



Department  
for Environment  
Food & Rural Affairs

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# **‘Feasibility For Growth’ SME innovation competition**

## **Evaluation Report**

**August 2013**

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## Summary

This short report evaluates the outcome of the Defra and Technology Strategy Board co-funded 500K 'Feasibility For Growth' SME innovation competition to encourage innovation in the agriculture, food and drink sectors and better access to market. 21 projects were funded in England, Wales and Scotland (up to 25K each). All projects were successful in developing innovation solutions, several of which have resulted in commercial opportunities and business growth.

## Headline results and key messages

- 21 projects were funded supporting agriculture, food and drink SMEs in England, Wales and Scotland
- Projects targeted innovation in crop protection, precision agriculture, engineering, hydroponic growing, horticulture, food processing technology, packaging, food quality, spoilage, waste reduction/re-use and local food...
- All participating businesses reported that projects were successful (partly or fully) in delivering their objectives, exploiting business opportunities and economic, social and environmental benefits.
- As a result of the competition the businesses reported that these feasibility studies had led to new collaborative R&D opportunities and securing funding to take products to market; improved competitiveness by quantifying and optimising resource efficiency/savings opportunities; diversification into other sectors; increased employment, development of new methods of manufacture, utilisation of new technological methods, development of more efficient equipment whilst promoting growth in existing business activity
- Lessons learned by businesses included raised awareness of the benefits of feasibility project funding schemes, building the right skills mix, the importance of awareness raising and building partnerships across the supply chain, and understanding consumer focus to frame research and innovation needs.

## Background

Following the announcement of the 'Innovate for Growth' summit in November 2011, as part of the Rural Growth Review, Defra and the Technology Strategy Board (TSB) launched 2 innovation competitions in March 2012<sup>1</sup> (500K 'Innovate for Growth' competition; and £15M Food processing and manufacturing efficiency competition).

The 'Innovate for Growth' competition was aimed specifically at SMEs and micro-businesses in the agriculture, food and drink sector to help improve their systems and processes to make them more cost-effective and to help deliver better products and services. A total grant of £500K was made available (joint funded by Defra and TSB) to support 21 projects (up to £25K grant award each). These awards supported the rapid development of an innovative idea and demonstrate its practical feasibility in the agri-food sector. The £25k grant reflected a 100% funding level for each proposal – allowable under the EU de Minimis state aid regulation.

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<sup>1</sup><http://webarchive.nationalarchives.gov.uk/20130221185318/www.innovateuk.org/content/competition/innovation-for-growth-in-agriculture-food-and-drin.ashx>

7 regional events were held to promote the competition and to facilitate individual and consortia applications. TSB received over 200 registrations, which resulted in 82 full applications, which demonstrated the high level of interest in the competition. These applications were independently assessed. The results of the competition were announced by the Minister of State for Agriculture and Food at an awards event at the House of Commons (July 2012) to show-case the project 'you-tube' entries and raise awareness of Government mechanisms available to businesses to stimulate agri-food innovation.

The scope of projects funded targeted innovation in crop protection, precision agriculture, engineering, hydroponic growing, horticulture, food processing technology, packaging, food quality, spoilage, waste reduction/re-use and local food. The range of projects highlighted the diversity of opportunities for products and services available in the agri-food sector. Projects were up to 6 months in length.

## **Evaluation of success – outcomes and business opportunities**

As part of the project each business was required to carry out an evaluation to assess the success of the project, its impact on the business, marketing opportunity, its potential for wider commercial application and uptake, exploitation of results, and lessons learned. Annex 1 summarises project activity and outcomes.

Examples of successful outcomes included projects designed to improve growth in the bagged salad sector. The technology developed has wide application across multiple crop sectors (strawberries, leafy salads, capsicum etc.) and offers significant increase in yield whilst minimising resource inputs.

Other examples include the production of animal fodder from hydroponic processes rather than through field cultivation. This process has the potential to reduce global water consumption used for the irrigation of the agricultural land required to prepare animal fodder. Wide usage of this system would free up the land for other use which would reduce waste and other environmental impacts and be less energy intensive.

Other successful projects included development of automated pollination monitoring which sought to assess if precision agricultural tools can be adapted to run on solar power providing the potential to increase the commercial possibilities by increasing the remote working capabilities of the system and increase resource use efficiency.

For local food production, one project has looked at optimising logistics for delivering local food at a national level using simulation models to demonstrate viability to partners potentially creating local jobs and reducing waste in the supply chain and lowering greenhouse gas emissions.

On waste/recycling, a project exploring the potential of producing a commercial fertiliser pellets based on anaerobic digestate and chicken litter has identified the potential for reduced use of fertiliser imports enabling farmers to expand their operations. This would have positive economic impacts on local rural economies by increasing productivity. Other

aspects of the study looked at turning the product into a pellet to feed animals in areas which are livestock intensive.

