



Queen's University
Belfast

Institute for Global
Food Security



WELCOME

The Institute for Global Security becomes one of four Queen's University Belfast flagship Global Research Institutes (GRI) from the 1st of January 2016. This is a time of considerable opportunity as the University is investing in new staff and facilities in IGFS, along with the start of clearing the site in Chlorine Gardens for our new building. We will take forward our success in the Research Excellence Framework (REF) 2014, where IGFS was ranked number one for research intensity in the UK for agriculture and veterinary science, to establish IGFS's place as a global leader in food security research. - Professor Andy Meharg

China-UK Agriculture Technology Funding Dialogue welcomed to QUB



As part of the continuing 'global comprehensive strategic partnership' commitment to strengthen bilateral relations between the UK and China, the Institute for Global Food Security (IGFS) at Queen's University of Belfast and the Agri-Food and Biosciences Institute (AFBI), recently hosted high level talks with experts from the Chinese Academy of Sciences (CAS), Natural Sciences Foundation of China (NSFC) - the leading Chinese funding agency, the Bureau of Science & Technology and the British Foreign & Commonwealth Office. Also on hand to input into the discussions was Devenish Nutrition's Operations Manager - Eamonn Whelan, AFBI

Deputy Chief Executive – Sinclair Mayne, DARD's Chief Scientific Officer – Alastair Carson, NI Contact Point H2020 Agri-Food – Elaine Groom, Agri-Food Quest's Manager – Stephane Durand, and Consul representative from the Chinese Consulate-General's office in Belfast - Mian Wu.

Formally welcomed to Belfast by Professors' Andy Meharg and David Rooney (Vice Dean of QUB's joint college in Shenyang, China), the event was the last stop for the Chinese team, which had been on a weeklong fact finding mission around the UK to investigate

agricultural science and technology funding. Better alignment of Chinese and UK project bidding and management systems are a crucial step in the process of building win-win cooperation's and implementing key tasks of reform, growth and innovation in the increasingly global Agri-Food Sector.

Speaking after the visit Helena Ou, Senior Science Policy Advisor from the British Embassy in Beijing commented on how the Chinese delegation were "deeply impressed" with the research activities in Northern Ireland and will draw on the examples they heard to make a strong case for policy recommendations when the final reports are presented to the Chinese Government at the beginning of next year.

The timing of the visit, comes just after the signing of an MoU between the NSFC and RCUK's Science & Technology Facilities Council (STFC), which marks the beginning of a 10 year commitment on collaborative activities to tackle global challenges, the first of which is centred on agricultural science & technology.

An article by Dr Paul Williams (IGFS) and Dr Zhiping Wu (AFBI).

New £6.7m Northern Ireland Competence Centre 'Agri-Food Quest' has launched at Queen's University

Hosted at Queen's University, Belfast, the competence centre will draw upon the research capabilities of Ulster University, Queen's University, Belfast, and the Agri-food Biosciences Institute (AFBI). Financing for the centre is made up of £5m of research and development assistance from Invest NI and a further £1.7m investment from industry partners.

Professor Chris Elliott said: "The establishment of this industry-academia research partnership is essential to help local companies keep up with the fierce competition they face on the world's global markets. The Institute for Global Food Security at Queen's University is very proud to host this centre and will work alongside our industry partners to drive innovation across the Agri-food sectors".

The centre led by Stephane Durand is a membership-based, industry-led innovation centre for the agri-food businesses in Northern Ireland. The centre is focused on increasing the level of collaborative research activity to support the agri-food industry growth strategy as defined by the Agri-Food Strategy Board in "Going for Growth", that is to grow the agri-business sector by 60% by 2020 to £7bn in turnover.



Pictured, from left to right, Professor Chris Elliott, Pro-Vice-Chancellor for Medicine, Health and Life Sciences (QUB), Jonathan Bell, Minister for Enterprise, Trade and Investment (DETI), Michael Bell (NIFDA) and Alastair Hamilton, CEO (Invest NI)

This collaborative research and Innovation activity will help grow a sustainable, profitable integrated agri-food supply chain in Northern Ireland.

The centre has four aims: develop its strategic research agenda through mapping the needs of the local industry based on the 'Going for Growth' strategic pillars; identify relevant science and technology experts who can provide solutions to these needs; facilitate partnership between research experts and the Agri-Food business to stimulate innovation and competitiveness and help

build an improved and sustainable R&D infrastructure supporting the NI Agri-Food sector.

