

SoundScience

News from NRM, Sciantec & Sci-Tech

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Big Data

by Professor John Crawford of Rothamsted Research

On the 1st August 2015, the UK Government formally signed an agreement with the UK's first Centre for Agricultural Innovation allowing it to start doing business.

Agrimetrics, as the new Centre is called, is the first of four new Centres that will be established as part of the Government's Agritech Strategy to help boost economic growth and sustainability in the UK agri-food sector. This first Centre is the only one to be prescribed by the Agritech Leadership Council and is focused on supporting data-driven innovation and metrics of sustainability.

There is so much hype in the media about the importance of 'Big Data' that one might be led to believe that there is genuinely something different going on. The truth is that large-scale data-driven innovation has been happening at least since the advent of the computer. The data produced by the Large Hadron Collider is legendary in volume, and the astronomy community's new Square Kilometre Array telescope will produce so much data when it is completed that it would currently overwhelm the entire global computing capacity just to process it.

The novelty behind the 'Big Data' revolution is not that there is lots of data, but rather that data is becoming so pervasive that its exploitation is impacting in aspects of our lives that were previously blissfully unaware of the potential of quantification. The affordability and portability of sensors and communication networks means that everything we do can now be measured in real time and transmitted. On-line retailers now know what we want before we do. The step change is that we can now instantly connect data that links nearly everything that affects our lives. The challenge is making sense of it all.

In agriculture, the head-turning event was when Monsanto purchased Climate Corp, a company full of data scientists, for \$2B



Professor John Crawford

signalling an enormous confidence in the future direction of farming. Since then various alliances between agricultural companies and data companies have been created, but many in the sector are still navigating the opportunities. In putting Agrimetrics together with our industry partners, four lessons stand out. Firstly, most of the big opportunities extend beyond the farm gate and require us to integrate data across the whole food chain from soil to society – the diversity of needs across the sector is staggering. **Continued on Page 5...**

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Celebrating 25 years in the Analytical Services Sector

Lord Curry, (Chairman of Cawood Scientific) "I am delighted that after 25 years the laboratories within the Cawood Group are still developing services in line with customers' expectations and are continuing to work on new innovative and unique services. Improving productivity is a national challenge and the data the

Cawood Group can provide is critical to improving agricultural productivity."



The Importance of PT schemes

The Cawood Group has a long standing commitment to the quality of the data provided to its customers.

The absence of Certified Reference Materials with known determinand concentrations for chemical analysis within the agribusiness sector means that Proficiency Testing schemes (PT schemes) must form the cornerstone of any guarantee of the precision and accuracy of analytical results.

What are PT schemes?

PT schemes are where samples are analysed blind by a number of laboratories and the results presented statistically. These are considered by some to be at the high-end of quality assurance and traditionally associated only with accredited analysis.

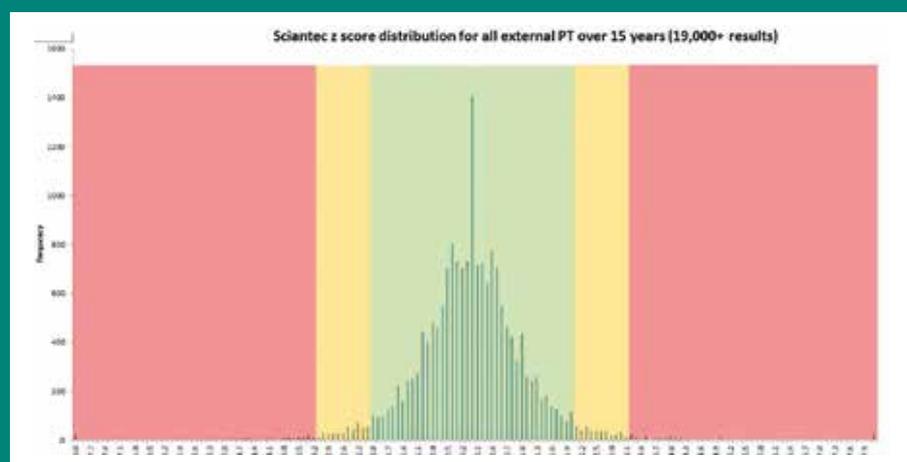
The group has adopted a more proactive view actively seeking out PT schemes relevant to all the analysis undertaken across the sites, this makes a significant contribution in assuring the quality of the analytical data and to identify and address issues with analytical methods and challenging sample matrices.

Cawood's role in PT schemes

Cawood currently participate annually in almost 30 PT schemes across a large number of different matrices, two of which are administered by Cawood's very own Sciantech. Alongside these annual PT schemes, the group also participates in a number of collaborative studies by industry specialists and one off schemes. Each PT scheme requires significant personnel resource and financial backing which can accumulate to quite a figure.

