

BBSRC ANNUAL DELIVERY REPORT 2008/09

EXECUTIVE SUMMARY

Recent successes: BBSRC continues to be a key funder of the vibrant, world-leading UK bioscience base. BBSRC is making a step change in activities to ensure that excellent UK bioscience translates into real benefits for the UK economy and society more widely. Notable scientific achievements in BBSRC-funded areas have included the prevention of an outbreak of the deadly livestock disease Bluetongue; an understanding of the chemical basis of attention span, with implications for the treatment of conditions such as Alzheimer's disease and attention deficit disorder; and advances in the development of crops resistant to parasitic weeds which can have devastating effects on crop production.

Progress in management: BBSRC continues to manage its administration very tightly and has again operated at a level below the overall Research Council target for proportion of science budget funds spent on administration. BBSRC continues to take an active role in planning and setting up the Shared Services Centre (SSC) which will undertake transactional activities for all the Research Councils.

Progress to date against targets and milestones: BBSRC met or exceeded almost all of the targets set for 2008/09. Achievements include:

- Low carbon economy - £20M investment in Bioenergy through the establishment of the BBSRC Sustainable Bioenergy centre
- Food security - commitment, in partnership with DfID and the Scottish government, of up to £9.5M to research on infectious diseases of major livestock species in Sub-Saharan Africa and South Asia
- Increased support for industrially relevant research and training, including a new Research and Technology Club relating to biorefineries, a new Innovation and Knowledge centre with TSB and EPSRC, £2.1M investment in the Follow on Fund, 145 new CASE studentship awards and development of a new Industrial Impact Fellowship scheme.
- £81M investment in high-quality and strategically-led postgraduate training through quota doctoral training grants and 70 studentships in targeted priority areas.
- International collaboration on ageing research through the establishment of a joint programme of up to £4M with the US National Institute on Aging
- £6M support for the establishment, maintenance and enhancement of essential databases and collections and other bioinformatic and biological resources underpinning UK bioscience.

Future targets/milestones: BBSRC will continue to use its CSR07 funding to build on achievements in a number of key areas. We will:

- Through major cross council programmes and by other mechanisms, maintain a vibrant, internationally competitive multidisciplinary UK bioscience research base, capable of delivering a step-change in its economic impact, in:
 - *energy* - taking forward funding commitments made to date under the Bioenergy initiative
 - *environmental change* - implementing the recommendations of the 2008 review of BBSRC research in this area, and leading a £10M initiative into the health of bees and other pollinators
 - *food security* - through public consultations, developing a strategic roadmap for research underpinning food security
 - *ageing* – including support for a joint initiative of up to £4M with US National Institute on Aging, and through the Cross-Council Lifelong Health and Wellbeing programme
 - *global security* – with emphasis on animal and plant diseases;
 - *nanotechnology* – including work to further develop crucial linkages between basic research and relevant bioindustries

- advance the national capability and appropriate facilities (in particular through BBSRC-sponsored institutes) and infrastructure for UK research base in biosciences and related areas, which will include taking forward the redevelopment of the Institute for Animal Health as a single-site national facility for animal health research
- contribute further to delivering a step-change in the economic impact of UK bioscience and related research, committing at least £12M to industrially relevant research.
- deliver wider impact through effective public engagement with the UK research base, and through enhanced access to science for young people
- significantly increase provision of skilled people for the science and bioindustry base, increasing studentship investment to £47M, and increasing the fellowships budget to £8.9M.
- seek to ensure that public policy decisions are based on sound scientific evidence
- help to ensure that the UK remains a world leader in biosciences, and that academic research, industrial R&D and the UK economy benefit from global scientific activity
- deliver effective and efficient BBSRC support for the UK bioscience research base

Gershon efficiency programme: BBSRC has delivered cumulative efficiency savings of £23.5M, and remains on target to deliver savings of £80.7M over the CSR period. A large part of the efficiency saving for 2008/09 was achieved through increased co-funding.

Science and Society: BBSRC further embedded the science and society agenda into its decision making process, including consideration of societal issues surrounding synthetic biology research, and contributions to RCUK Science in Society Unit's public engagement activities.

INTRODUCTION

This Report outlines BBSRC's progress against its objectives as defined in the BBSRC Delivery Plan 2008-11, and the Department for Business, Innovation and Skills (BIS) Performance Management System. The structure and content are in accordance with the reporting requirements for all Research Councils as specified by BIS. Further detail is available in the BBSRC Annual Report and Accounts 2008/09: http://www.bbsrc.ac.uk/publications/accounts/bbsrc_annual_08_09.html.