To achieve this, Agri-Food Quest targeted areas of research include innovative packaging and products (including health), hygiene and shelf-life, bi-products & sustainability, and food safety/security.

Already local firms including Moy Park, Dunbia, Thompson's & Sons, Devenish and Dale Farm have joined Agri-Food Quest.

Director of Agri-Food Quest, Stephane Durand is pleased to announce the first call for project proposals opened on 20th October for 3 months. Members of the Competence Centre with research partners are invited to put a proposal in one of the 5 key research themes and further details are available on the newly launched website www.agrifoodquest.com



Grow through research

IGFS Marie Skłodowska-Curie Early Stage Researchers participate in SARAF training programme

Marie Skłodowska-Curie Early Stage Researchers (ESRs) Emiliano Ventura and Anna Holderbaum attended the School for Advanced Residue Analysis in Food (SARAF) coordinated by LABERCA at the National College of Veterinary Medicine, Food Science and Engineering (ONIRIS) in Nantes (France) from 21st to 26th September 2015.

LABERCA is a world-leading research institution in the field of advanced analytical chemistry dedicated to food safety and a national reference laboratory for dioxins, PCBs, PAH, melamine as well as growth promoters in cattle. Emiliano (Italy), Anna (Austria) and Alexis Ripoché (France) have joined IGFS during 2015 as ESRs on the newly funded H2020 Industry Training Network MET-A-FOR project (grant agreement n° [605411]). This European Industry Doctorate (EID) programme is co-ordinated by IGFS and in conjunction with project partner Irish Diagnostic Laboratory Services (Ireland) will focus on the development and practical advancement of methods for the forensic detection of drugs of abuse based on new concepts in metabolomics in performance and food producing animals.

Over the course of the four year MET-A-FOR project, Anna will profile and identify metabolites of emerging designer drugs of abuse, Emiliano will focus on method validation of targeted detection procedures, and Alexis will develop metabolomic/lipidomic profiling techniques to monitor in vivo responses to new anabolic agents. Therefore, this year's SARAF course which focused specifically on hyphenated gas chromatography-mass spectrometry (GC-MS) and liquid chromatography-mass spectrometry (LC-MS) techniques was particularly beneficial.

Hands-on practical training in various aspects of chemical food safety analysis utilising basic and advanced GC-MS and LC-MS instrumentation was provided by internationally recognised experts from across academia, reference laboratories and industry.

Valuable knowledge with regards to EU regulations, identification and quantification of residues and contaminants in food, method validation and data analysis was also gained enhancing the on-going research activities of IGFS Marie Skłodowska-Curie ESRs.



IGFS Marie Skłodowska-Curie ESRs Anna Holderbaum and Emiliano Ventura with fellow SARAF course participants in Nantes

BOOKLET 31

Developments in
dairy cow fertility research



AgriSearch
Driving Excellence & Innovation

Informing farmers on the latest developments in dairy cow fertility research

What is absolutely essential for milk production? A cow must become pregnant and produce a calf! Therefore, a sustainable dairy industry is reliant on efficient dairy cow fertility. However, poor reproductive performance is a problem on many dairy farms, partly as a result of a prior focus on selective breeding solely for milk production.

Given the importance of this issue for the dairy industry, it attracts considerable research effort. A key challenge, however, is translating the technicalities of this research into a source of useful information for farmers. Along these lines, Drs Gareth Arnott and Niamh O'Connell from IGFS, along with Dr Conrad Ferris from AFBI Hillsborough, have just published a farmer booklet funded by AgriSearch. This comprises six short chapters updating farmers on the latest research developments on topics critical for optimising dairy cow fertility.

Copies of the booklet are freely available to download from the AgriSearch website www.agrisearch.org

Queen's University research could revolutionise farming in developing world

A brand new technology developed by researchers at Queen's University Belfast, Northern Ireland, has the potential to reduce crop losses across the developing world and boost the incomes of subsistence farmers. The technology is designed to combat parasitic 'nematodes' - microscopic worms which infect crop plants from the soil, and are responsible for a 12.3% reduction in global agricultural productivity, a loss of around £100 billion annually.