## Lessons learned

The competition has successfully raised awareness to business of the power of short R&D projects to kick-start innovation and improve supplier/retailer relationships. Several projects have led to new exploitation opportunities through optimising and exploiting processes, systems and technology which have the potential for increasing business competitiveness, and resource efficiency whilst positively impacting on the environment. (e.g. increased nutrient/water/energy efficiency).

## What next

This competition has resulted in spin off opportunities including further collaborative R&D funding; new partnerships, diversification into new areas of research and improved resource management.

The possibilities of adoption for use of the project outputs and take up of technology into practice also has wider application. For example innovation to support growing more crops whilst using simpler control mechanisms not requiring electricity could have widespread applications in the developing world.

Further opportunities for funding to support business-led innovation in food are available through TSB initiatives including Innovation Vouchers through SMART awards and R&D competitions.

# Annex: Innovate For Growth Competition winners project details

## 1. Link2Energy Ltd

### Pathway to a Marine Bio refinery

The UK Seafood processing industry produces a significant amount of waste which is reduced by using secondary grade materials within a variety of products. However, there still exists approximately 250,000 tonne of material deemed unusable directly in the human food chain. Through this project Link2Energy Ltd defined and developed the key concepts and underpinning processes of a Marine Bio refinery to fractionally extract valuable resources from fish skins (such as high value oils, minerals, pharmaceuticals, bio fuels) using principles of green chemistry in order to exploit commercial opportunities for turning UK fish skin 'waste' into a feedstock for a tailored, food & pharmacy-grade extraction process. The funding has helped development of IP for the marine bio-refinery concept that is directly relevant to the company's strategic direction. This technology is highly transferrable globally given that there are 1.5m tonnes of farmed salmon alone.

## 2. Magna Parva Ltd

### FREEAIR - Zero compressed air beverage can manufacture.

The project developed and demonstrated the feasibility of a technology (FREEAIR) that will dramatically reduce the carbon footprint and energy costs of beverage can factories. When applied the FREEAIR system will have the net effect of reducing the annual CO<sub>2</sub> output of each factory to the equivalent of 100 homes usage. For the Can Maker, FREEAIR will have the benefit of reducing their annual electricity bill by approximately £200,000 per factory where the system is applied.

## 3. Tumbling Dice Ltd

### Automated Pollination Monitoring: Delivering a precision agriculture tool to farming and horticulture worldwide.

This feasibility study assessed whether an existing precision agriculture tool used for monitoring managed pollinators, can be adapted for increased deployment and uses. E.g. to monitor ecosystem services, such as pollination services and biological control agents. The feasibility study showed that the tool can be adapted to make it solar powered for longevity in the field, and lightweight and compact in order to increase deployment possibilities. The precision agriculture tool is a tunable motion detection system which uses advanced computer vision algorithms to detect and track the motion of small objects – such as invertebrates. The ability to do this in a completely automated fashion in the field and away from sources of electrical power, means that real time management of pollination services in orchards and glasshouses, will become a commercial and practical possibility.

## **4. Saturn Bioponics Ltd**

### **Increasing Yields and Reducing Resource Use in Bagged Salad Production**

This project is designed to assess feasibility of an innovative vertical growing technology as a commercially viable crop production system in the bagged salad sector. The objectives of the technology are to significantly increase yield per unit area whilst minimising resource inputs. The technology has potential across multiple crop sectors, including strawberries, whole leafy salads, capsicum and ornamental. The feasibility study delivered commercially acceptable results for a cost benefit analyses of the technology in commercial growing conditions, operating procedures for optimised light distribution and yield and identifying future opportunities and collaborative bids.

## **5. EMCO Packaging Systems Ltd**

### **Active Food Packaging Inclusion**

EMCO Packaging Systems have developed an active, oxygen generating and carbon dioxide absorbing, food packaging inclusion to maintain elevated oxygen, controlled atmosphere packed, whole and prepared fresh produce. It will substantially extend produce quality, shelf life and significantly reduce spoilage waste within the retail chain.

## **6. Blackroc Technology**

### **Integrated sensing and support platform for irrigation scheduling of high-value field crops**

Irrigation is essential during the production of crops with high market value, such as leafy vegetables and potatoes. Due to changing climate patterns it has been estimated that irrigation could increase by about 20% by 2020. Currently, 50-60% of farmers do not use scientific methods for irrigation scheduling but rely on personal experience. There is currently no commercial system which offers a robust irrigation scheduling method based on an integrated sensing and decision support platform founded on different scientific methods for water demand prediction (soil water balance and soil water status). This project has successfully assessed the technical and commercial feasibility of introducing an integrated wireless remote sensing of soil and crop water needs for irrigation management.