RECENT SUCCESSES

A healthy UK science base

BBSRC funds high quality basic and strategic research that adds significantly to the knowledge base that underpins the agri-food, pharmaceutical, healthcare and other bioindustry sectors. Examples of high quality science that may ultimately lead to practical applications with economic and social benefits, as well as being exciting scientific discoveries include:

- **Understanding the basis of allergies:** BBSRC-funded scientists at Kings College London have discovered how evolution may have led to allergy problems in humans. The team have been working on a molecule vital to a chicken's immune system which represents the evolutionary ancestor of the human antibodies that cause allergic reactions. Crucially, they have discovered that the chicken molecule, an antibody called IgY, behaves quite differently from its human counterpart antibody IgE, which throws light on the origin and cause of allergic reactions in humans and gives hope for new strategies for treatment. http://www.bbsrc.ac.uk/media/releases/2008/080613_human_evolved_allergies.html
- **Brain science:** Researchers at Newcastle University and UCL, funded by BBSRC, Wellcome Trust and Gatsby Foundation, have uncovered the chemical basis of attention span, by showing that brain cells require the presence of the neurochemical acetylcholine before we can attend to a demanding task. Acetylcholine is well known as a signaling molecule in the nervous systems, but the research revealed an unexpected role in triggering brain cells to

focus attention and so enhance perception. The research team showed that when monkeys were given tasks requiring high levels of attention, acetylcholine enhanced attention and awareness, but blocking acetylcholine receptors reduced attention. The research has potentially significant implications not only for our understanding of how our brains work but in the development of treatments for conditions such as Alzheimer's disease and attention deficit disorder.

http://www.bbsrc.ac.uk/media/releases/2008/080716_attention_span.html

- **Food security:**

- **Combating livestock disease:** Collaborative research between the Institute for Animal Health and the Met office has provided the UK with the capability to predict incursions of the deadly livestock disease, Bluetongue, enabling surveillance and control to be targeted to cattle and sheep in high-risk areas. Effective preparation and preventative vaccination (again based on IAH research) against BTV-8, the virus strain most likely to reach Britain, successfully prevented an outbreak of the disease in 2008. Independent consultants DTZ estimated that this work potentially saved the UK £485M and 10,000 jobs. http://www.bbsrc.ac.uk/media/releases/2008/080807_midges.html

- **Reducing farm pollution:** Researchers funded by the cross-Council Rural Economy and Land Use (RELU) programme, and led by BBSRC-sponsored North Wyke Research, have developed an advice system to help farmers recycle manure safely and avoid polluting watercourses. The team, which included researchers from the Universities of Exeter and Lancaster, developed a model which shows interactions of four risk factors - microbial mass, potential landscape transfer, farm infrastructure and social and economic factors - to inform the farmer where interventions will be most effective.

http://www.bbsrc.ac.uk/media/2008/water_quality_manure_recycling.html

- **Weed-resistant crops:** Scientists at the University of Sheffield have been leading a project funded through the joint BBSRC-DfID programme 'Sustainable Agriculture Research for International Development' to develop crops resistant to the parasitic weed *Striga* (witchweed) that infests around 40% of cereal-producing areas in sub-Saharan Africa. They have already identified some varieties of rice that are resistant, and are now 'homing-in' on the genes responsible so that breeders can increase resistance to this parasite.

- **Basic bioscience improving yields:** Plant scientists at Durham University have created spin-out company Creative Gene Technology Ltd to translate their research into commercial opportunities for improving crop yield. The researchers originally investigated genes that control the organisation of cells and the production of oil in the seeds of Arabidopsis, a member of the mustard family along with cabbages and radishes. Corresponding genes in larger relatives of Arabidopsis such as oilseed rape are important in determining crop yield. So understanding how oil production is regulated could help us to breed crops with higher yields

http://www.bbsrc.ac.uk/publications/business/2009/0901_business.pdf

- **Diet and health:** In a study funded by BBSRC, Juvenile Diabetes Research Foundation International, and The Wellcome Trust, researchers at the University of Warwick have discovered how eating broccoli could undo the damage caused by diabetes to heart blood vessels. The research team found a broccoli compound called Sulforaphane, which can encourage the body to produce more enzymes to protect the vessels, as well as reduce high levels of molecules which cause significant cell damage.