The research, which involves using 'peptide mimics' – synthetic versions of the parasites own signalling molecules – to confuse the parasites and ultimately, render them impotent, has been awarded a Phase II Grand Challenges Exploration grant of \$1million from the Bill and Melinda Gates Foundation to be developed in Belfast, and proceed to trials in Kenya.

The project will focus on banana and plantain – although in theory it could extend to other crops – which are cultivated across 130 countries, making them the eighth most produced staple in the world. The fruits are often grown by smallholders in the developing world and can account for up to 30 per cent of farmers' income. Despite their popularity, however, the crop is highly susceptible to a variety of plant parasitic nematodes, which typically reduce yields by 30-50 per cent.

Lead researcher on the project, Dr Johnathan Dalzell from Queen's Institute for Global Food Security said: "This project builds on our previous research where we developed a novel way of interfering with parasitic nematode host-finding behaviour. Through our lab work we have identified a family of peptide mimics, which specifically and potently interfere with their neurobiology, disorientating the parasites so they can't find the host plant. They then die quickly through lack of food. Importantly, these peptide mimics appear to have no impact on non-target animals.



clean, and robust approach to parasite control.

"Our aim is to develop a variety of approaches which harness this new technology in order to protect crops plants from these parasitic worms. We have chosen to focus on banana and plantain as these crops are highly susceptible to a range of pests and diseases, including nematodes, insects, viral and fungal pathogens. Developing a broad-spectrum nematode control strategy represents a significant challenge, especially in sub-Saharan Africa, which is a hotbed for pathogens which can break resistance strategies. This is yet another example of how Queen's is having a global impact and is using its research findings to improve how our world functions."

As a result of the Gates Foundation grant and other funding, the Queen's-led project will proceed to glasshouse trials, in association with the International Institute for Tropical Agriculture in Nairobi, Kenya. Subsequently, field trials will be conducted and regulatory approval sought.

Funding has been provided by the Bill & Melinda Gates Foundation, the Leverhulme Trust, the Royal Society, and Queen's University Belfast

IGFS relay teams in the Belfast Marathon 2015

Three relay teams of staff and students from Institute for Global Food Security ran the Belfast Marathon in May, raising over £1200 for Action Against Hunger, the Institute's nominated charity.

Action Against Hunger (www.actionagainsthunger.org) runs programmes in over 40 countries, providing life-saving support to severely malnourished children and helping vulnerable communities to become self-sufficient.

In addition to long term community programmes with a focus on nutrition and food security they also work in crisis situations such as refugee camps in Syria and Lebanon.

Fund-raising events will continue throughout the year.

Congratulations to all of those that took part in the relay and our thanks to everyone that donated to such a worthwhile and important cause. A picture of those who took part can be found on **page 8**, [click here to view](#)

IGFS graduate short listed for Undergraduate Awards (UA)

Danielle Logan, a former graduate of the Food Quality, Safety and Nutrition with Professional Studies degree, entered her final year research project entitled "The relationship between milk and dairy product consumption and body composition measurements in young adults: the Northern Ireland Young Hearts Project", into the Undergraduate Awards (UA) 2015.

The UA is a prestigious and international academic awards programme open to all penultimate and final year students on a degree course. It aims to celebrate and support the world's brightest and most innovative undergraduate students by recognising their best projects. This year the UA received 5,117 submissions from students in 255 universities across 39 countries. Danielle received excellent news that she is a Highly Commended Entrant in the UA and has made the shortlist to be announced as one of their 50 winners. Her project performed in the top 10% of all submissions in the Medical Sciences category. Danielle said "I am delighted that my project has made me a Highly Commended Entrant in the UA



and I look forward to hearing the final category winners announced!" forward to hearing the final category winners announced!"

Danielle's project, supervised by Dr Yun Yun Gong and Dr Sinead Watson, investigated the effect of milk and dairy consumption on the risk of obesity and central obesity in young Northern Irish adults. Her research found that high consumers of whole milk compared to low consumers had an increased risk of

overweight/obesity. Danielle said "Although this is an important finding, owing to the high prevalence of overweight/obesity in Northern Ireland, this research was carried out using a small sample. Hence, we should not be advising the public to avoid whole milk, as further research is warranted. Milk and dairy products are the main source of calcium in the diet; therefore, the public should aim to consume the recommended three portions per day within a balanced diet"

New QUB food society launched

QUBFoodies is QUB's new food based society currently ran, and initiated, by second year students on the BSc Food Quality, Safety & Nutrition programme. We all have a real passion for all things related to health, nutrition and food and

are now delighted to have the opportunity to share our enthusiasm and interest with staff members, fellow food and non-food students within Queen's through this Society.