One stop shop

Over the years, thousands of samples have passed through the doors of the Cawood Scientific laboratories to be analysed under various schemes and thousands more are destined to. With quality and reliability the main factors when considering analytical help, the group will continue to seek out and participate in PT schemes to ascertain itself as the 'one stop shop' for trustworthy analytical testing.



Meet the staff



Dr Rebecca Wilkinson

Dr Rebecca Wilkinson manages the Customer Service Team for NRM Laboratories, based in Winkfield near Ascot.

Rebecca joined NRM almost 20 years ago, fresh from completing her PhD. Now the Customer Operations Manager with a team of 11, her role is extremely varied with no day being the same.

Rebecca and her team are responsible for ensuring that customers are satisfied with every aspect of their NRM experience from the initial quotation to the reporting of the sample results and any queries in-between.

While ensuring the 'day to day' business is running smoothly, she is also heavily involved in the setting up of new services and the production of advice notes to accompany these services. She particularly 'likes the dynamic nature of her role and the different challenges that are thrown at her everyday'.

Rebecca grew up in Clapham, London,

not the first place that comes to mind when considering wildlife and the natural environment but this did not put off the aspiring nature lover. When choosing which degree to study at University it was a very easy decision and Rebecca graduated with a BSc degree in Zoology from the University of London. This spurred her on to learn more, driving her to want to complete a doctorate. Rebecca was lucky enough to undertake a PhD which focused on pig reproduction funded by the Ministry of Agriculture, Fisheries and Food (MAFF) which would later dissolve and form into what we know today as the Department for Environment, Food and Rural Affairs (DEFRA).

The natural environment still plays a big part in Rebecca's life. When not at work Rebecca spends her free time maintaining her two horses, one of which is 30 years old! In order to balance work and her equestrian life, she has to get up at 3.50am every day



Dr Rebecca Wilkinson

to muck out, box up and ride the horses followed by a full day at work and a 124 mile round trip commute. Rebecca has such a strong passion for her horses that she 'wouldn't have it any other way'.

Unbelievably while juggling her work and horses, Rebecca manages to find time to spend with her husband of 16 years and her beloved pet dogs. She feels lucky that 'her husband works in agriculture so understands that their lifestyles are as far away from the 9-5 approach as possible'.

Further developments for the Anaerobic Digestion Sector

Over the last 12 months NRM Laboratories have further expanded the services it currently offers to customers operating in the Anaerobic Digestion Sector.

This began with the validation and proof of equivalency of the in-house method for the determination of Residual Biogas Potential (RBP) which is an important parameter and forms part of the Publicly Available Specification PAS110. This has resulted in NRM being able to reduce the overall cost of PAS110 analysis and avoid issues with external providers of this service such as the turnaround of results.

Towards the latter half of 2015 NRM purchased, with the help of a grant from the Biorenewables Development Centre, four further biogas instruments which are based in Yorkshire on the site of our separate division Sciantech Analytical Services for the analysis of feedstock for anaerobic digestion to determine their Biological Methane Potential (BMP). This instrumentation will evaluate the possible biogas yield and anaerobic biological degradability of the material being tested and provide information as to the speed of the anaerobic degradation and possible inhibitory effects. The instrumentation will also allow for bespoke customer trials to be

carried out such as looking at additives to the anaerobic digestion process to determine what effect that can have on the digestion of the feedstock.

The service includes the option to request various durations of testing with or without the determination of the basic composition

of the biogas produced at various time points. The report provided will graphically represent the amount of biogas produced over the duration of the test alongside its composition and change over time. In addition customers can request the actual raw data for the test if they wish to look at the kinetics of the digestion in more detail.



BMP Instrument

David Petrie-Dolphin

David Petrie-Dolphin joined Sci-Tech as Business Manager less than a year ago in 2015.

David has had a long career in the analytical industry, joining Sci-Tech from Eurofins after 19 years of service. David joined the multinational food testing company as a lab technician and following many promotions his final role with the company was as an Analytical Service Manager. This role involved providing the link between the customer and the laboratory along with any technical support the client required. If David's role was not challenging enough, whilst working, he also completed an honours degree in Biological Science.

David's current job shares many parallels with his previous role, with a major focus on maintaining customer relations, however he has taken on new challenges such as the enforcing and managing

of the laboratories Health and Safety and Quality Management. David's daily role involves liaising with the laboratory manager to address if there are any issues, dealing with sample queries and regularly attending client meetings. David is a 'firm believer that face to face meetings are better than emailing' and with the recent new administration building at Sci-Tech, this has been made far easier. It is also a clear indicator of the strength in customer relations that the company is developing.