http://www.bbsrc.ac.uk/media/releases/2008/080806_warwick_broccoli.html

- **Ageing research:** BBSRC-funded scientists have found a fast and effective way to investigate important aspects of human ageing. Researchers at the University of Oxford and The Open University have identified the fruit fly equivalent of the key human ageing gene known as WRN. They find that flies with damage to this gene share important features with people suffering from the rapid ageing condition Werner syndrome, who also have damage to the WRN gene. In particular, the DNA, or genetic blueprint, is unstable in the flies that have the damaged version of the gene and the chromosomes are often altered. This exciting study demonstrates that fruit flies can be used to study critical aspects of human ageing at cellular, genetic and biochemical levels.
http://www.bbsrc.ac.uk/media/releases/2008/080512_human_ageing_gene.html

- **Low carbon economy**
 - **Renewable bioenergy:** The £27M BBSRC Sustainable Bioenergy Centre (BSBEC) has been established, with funding of £20M from BBSRC and £7M from 15 industrial partners, to provide the science to underpin and develop the important and emerging UK sustainable bioenergy sector. The Centre's research activities will encompass many different stages of bioenergy production, from widening the range of materials that can be the starting point for bioenergy, to improving the crops used by making them grow more efficiently, to changing plant cell walls. The Centre will also analyse the complete economic and environmental life cycle of potential sources of bioenergy. This means the researchers will be working to make sustainable bioenergy a practical solution by improving not only the yield and quality of non-food biomass and the processes used to convert this into biofuels, but also ensuring that the whole system is economically and socially viable.
http://www.bbsrc.ac.uk/media/2009/public_investment_bioenergy.html

 - **Cleaner, greener chemicals:** The Integrated Biorefinery Technologies Initiative (IBTI) Club was launched to accelerate development of technologies required for the sustainable production of chemicals through biorefining. BBSRC will be working with the Bioscience for Business Knowledge Transfer Network and the ten company members of the IBTI Club to fund research in basic bioscience which has the potential to solve some of the issues the sector currently faces. These include challenges specific to the second generation of biorefining, the technology that could lead to the production of chemicals, materials and fuels from agricultural and food waste and non-food crops instead of from fossil fuels.
http://www.bbsrc.ac.uk/media/releases/2008/080807_ibti.html

- **Recognising excellence with impact:** The inaugural BBSRC Innovator of the Year title was awarded to Professor Stephen Jackson from the University of Cambridge. The award, honours the UK bioscientist who has been best at turning world-class research into a product, company, service or advice to have an impact on our lives. An independent judging panel selected Professor Jackson as the 2009 Innovator of the Year for his work to turn research on DNA damage and repair into cancer therapies that are now saving the lives of breast and ovarian cancer sufferers.
http://www.bbsrc.ac.uk/media/releases/2009/090325_innovator_of_the_year.html

BBSRC exceeded its 2008/09 target for investment in collaborative research. For further detail of achievements in support of industrial collaboration, knowledge transfer and commercialisation, see **Progress to date** (*below*).

PROGRESS IN MANAGEMENT

BBSRC continues to manage its administration very tightly and has again operated at a level below the overall Research Council target for proportion of science budget funds spent on administration.

BBSRC continues to take an active role in planning and setting up the Shared Services Centre (SSC) which will undertake transactional activities for all the Research Councils.

PROGRESS TO DATE AGAINST 2008/09 TARGETS AND MILESTONES

BBSRC successfully met or exceeded almost all the targets and milestones for 2008/09, as shown in the [2008/09 Scorecard](#) (see pages 9-10 for the few not met). Particular highlights include the following.

Healthy Disciplines

Following extensive consultation with the academic community, BBSRC has restructured its responsive mode research committees to ensure that we can support multidisciplinary research whilst maintaining our ability to fund the best science across our wide portfolio, wherever it is to be found. Four new research committees have been created to replace the existing seven, and a mixed economy of peer review membership has been established, comprising core committee members and a pool of reviewers to be called on flexibly for their scientific expertise. These changes were presented through a series of Roadshows across the UK in Autumn 2008.

BBSRC continued its ongoing evaluation of its research funding: the programme of formal evaluations covered the Engineering and Biological Systems responsive mode research portfolio and the Japan Partnering Award scheme. A review of the 'Investigating Gene Function' initiative and related responsive mode funding was also launched.

Strategic planning activities

In 2008/09 BBSRC began to commit funding for its CSR07 Strategic Priorities.

Bioenergy: In early 2009, as part of BBSRC's commitment to the cross-Council energy programme, we announced the establishment of a £27M "virtual" BBSRC Sustainable Bioenergy Centre (BSBEC), with programme grants to five lead institutions and a number of other academic partners, comprising funding of £20M from BBSRC and industrial contributions with a total value of £7M from a wide range of companies.