Through frequent events ranging from talks, to quizzes to nutrition themed nights and socials we hope that the QUBFoodies can firmly establish itself within Queen's, aided by our enthusiasm, commitment and approachable nature to making such as Society a success! So far this semester we have weekly health posts via social media, an exciting link up with the Food Standards Agency, interesting socials from a chocolate themed movie night to nutrition themed talks as well as enticing discounts with local cafes such as Common Grounds and Raw Food Rebellion to offer our members.

As a small course we felt that a Society would be an ideal way to make our course feel closer whilst also include and make incoming first year students feel more welcome- alongside those from different academic disciplines.

Our first exposure was at this year's Fresher's Fair and it was an incredibly successful day with 60 members on the day itself signing up, alongside a registered interest of over 200 from a plethora of academic disciplines! So far we are delighted with the interest shown and response received but would LOVE QUB staff members to sign up too-If you are interested or would like more information then please email Anna Monaghan (President) or Patrick Martin (Vice-President) at nutrition-soc@qub.ac.uk



Chinese agriculture takes a green leap forward



The United Kingdom, through programmes like Newton Network+, will invest tens of millions of pounds over the next few years supporting China's transformation to smarter and more sustainable agricultural practices – with the aim to ensure the region's food security, whilst concomitantly opening up huge opportunities for economic growth. As part of this partnership drive, on July 8th the British Embassy in Beijing (BEB) in conjunction with the China International Technology Transfer Center, hosted a specialist meeting to promote & facilitate agritech research and business collaborations in the disciplines of Precision Agriculture, Soil Management and Food Safety.

The event, chaired by Tim Losty (Director, Northern Ireland Bureau, China) and Karen Morgan (the new Agriculture, Food & Drink Counsellor, BEB), was supported by 20 invited experts from UK business and academic bodies, which included QUB and AFBI. From China, there were over 70 participants representing over 50 organisations, such as the Ministry of Science & Technology, Chinese Academy of Sciences, China Agricultural University, and the Da Bei Nong (DBN) Science & Technology group.

Speaking at the event, Dr Paul Williams, highlighted some of the world leading research, from chemical imaging & nano-sensing technologies through to root transcriptomics, on-going within IGFS; illustrating how these advances can improve the way we understand and predict how crops take up trace-element nutrients and their toxic counterparts. When asked about the opportunities that exist to work in the orient, Dr Williams had this to say *'this is a golden age for collaborative agri-food research with China. We know first hand from existing match funded, joint projects we have with the Newton Scheme and the Natural Science Foundation of China'*, how powerful the synergy from these partnerships can be.'

The launch of these new initiatives is very fitting as Belfast celebrates the opening of it's first Chinese Consulate, heralding a new era of closer exchange and bilateral cooperation between China and Northern Ireland.

Take the temperature of your fridge seriously!

A new QUB study highlights key areas of concern regards consumer knowledge and behaviour in fridge and food safety. Dr Tassos Koidis (PI), Dr Moira Dean (CI) and Dr Victoria Cairnduff (RA) co-authored the report 'A study of domestic fridges on the island of Ireland: Temperature control, design and consumer practices' published by **safefood**, the cross border agency for food safety promotion on the Island of Ireland and funding body of the research. Findings are instead very interesting: out of 100 households surveyed, split between NI and ROI, two-fifths of fridges had an operating temperature above the range recommended to prevent food poisoning and only 6% of fridges had a fridge thermometer. There seems to be confusion as to the meaning of "use by" (which is principally about safety) and "best before" (which is principally about quality) among consumers. As a recommendation, apart from increasing consumer knowledge by promotion campaigns, the authors suggest that fridge thermometers should be heavily promoted to consumers as best practice for assessing fridge temperature (e.g. given out with each new fridge sold), and manufacturers should be encouraged to include LED thermometer displays in the front of the fridge.

The report can be found by [clicking here](#)



Queen's University researchers play 'tag' with cheetahs

A team of international researchers, including Dr Michael Scantlebury, from the School of Biological Sciences, Institute for Global Food Security at Queen's University Belfast, have conducted research revealing techniques used by predators and prey – with some surprising results.