## **7. Meadex Rubber Mouldings**

### **Reuseable Plant Pots**

To develop a reusable rubber plant pot with a copyright-able design to be used in wholesale / retail distribution of horticultural produce. The concept will reduce the environmental impact of waste associated with plastic plant pots and the novel design will



reduce the volume of water wasted in garden centres and nurseries. The project was partly successful with the main obstacle to the project being cost.

## **8. Crafty Tech Ltd**

### **3d Moulding**

Crafty Tech has patented a low energy system for instantaneous 3d shaping. It has built prototypes which have explored what might be possible, using short runs with play do. This project has developed a precise, long-running, food-grade 'feasibility rig' to demonstrate that technique will be effective in the food industry. The output has led to developing commercial links with an International food manufacturer. The technique is widely applicable to food products such as confectionery, biscuits, ice cream, but may have spin offs for example in plastics forming and soap manufacture.

## **9. Smart-Tech Ltd**

### **Growing more crops with less resources.**

Smart tech are currently involved in cutting edge technologies in the efficient growing of crops by simplifying the growing systems, the setting up of the said systems, maintenance cost and skills required to grow specific crops. The technologies involved in this project involved the monitoring and control of the efficient delivery of water and feeding to various crops in differing growing conditions, using with simpler monitoring and control mechanisms, specifically ones that do not require electricity to power them – and are therefore transferable to the developing world.

## **10. Fixed Phage Ltd- Scotland**

### **Efficacy of antibacterial active packaging**

Bacteriophages can be covalently immobilised onto plastics and papers used in packaging, to give a true active antibacterial packaging. These packaging products have a shelf life in excess of 6 months, giving them the potential to be manufactured and distributed as conventional packaging materials, while retaining enough activity to provide consumer protection and enhanced shelf life. The packaged product is not adulterated with the antibacterial agent as this remains firmly and covalently bound to the packaging and is only activated in the presence of the target bacteria. Such a product could reduce the incidence of food poisoning and the amount of waste food. Not all of the project was completed, however the parts which were completed were successful.

## 11. McKnight Transport Ltd- Northern Ireland

### Investigating the potential of producing a commercial fertiliser pellet, based on anaerobic digestate and chicken litter

Many areas of NI are livestock intensive. Nitrogen rich chicken litter and slurry can only be spread to land within strict consent limits. The factor limiting growth in many farms is the availability of land on which to spread slurry. Despite this 'nitrogen problem' in livestock intensive areas, many arable areas import large tonnages of fertiliser, at increasing costs. Concentrating nutrients from chicken litter, slurries and anaerobic digestate into a solid pellet, could prove an economically viable way to move nutrients between livestock intensive areas (where nitrogen is a problem) and arable areas (where it is a resource). This would benefit arable farmers by reducing fertiliser costs, and benefit livestock farmers by enabling them to expand operations. The project confirmed that there would be positive impacts on local rural economies by increasing agricultural output.

## 12. Merralls Consulting Ltd

### Rate a Trait

Rate a Trait (TM) is a project which aims to improve the quality and speed of collection of qualitative trait data from plant and animal populations with the aim of improving competitiveness in this important sector. The project achieved its aims and although parts of the project are yet to be developed further there has been significant interest from industry. The system represents a very easy way to share and compare images of samples. This project is led by rural sector technology specialists Merralls Consulting Ltd based in Worcestershire, with assistance from NIAB, the National Institute of Agricultural Botany, Cambridge.

## 13. Graham Oaks Ltd

### Five Mile Food

People want to buy local food. It's a £5.7bn market, growing at 7% per annum. Supermarkets can't meet demand as supply chains are based on large, centralised distribution facilities not suited to many local producers who deliver within the same area. This project will build a logistics network to deliver local food at a national scale using simulation models of the network to demonstrate viability to potential partners. Developments in ecommerce and just-in-time order handling will help the company innovate in the way we distribute local food. Potential benefits are a commercially viable company turning over £300-600m p.a. Hundreds of local jobs. Reduced wastage in the supply chain. Reduced greenhouse gas emissions. The study showed that these benefits are viable and should be easily integrated into supermarket logistics operations.

## 14. New Generation Biogas Ltd

### Automated Hydroponic Production of Animal Fodder

As the world's population grows in number and wealth the demand for animal protein will outstrip the sustainable supply. Grazing land and cropland producing animal feed represents almost 80% of all agricultural land and about 8 % of global water use, primarily for irrigation. There is an emerging opportunity to find new methods of increasing the production of animal feed from other than natural resources (field cultivation). This project successfully demonstrated the feasibility of automating the hydroponic growing process to produce animal fodder.