Environmental change: The BBSRC review of research relevant to environmental change reported to BBSRC Council in December 2008. The report, which is part of the ongoing series of strategic reviews aimed at informing the Council's future direction, makes recommendations on future priorities for BBSRC research as well as on mechanisms for their successful implementation.

Ageing: BBSRC supported 3 awards, totalling £1.4M, for research on the physiology of the ageing bladder and bowel to understand the processes that lead to incontinence, as part of a joint funding call with the charity Research into Ageing. BBSRC has also come together with the US National Institute on Aging (NIA) in the first agreement of its kind in the biosciences to fund collaborative UK-US research projects into normal ageing. BBSRC and NIA have agreed to provide up to £4M.

Global security: BBSRC, in partnership with DfID and the Scottish Government, has established a joint research programme of up to £9.5M in 'Combating infectious diseases of livestock for international development', to support high quality research on infectious diseases of major livestock species in Sub-Saharan Africa and South Asia.

3Rs: BBSRC launched a joint highlight call with the National Centre for the 3Rs (NC3Rs) for research aimed at replacing animals protected under the Animals (Scientific Procedures) Act 1986 with invertebrate models.

Synthetic Biology: In partnership with EPSRC, and with support from AHRC and ESRC for specific projects, BBSRC has established seven 'Networks for Synthetic Biology'. The networks will facilitate multidisciplinary research and development of new research tools and also address specific research questions. They will also have strong social and ethical dimension.

Tools and resources: During 08/09 BBSRC awarded a further £6M under our Bioinformatics and Biological Resources Fund for thirteen projects at seven institutions. BBSRC also awarded a further £2.5M under our pump-priming Tools and Resources Development Fund for twenty seven projects at a total of 18 institutions.

Nanotechnology: BBSRC invested 6.1M in nanotechnology research, in addition to an estimated £400k support for industrial partnerships, and co-funding of Technology Strategy Board projects worth £4.4M.

BBSRC has taken a leading role in the development of plans to co-ordinate a major new multi-agency programme in 'Food Security', to address the long term need to double global food productions by 2050 in a sustainable way. A BBSRC workshop in February 2009 brought together key stakeholders to discuss the research challenges in this area, and was followed by the launch of a consultation that will lead to a 'roadmap' for future research (for BBSRC and other funders). The roadmap will also feed into a wider cross-government UK Food Research Strategy.

Training and Career Development

BBSRC has an integrated framework of support to train bioscientists and equip researchers with the skills needed to sustain the competitiveness of the UK research base and bio-industries. In 2008/09 this included the delivery of a broad range of activities:

- Following a major Quota funding competition, BBSRC made awards in 08-09 of almost £81m in flexible Doctoral Training Grants to support strategically-led, high-quality four-year PhD training.
- 70 four-year studentships were awarded in targeted priority areas: 18 in the area of ageing research; 9 in bioenergy; 9 in bioprocessing (in connection with the BRIC industry research club); 15 in environmental change; 10 to Doctoral Training Centres in systems biology; and 10 in diet and health research (in conjunction with the DRINC industry research club).
- 75 four-year studentships were awarded to our major industrial partners, allowing them to select the academic partner of their choice to ensure a demand-led approach to research training in areas of strategic importance for industry.
- 70 four-year studentships have been awarded through BBSRC's annual Industrial CASE competition. Following changes to the competition, a record number of proposals were received, primarily from SMEs.
- BBSRC's major fellowship competition was launched and will make awards in May 2009 to support research leaders of the future across its portfolio of schemes.
- A new fellowship scheme has been developed - the Industrial Impact Fellowship. This scheme will support the movement of experienced R&D leaders from industry to work alongside major BBSRC-funded programmes of work in universities and institutes.
- BBSRC has launched a public policy placement scheme in partnership with the Parliamentary Office for Science and Technology (POST). Three Parliamentary Fellowships were awarded to BBSRC-funded PhD students.

BBSRC has continued to be an active supporter of the new Research Council funded *Vitae* programme (replacing UKGRAD), which now has an extended remit to support the career development of postdoctoral researchers as well as PhD students. BBSRC was also represented at the ministerial launch of the new *Concordat to Support the Career Development of Researchers* in June 2008.

Through RCUK, BBSRC provided support for a national longitudinal survey of PhD students 3-4 years post-qualification in order to better understand the impact which highly skilled individuals make in their employment.

