

News Release

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UK scientists help crack genetic code on eggshell quality

- SABRE research project delivers benefits on food safety and animal welfare -

Huge benefits in food safety and quality, animal welfare and sustainability are set to result from the findings of a major EU research project into food production.

UK companies and academic institutions played a key role in the four and half-year, €23 million pan-European SABRE project which used the latest techniques in genetic science to develop more economically and environmentally sustainable production systems for dairy cattle, pigs and chickens.

The key objectives of the project, which was made possible by a grant from the EU Sixth Framework Programme, were to deliver a range of new breeding strategies to improve animal health and welfare, minimise livestock waste and pollution and maximise food safety and quality. €4.5 million of the EU's €13.9 million contribution was allocated to UK organisations.

The programme of work involved over 200 scientists from 36 organisations operating across 12 research, development and communication packages. These harnessed key areas of emerging genomic science to generate new knowledge and apply it in practical breeding improvement strategies throughout Europe.

The research was conducted across a wide range of areas including enhancing eggshell quality, improving animal behaviour linked to welfare, reducing mastitis in dairy cattle, eliminating boar taint in pigmeat and improving fertility of livestock in general.

The work on eggshell quality has the potential to drastically reduce the incidence of salmonella outbreaks. Poor shell quality leads to increased numbers of cracked or damaged eggs which, in turn, encourages bacterial infections. Just 10% fewer cases of human salmonella infections across the EU would save about €400 million each year.

In addition to its importance to the consumer, egg quality is also a key concern for breeders and farmers of laying hens, as it has a direct impact on both the lifespan of birds and their marketability.

The team developed new tools to measure aspects of eggshell structure which underlie egg safety and quality as well as molecular tools to improve the efficiency of selection. These will enable breeders to select hens which lay stronger eggs that are less susceptible to bacterial infections.

The SABRE project was coordinated by Edinburgh-based Biosciences Knowledge Transfer Network (KTN), which works to convert the UK's bioscience knowledge into innovative agricultural, food and industrial bioscience products and processes. The Biosciences KTN's activities in the SABRE project were funded by the Scottish Government, the European Regional Development Fund and the EU Sixth Framework Programme.

UK companies contributing to the project included Aviagen, the world leader in poultry genetics, Biobest which specialises in veterinary virology, serology and DNA diagnostics and Argentix which provides commercialisation and business-structuring support to fledgling technology enterprises.

In addition to the Roslin Institute, other academic partners included the Wellcome Trust Sanger Institute, the Institute for Animal Health, the University of Glasgow and the Scottish Agricultural College.

A separate programme of work was aimed at reducing the incidence of mastitis amongst cattle. An inflammatory reaction in cows' mammary gland, mastitis is the most costly disease amongst dairy cows, amounting to an annual figure of €2 billion in Europe alone.

The SABRE research identified genes and genetic pathways involved in the immune response of dairy cows and has greatly improved understanding of how these function in bovine mastitis. Increasing resistance to mastitis will decrease use of medicines while also improving animal welfare, food safety, product quality and breeders' economic returns.

Toine Roozen, International Manager at Biosciences KTN, commented:

"The SABRE research has potentially enormous benefits for the consumer, for animal welfare and for the environment. The efficiency and sustainability of food production is improved year-on-year by the world's animal and plant breeders and, because breeding is cumulative, even small enhancements to the rate of this improvement can have very large impacts over time. The use of new genomic technologies could be worth in excess of £20m a year to the UK alone.

"It's also important to stress that, as well as the many scientific benefits which result from SABRE, there are also enormous spin-offs for UK companies working in the life sciences arena. The Biosciences KTN has become an international hub in knowledge transfer for the benefit of the UK; not only in animal genomics but also in the plant, food and industrial bioscience sectors.

"SABRE epitomises the huge value of EC research projects and has already led to Biosciences KTN attracting additional funding for two more genomic programmes - the "Quantomics" project on the availability of technologies and tools for the economic exploitation of livestock genomes and the "3SR" project on Sustainable Solutions for Small Ruminants (sheep and goats). The UK element in "3SR" consists of research into parasite resistance in Scottish Blackface sheep.

"The UK has an excellent reputation for the high quality of its research. There is a tremendous opportunity for firms in the sector to take further advantage of the opportunities for collaboration and to maintain and enhance the UK's position in the global marketplace."

Dr Ian Dunn, who coordinated the research into eggshell quality at the Roslin Institute, commented:

"There are obvious applications emerging from the work we've completed on cuticle measurement in eggs which will almost immediately help to deliver clear improvements in terms of human health and enhanced hygiene in hatcheries.

"The added value of SABRE and projects like it is the unexpected benefits which can arise from the collaborative nature of research and we've seen that in areas such as, for example, the improved hatchability and quality of chicks in eggs.

“These ‘added bonuses’ highlight the value both of the funding and of the collaboration which brings together diverse groups offering a range of skills. As well as the obvious, almost immediate, benefits which will ensue from SABRE, we would expect the links which have been established to bring further improvements in the longer term.”

About the Biosciences KTN

The Biosciences Knowledge Transfer Network (KTN) is funded by the government to drive the conversion of the UK’s bioscience knowledge into innovative agricultural, food and industrial bioscience products and processes. The Biosciences KTN is sponsored by the Technology Strategy Board, the Scottish Government, European Regional Development Funds, Defra, the BBSRC and NERC. For more details, see: www.innovateuk.org/biosciencesktn

About SABRE

The aim of the Cutting-Edge Genomics for **Sustainable Animal Breeding** (SABRE) project, one of the largest food-related EC projects to date, was to provide the fundamental knowledge of the genomics of animal health, food safety and food quality traits of livestock species, together with the strategies to deliver such technologies for use in selection.

A primary aim of the four and a half-year project was to enable producers to move animal breeding and production towards more sustainable, environmentally and welfare friendly, low-input systems, that deliver safe and high quality foods in line with consumer expectations and European Policy.

For more details, see: <https://ktn.innovateuk.org/web/international-projects/sabre>

and/or

<http://www.sabre-eu.eu/SABREResults/SABREsfinalresults/tabid/417/Default.aspx>