## 15. Brewfitt Ltd

### An Innovative, Low Energy Method for Cooling Dispensed Drinks

Brewfitt are a leading family drinks company. They invented the first drinks cooling system. The temperature at which a drink is served is crucial to its success but the technology to deliver temperature range needed is over half a century old. Befit have invented an innovative new, cooling system that is far more efficient system - based upon a highly compact heat exchanger - that can cool drinks on demand, at the point of dispense. This system could potentially save up to 75% of the cooling costs of an outlet resulting in savings of approximately £100m, 100's of millions of tonnes of CO2 and 40 million litres of lost drinks (pipe run wastage) in the UK. Specifically the project showed that the Brewfitt method was 15-39% more energy efficient (depending on usage conditions) than current methods.

## 16. Silsoe technology Ltd

### To develop a weight-transducing, vacuum cup end-effector for handling light objects which is unaffected by vacuum supply characteristics (hose stiffness and dynamics).

Many applications in the food and horticultural sectors involve manual picking of individual objects from a bulk container e.g. making-up the weight of strawberry or mushroom punnets. this project researched and developed a weight-sensing vacuum cup device for lightweight objects that is unaffected by the vacuum hose stiffness or object-cup interactions. It also used an array of these devices to investigate automatic-blind-picking and intelligent sorting of multiple objects e.g. strawberries into their respective weight categories which proved successful.

## **17. Cellular Systems (Grantham) Limited**

### **Can Volatile Organic Compounds be used to detect Campylobacter infection in Poultry Houses?**

In the UK, Campylobacter is believed to cause over 100 deaths a year and infects at least 600,000 people. Campylobacter infection of UK poultry is a major public health issue and economic burden due to human foodborne disease. Chicken is estimated to cause ~80% of human cases. This feasibility project showed that Campylobacter, in poultry faeces, can be detected using air sampling technologies, electronic noses. Using this passive monitoring method poultry producers will be able to easily identify Campylobacter positive flocks and reduce the level of cross contamination in the slaughter house, improving the quality of poultry meat leaving the slaughter house. The project was fully successful and showed that the method under investigation is feasible.

## **18. Cellular Systems (Grantham) Limited**

### **Adding Value to Food Waste" - the retrieval of High value Materials from Eggshell Waste**

The egg processing industry generates 15000 tonnes of waste egg shell annually in the UK, this goes to land fill at a cost to the processor. The output of this project will turn this negative flow of funds positive through the extraction of materials that can be used in other fields, generating a profit to the egg industry. Although it was not possible to extract both the biopolymer and minerals from the waste egg shell, a number of target materials and markets (specifically ceramics manufacturers) have been identified and we plan to roll out calcium carbonate mineral after the project has ended and more complex biological based materials. We expect to be able to generate jobs through manning the processing plant, and generate additional jobs in disparate industries with the materials produced from the plant.

## **19. Techneat Engineering Ltd**

### **Reducing Disease and Consequent Losses on Potatoes**

This aim of this unique project is to control skin diseases on the surface of potatoes with an environmentally improved method, to increase yields and reduce field losses, improving storage, preventing skin blemishes and minimising food losses. The system utilises high power light energy to control the diseases on the surface of the potato. In our 'proof of concept' work we have shown we can control a number of these pathogens, to at least the level of control achieved by pesticides. The aim of this project is to build a scaled version of the conceived production machine, and test the efficacy of the method using real potatoes in 'real-world' conditions.

## 20. Cornish Sea Salt

### **Optimisation of Crystal Design for Food Manufacturing**

The UK imports large quantities of salt each year to address production needs. The aim of this project is to ascertain and trial steps within the Cornish Sea Salt Co. (CSS) production process to explore the application of Cornish Sea Salt in a number of market sectors. This innovative project will lead to clearly identifiable quality, taste, environmental and health benefits for UK manufacturers and consumers of their products and for the first time; reduce reliance on overseas salt imports. The project has helped to understand input controls and target specific sectors to add value.

## 21. Three Musketeers Ltd

### **To develop a unique management tool for delivering improved freshness and reduced wastage in new potatoes**

There is considerable potential for increasing the sales and consumption of fresh new potatoes in the UK. Small new potatoes are quick to prepare and to cook, meeting the requirement for more convenient products. However, customers expect consistent performance. However, current supply chain processes deliver an inconsistent product. New potatoes are immature and quality can deteriorate quickly if potatoes are not managed appropriately. The project aimed to identify how the washing and cold chain process can be managed more effectively to deliver both an improved and more consistent product and to reduce wastage due to poor quality. The project also linked the accumulated heat management tool to consumer preference testing of cooked product to show that there is a significant consumer benefit. This has led to the identification of specific descriptors regarding freshness that will drive improvements in the way new potatoes are managed post harvest.