Sustainable institute base

2008/09 has seen the continuation of a major set of activities by BBSRC towards a sustainable institute base to undertake longer-term strategic and multidisciplinary research, and to provide a diverse range of economic impact activities.

As part of the extensive programme of co-ordinated changes, investment in the new Roslin Research Centre at the University of Edinburgh has been agreed and a major building project is underway. The North Wyke site in Devon (formerly part of IGER), which will shortly join together with Rothamsted, has been established as a national facility for sustainable agriculture and land use. BBSRC has also made progress with plans to develop a strategic partnership between IFR and the University of East Anglia with a focus on diet, food and health research; these plans are now closely linked to wider developments in science and innovation across the Norwich Research Park.

BBSRC has confirmed its commitment to establishing the Institute for Animal Health (IAH) as a national research facility in animal health, in line with recommendations of the report to Government by Sir Iain Anderson, and has announced plans to develop IAH as a single-site institute based at Pirbright. BBSRC has made a £30M interim capital investment in facilities at the IAH Compton and Pirbright sites to underpin high quality research and national capacity in the period leading to the redevelopment. In addition, following a review of governance structures at IAH, revised governance arrangements have been put in place in which BBSRC has become a Corporate Trustee of IAH.

Single core grants to institutes have been replaced by a small number of five year strategic programme grants to each institute. These allow Directors to focus resources around major scientific themes where institutes are internationally competitive.

BBSRC, in partnership with EEDA, Norfolk County Council, South Norfolk Council, Norwich City Council, and the Greater Norwich Development Partnership, has established The Genome Analysis Centre (TGAC). TGAC will be based on the Norwich Research Park and will provide genome sequencing to underpin advances to improve food security, protect UK agriculture from exotic animal disease, and exploit weaknesses in microbes to develop new ways to kill superbugs. It will also be a centre of excellence in bioinformatics to ensure that the data generated by its genome analysis, and that of other facilities, can be effectively collected and analysed.

International collaboration

International collaboration in science and training continues to be a high priority for BBSRC. Under our *International Strategy*, BBSRC is working to ensure that the UK remains a world leader in the biosciences, and that academic research, industrial R&D and the UK economy benefit from the increasing scientific activity across the globe.

In the course of the reporting period, BBSRC ran the following activities to promote international partnerships:

- 22 Partnering Awards funded with USA, Japan, China and India
- support for a second round for ERA-NET funding in systems biology

- initiation of discussions around a possible Animal ERA-NET with Defra and other EU funders
- the launch of a joint programme with the US National Institute on Aging (NIA), which is the first agreement of its kind in the biosciences, to fund collaborative UK-US research projects into normal ageing.

BBSRC and the Japan Science and Technology Agency (JST) signed a Memorandum of Understanding which agreed to align their respective schemes for partnering and exchange of researchers, with a focus on building links between the systems biology research bases in both countries. The agreement resulted from a successful joint BBSRC-JST workshop on systems biology in Tokyo earlier in 2008.

As managing sponsor of UK the Research Office (UKRO) in Brussels, BBSRC continues to ensure UKRO meet the needs of subscribed sponsors. BBSRC has also fulfilled its role as a sponsor of RCUK Offices in China, USA and India, which included chairing the project board for the launch of the India office.

Economic Impact (Industrial collaboration, knowledge transfer and commercialisation)

During 2008/09 BBSRC has made a step change in activities to ensure that excellent UK bioscience translates into real benefits for the UK economy (and society more widely).

Examples of where BBSRC is enhancing the economic impact of its funding through supporting research and training relevant to industrial needs include:

- Delivering £14M new commitment to industrially relevant research, £13M of which was awarded in collaboration with, or through activities complementary to the Technology Strategy Board
- In relation to the above, implementing BBSRC's Technology Strategy through increased investment in research in areas of strategic relevance to industry, particularly through Research and Technology Clubs (RTCs). This has included awarding grants totalling £3.7M through the Bioprocessing Research Industry Club (BRIC) and £4M through the Diet and Health Research Industry Club (DRINC). In addition BBSRC has launched a new RTC relating to biorefineries and has engaged in positive discussions with industry, wider stakeholders and the Technology Strategy Board on establishing new clubs focused on Crop Improvement and Health Ageing.
- Support for a new Innovation and Knowledge Centre in Regenerative Medicine, with EPSRC and TSB
- Maintaining a high commitment to collaborative training and career development with industry through awarding 145 new industrial CASE studentships, promoting entrepreneurship in our students and early-stage researchers through our funding of the Biotechnology Young Entrepreneurs Scheme; and supporting continuing professional development through postgraduate modular training for industry.