The study, published in the journal eLife examines what determines the outcomes of predator-prey interactions in wild animals and how both predators and prey can best increase their chances of success.

The study was a joint collaboration with zoologist Professor Rory Wilson and sports science expert Dr Iwan Griffiths from Swansea University, and South African researchers Dr Johnny Wilson and Dr Gus Mills, looking first at how mass should affect an animal's speed and cornering ability.

Although it is recognised that larger animals tend to be able to run faster, the study highlighted how larger animals actually have to exert greater forces to turn but have relatively less capacity to provide the necessary force for this than smaller animals.



To see how this theory played out in the wild, Dr Scantlebury, Dr Wilson and Dr Mills equipped nature's fastest land animal, the cheetah, with accelerometers to look at how they dealt with variously sized prey.

Dr Scantlebury said: "This truly shows how both predators and prey are involved in an evolutionary arms race - important for each of their own survival - to catch dinner or avoid being eaten"

The tagged cheetahs chased everything from small hares to large wildebeest and ostrich and, true to predictions, were found to turn more often and more sharply when pursuing smaller prey.

"Predator chases are governed by fundamental principles, which include not being able to turn abruptly if you are travelling fast, or indeed if you are large."

Annual IGFS summer BBQ proves popular

This year's annual summer BBQ was our most popular to date with over 80 people from across the Institute attending. Thankfully the weather stayed dry, with the sun even appearing at times throughout the day, so everyone could enjoy the games and fantastic food. Friendly rivalry extended from the games of Giant Jenga to Sumo Wrestling and our own gladiatorial podium duel.

Our thanks to Stephanie, Fiona, Laurie, Siobhan and Claire for organising such a fantastic and popular event and to Linden Foods for kindly supplying the meat, the steaks were particularly enjoyed by those attending!



Student and Staff News

On Friday 2nd October **Mark Little**, final year PhD student based at AFBI Hillsborough and supervised by Dr Conrad Ferris from AFBI and Dr Niamh O'Connell from IGFS, attended the Association for Veterinary Teaching and Research Work (AVTRW) 49th Annual Scientific meeting at the Teagasc Animal and Bioscience Centre. Mark delivered a presentation entitled 'Concentrate supplementation of a grass silage diet during the dry cow period: effects on cow performance, metabolism and immune function.' The presentations were judged by the keynote speaker, Professor David Kerr from University of Vermont and Mark was awarded first prize.

PhD Student **Grace Carroll** won the BSAS Industry Prize for her presentation entitled, 'The effect of routine abattoir processes on the visibility of welfare-related lesions on pig carcasses', at the 2015 Annual Conference. The judges commented "This was a very well researched and presented paper; thought had gone into where the application could go in the future with regard to pig welfare and the financial implications to both the abattoir and farmer. You handled questions very well and you are clearly passionate about the topic".



Pictured, members of the IGFS relay teams that ran in the 2015 Belfast Marathon. Not pictured is Maeve Shannon, Grace Carroll and Niamh O'Connell

Dr Moira Dean, Dr Laura McGowan, Dr Michelle Spence and PhD student **Fiona Lavelle** had a paper accepted for publication in the prestigious journal *Critical Reviews in Food Science and Nutrition*. The paper entitled, 'Domestic cooking and food skills: A review', looked at the measurement of cooking and food skills in the existing literature and formed part of their Cooking and food Skills project funded by **safe food** (Grant No. 11/2013).

The team are also currently working on another publication illustrating the development of a tool for measuring cooking and food skills.

PhD student **Ruth Kinkead** had her paper published in the topical collection on Hormone and Veterinary Drug Residue Analysis, the online version of this article (doi: 10.1007/s00216-015-8651-0) is available from www.springer.com

Dr Mark Robinson had a paper accepted by *Molecular & Cellular Proteomics*. The paper, entitled "The extracellular vesicles of the helminth pathogen, *Fasciola hepatica*: biogenesis pathways and cargo molecules involved in parasite pathogenesis" describes a new host-parasite interaction which could be targeted for parasite control. The paper can be viewed [here](#)



Pictured, from left to right, Dr Brian Markey on behalf of the AVTRW (UCD senior lecturer in veterinary microbiology), Professor David Kerr (University of Vermont, USA) and Mark Little

If you have an article, research announcement or staff/student news you would like to see featured in the next IGFS Newsletter then please email Michael Hills at m.hills@qub.ac.uk

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