The role has brought about many challenges with no two days the same. David states that 'every day is a learning experience which he readily embraces along with the help of the fantastic team he works alongside'. Although new to both the company and the industry, he 'can see the business developing and a very bright future ahead'.

Happily married to Debra, David has an



David Petrie-Dolphin

8 year old daughter called Eve and a 3 year old son called Ethan, who combined keep him very busy. When not at work, David enjoys going to the football with his dad and brother particularly to watch Wolverhampton Wanderers whom he has supported since he was small or as David would phrase it 'a long suffering fan'. He also enjoys spending quality time with his family and with any spare time left, David can be found on his bike cycling in the countryside.

All time high for Sciantec's Prep Team



Sample Preparation Team

Keeping abreast of the ever increasing demand for testing has posed some challenging times for this pivotal unit but with team work, clever organisation plus a good helping of sheer grit and determination, they have succeeded.

The Sample Preparation Laboratory, known as Sample Prep, is an integral link in the chain of high quality service provision to hundreds of customers, year on year, by Sciantec. Adhering to a comprehensive framework of standard operating procedures, Linda's six-strong team take the samples in the shape that they arrive and transform them into a homogenous, powdered format. This provides the analysts with a manageable and consistent baseline sample from which



the analysis can be carried out.

Samples can arrive in many different shapes, from the majority such as pelleted animal feeds & raw materials through wet materials such as cat food right down to dense items like bones and mineral lick-blocks. These all need to be ground to a standard particle size and that takes some organising. Some of the wetter samples must undergo a pre-drying process in addition, reducing the moisture content so it is the right consistency for it to pass correctly through the grinding machines. Regular checks and measurements are made by the Technicians on all the grinders to ensure that they are all grinding to the exact same specification. The dry samples are then divided using a sample splitter which gives a manageable sample size. The Lab Technician places the ground material into a uniquely labelled sample bag and places it in a predetermined location within the temperature controlled store.

As their Team Leader, Linda has risen to this challenge by working alongside the management team to introduce a number of efficiency improvements. Their aim: to work smarter, not harder. One tactic that they brought in involved plotting daily output levels against Key Performance Indicators. This motivated staff and gave informative



Sciantec Gains FOSFA approval

Sciantec Analytical Services is pleased to announce it has gained accreditation as an Associate Analyst Member with the professional body 'The Federation of Oils, Seeds and Fats Associations Ltd (FOSFA)'.

FOSFA is an international contract issuing an arbitral body covering 85 countries concerned wholly with the world trade in oilseeds, oil and fats. FOSFA accredited laboratories comply with the requirements of the scheme and agree to use contractual methods of analysis for the analysis of samples to ensure the goods are of a high quality/specification. Sciantec is one of only three laboratories in the UK to have achieved this approval.

data which enabled accurate targeting and allocation of resources. Flexible working patterns and temporary staffing gave an extended range of resource and bolstered the teams' capability exactly when and where it was needed.

Training and mentoring of staff has been a high priority for Linda this year with the arrival of new staff including a transferee from another of the Cawood Scientific Group laboratories. "They are a relatively new team" says Linda. "Half of them have less than five months experience". She really has had her work cut out for her this year but the hard work has paid off and the team are meeting the needs of the business.

Despite this tricky year and the increasing workload, the Sample Prep team have succeeded in meeting their targets and are on track for the next year's challenges.

Sci-Tech expands service

As part of its on-going development programme Sci-Tech Laboratories has further expanded its range of analytical services in the poultry and porcine industry to encompass all aspects of the bovine (cattle), ovine (sheep) and caprine (goat) sectors.

The primary focus is on the major health and welfare issues of farm livestock and to provide customers with the best possible support in the diagnosis and control of animal disease through the specialist laboratory.

Working with the world leader in 'animal diagnostic' technology, Sci-Tech has access to the strongest and broadest global portfolio of modern diagnostic tools and services for production animals including ELISA and PCR test systems that cover the most economically important production animal diseases.

Sci-Tech's strength derives from its expertise and long established experience in bacteriology, serology and molecular diagnostic (real-time PCR) biology. As a result the laboratory can now offer an independent and comprehensive veterinary diagnostic service to the complete farm animal sector.

Sci-Tech's vision is to provide comprehensive solutions to help diagnose farm animal health issues more quickly and accurately than ever before—and so enhance animal health and productivity.



New livestock water service launched

Water is second only to oxygen in importance to sustain life and optimise growth and reproduction in both beef and dairy cattle. However, unlike the careful attention paid by cattle producers and nutritionists to other nutrients in the ration, the quality and provision of free drinking water does not receive the attention necessary to ensure optimal nutrition and cattle performance.

