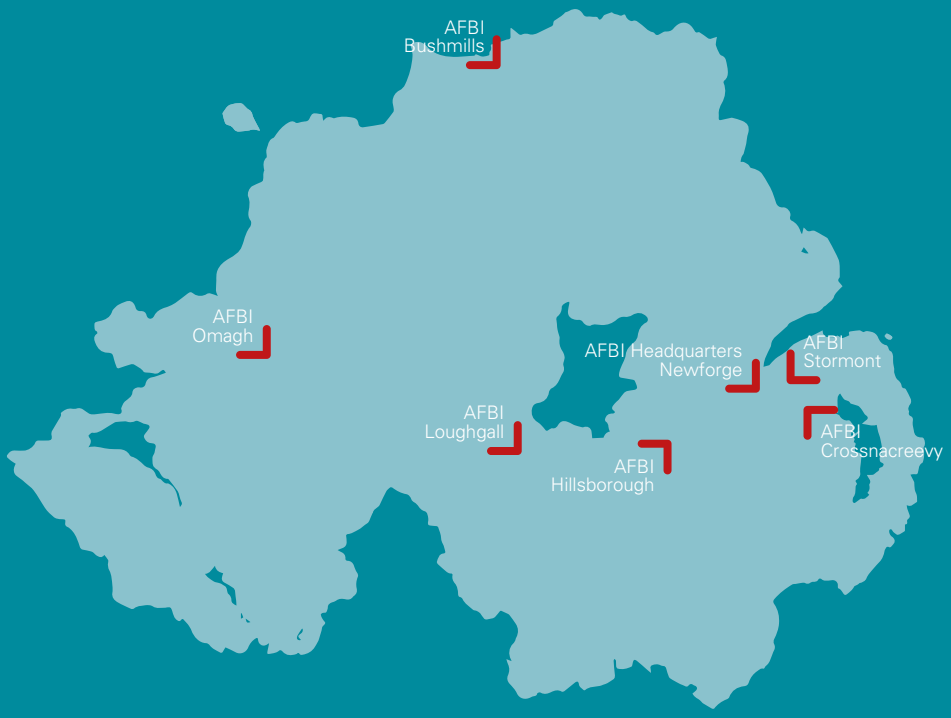
National Reference Laboratories (NRLs)

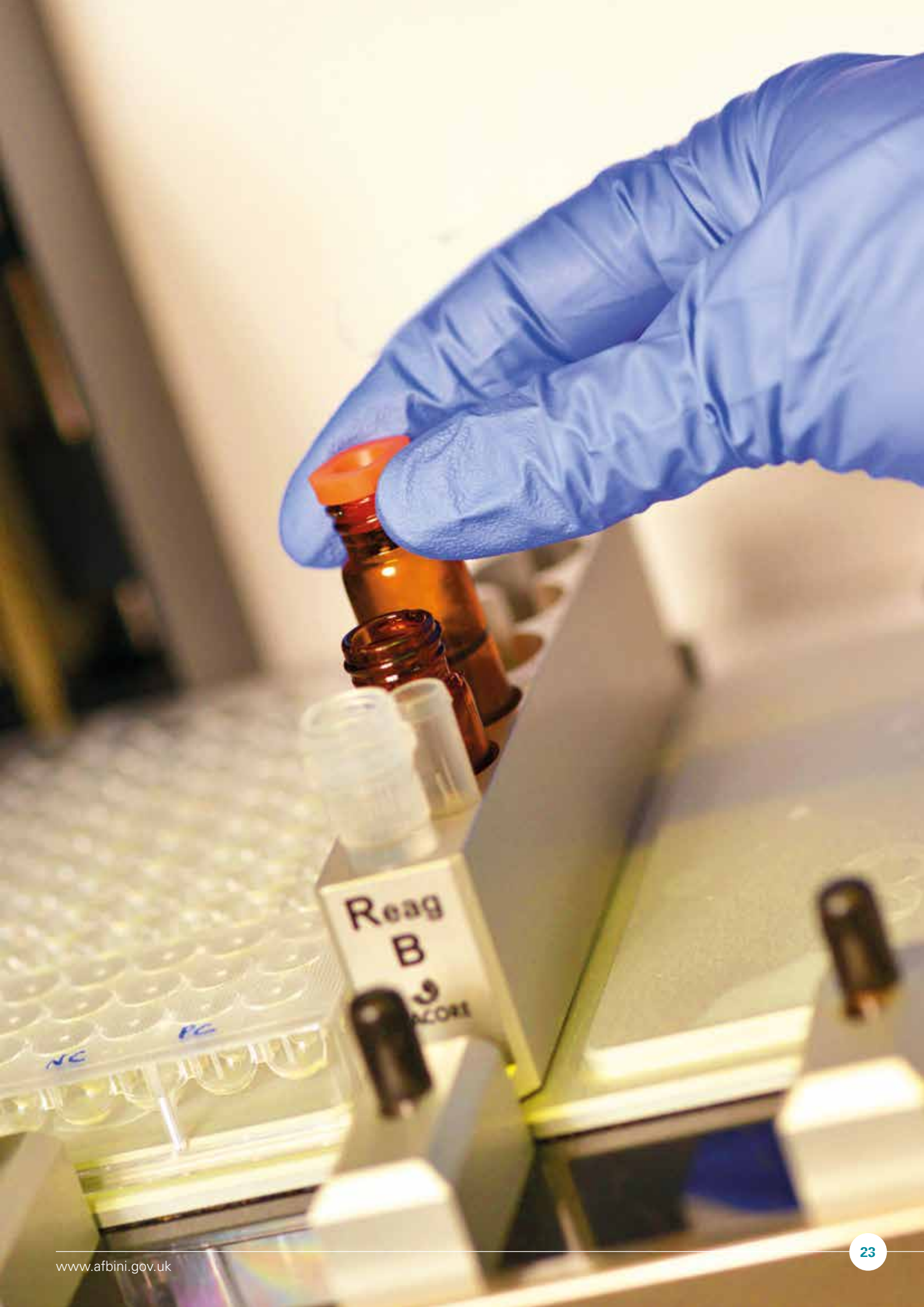
AFBI is the UK National Reference Laboratory for milk and milk products, selected veterinary drug residues and shellfish toxins. These laboratories are responsible for containing reference material against which samples from other labs across the UK can be compared.

Where are we?

AFBI employs over 600 staff with a multi-million pound annual budget. The Institute is located across seven specialised sites

- Newforge Lane (Headquarters)
- Stormont
- Omagh
- Crossnacreevy
- Loughgall
- Bushmills
- Hillsborough

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