Having an excellent working knowledge about the provision of this essential nutrient is crucial for optimal performance of cattle and the financial success of bovine businesses. At times, quality and provision of water may not be optimal to maximise animal performance and health.

Water quality problems can occur with boreholes and springs, especially when associated with poor environmental management. Often, septic tanks, slurry run-off and industrial drainage may be involved. Cows are particularly sensitive to poor water quality because high-producing dairy cows may consume upwards of 90 litres of water daily.

The two key areas of livestock water testing are Chemical Quality and Bacterial Quality. The chemical balance of water can have a detrimental effect on cattle and in particular heifers. There are a number of determinants which need to be monitored, and if not done so correctly, can lead to a number of conditions such as diarrhoea, acidosis, infertility and in severe cases death. Bacterial polluted water may increase susceptibility or contribute to a variety of calf and cow disease problems. Drinking bowls, cups and troughs should be kept relatively clean. Bore holes and areas of stagnant water are particularly susceptible to increased bacterial levels of coliform.

Using the expertise and knowledge built up over many years at SciTech Laboratories we can now offer a Livestock Drinking Water testing suite as part of the development in the area of testing specific to the Bovine Sector.

Continued from page 1...

Big Data

Secondly, whilst there are notable exceptions, most companies lack the internal capacity and leadership in data science to be fully aware of the opportunities and how to engage with them.

Thirdly, there is wide acceptance that data on its own has very little value – the real value is added when we combine data to build predictive algorithms that enable us to do things better. Finally, and perhaps most importantly, there is justifiable nervousness about the future security of data and the potential for farmers in particular, as custodians of a large amount of critical

data, to be exploited. Agrimetrix's role is therefore to provide an independent, secure and trusted platform for data that connects across the food chain, and to add as much value to that data through modelling and analytics. It will raise awareness, and provide capacity and co-funding to make it easy for all businesses to benefit from this new era of data-driven innovation.

The global food system is subject to a multiplicity of interconnected risks. The opportunity is to manage these risks and build a more productive, efficient and resilient food chain. It has never been more important to do that. Data is the currency that links these risks and Agrimetrix is the means to maximise its value.

Sciantec investigates endangered snail issue

One of the more unusual enquiries that Sciantec has received was a request from London Zoo (ZSL) for assistance with a problem that they were experiencing with their colony of Vietnamese Giant Magnolia land snails.

Only known to occur in one part of Vietnam, they were believed to be an extinct species having been over-collected due to the attraction of their very large and decorative shells.

However in 2012 a ZSL expedition to Vietnam discovered a small colony and immediately, in collaboration with the Natural History Museum and Vietnamese

research agencies, initialised an emergency conservation plan. Part of this plan included breeding trials to be undertaken by the ZSL back in the UK, having been sent the colony shortly after their discovery. As a result, by the beginning of 2015 the ZSL were proud custodians of 5 adult and 37 baby snails.

The trials soon exposed a major issue with the breeding plan, the snails were eating

their own eggs, resulting in less young being hatched. The request that Sciantec received was help with investigating if this was in response to any particular nutritional deficiency in their diet. Although a fully comprehensive nutritional profile of the shells could not be undertaken due to the limited amount of sample material available, after consultation, a perceived appropriate analytical suite was agreed and very carefully programmed within the laboratory in order to achieve the maximum results from the minimal samples available.

Sciantec's findings suggested that changes to the current diet could be made which might prove beneficial in resolving the problem. Initial feedback from ZSL has been encouraging and we have been pleased and appreciative to receive back pictures of some recently successfully hatched baby snails.

Services at a glance



Sciantec services at a glance

We provide analytical testing for:

Raw Materials | Animal Feedstuffs | Premixes | Pharmaceutical Compounds | Forages | Combinable Grain and Pulses | Primary Food | Microbiology



NRM Laboratories services at a glance

We provide analytical testing for:

Soil | Manure/Slurry | Anaerobic Digestate | Composted Waste Contaminated Land | Incinerator Bottom Ash and Air Pollution Control Residues | Fertilisers | Raw Water | Effluents



Sci-Tech services at a glance

We provide analytical testing in the areas of:

Elisa testing (any sample type) | Molecular Diagnostic testing (Real Time PCR) | Bacteriology | Serology | Potable and Mineral waters | Bioaerosol (Environmental & Occupational)



Sci-Tech Laboratories Administration Block



NRM's Refurbished Laboratory

Cawood continues to develop each site

The Cawood Group has continued to develop each site with the addition of a new modular administration block and the renovation of existing laboratory rooms.



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