In addition, BBSRC continues to increase support for the identification and commercialisation of research outputs through, for example:

- Investing £2.1M in 17 new awards through the Follow-on Fund (FoF).
- Awarding 7 new Enterprise Fellowships.

BBSRC has continued to develop an understanding of the economic and social impact of BBSRC supported research and training. This has included:

- Developing plans for a study to evaluate the impact of the provision of skilled bioscientists through an external economic analysis.
- Publication of Economic Impact reports for BBSRC Institutes.

BBSRC has also developed and launched two new schemes to promote and encourage the concept of excellence with impact:

- The Innovator of the Year award celebrates the success of BBSRC-supported bioscientists in delivering economic and/or social impact from their excellent research. The inaugural BBSRC Innovator of the Year title was been awarded to Professor Stephen Jackson from the University of Cambridge (see *Recent successes* above)
- The Excellence with Impact award acknowledges university departments that are most active in embedding a culture that recognises the importance of economic and social impact alongside excellent research. Entrants will be monitored over a two year period and the awards will be presented in March 2011.

Science in Society

A working group established by BBSRC's Science for Society Strategy Panel commissioned an independent review of societal issues raised by Synthetic Biology. The Group is advising on BBSRC's response to the findings of the review, and BBSRC is taking a lead role in working with other Councils on approaches to public engagement on the issues raised by this rapidly emerging area of science and technology.

BBSRC is leading the RCUK public exhibition and events programme through 2009 to celebrate the bicentenary of Darwin's birth. The touring exhibition began in February 2009.

The results of the largest ever public dialogue on stem cell research in the UK, commissioned by BBSRC and MRC and supported by the Government's Sciencewise programme, were announced in December 2008

As part of RCUK's commitment to enhancing access to science for young people, BBSRC has provided support for two schools biology competitions, the national 'Biology Challenge', and the UK team for the 2009 International Biology Olympiad.

BBSRC has continued to work with its sister Research Councils through RCUK to deliver a range of activities including: the RCUK, Higher Education funding councils and Wellcome Trust funded Beacons for Public Engagement, and school-science links such as Researchers in Residence, Nuffield Bursaries and CPD for teachers.

Missed or delayed targets

BBSRC met in full 146 milestones out of a total of 154. This is a 95% success rate.

Revised targets:

- Initial proposals for governance of the Institute for Animal Health (IAH) following the Beringer and Anderson reviews were revised. Defra, DIUS and BBSRC have discussed over the past year the future facilities needed for animal health in the UK, and specifically the future management and arrangements at IAH Pirbright. BBSRC will continue to fund IAH so that it can provide the nation with world class research facilities that underpin the livestock industries and our food security.

The following targets were attained, but at a reduced level:

- Investment in new Roslin Research centre at University of Edinburgh was £7M in 2008/09 (target £11.1M)

Delayed targets:

- Evaluation of the Investigating Gene Function initiative and related responsive mode funding

now due for completion Autumn 2009 (target Mar 09)

- Spend of £1.5M (target £6.6M), pending new business case for redevelopment of facilities at IAH Pirbright
- Full business case for reprovision of facilities currently located at IAH Compton delayed due to revision of plans for IAH redevelopment.
- Implementation of the IBERs Estates Strategy delayed due to science review; no BBSRC spend in 2008-09 (target 0.5M)
- Due to economic conditions, Houghton Grange property temporarily withdrawn from sale pending market recovery (target Mar 09)
- Second Bioenergy call deferred pending establishment of Bioenergy Centre and recruitment of bioenergy champion (target Dec 08)

FUTURE TARGETS/MILESTONES

Full details of targets and milestones for the 2009/10 period can be found in the [2009/10 Scorecard](#). Further description of priorities and activities can also be found in the [Delivery Plan 2008-11](#). Examples of future targets and milestones include:

Research priority areas

BBSRC is working closely with other Research Councils and funders to maintain a competitive multidisciplinary research base in the following areas:

- *Energy*: BBSRC will recruit a bioenergy champion within the bioenergy initiative, to take forward and co-ordinate BBSRC activities which will include initiating programme grants funded under the first call, and working with the BBSRC Bioenergy Centre.
- *Environmental Change*: BBSRC will work to implement the recommendations of the 2008 review of research relating to environmental change. BBSRC will also lead a £10M multi-funder initiative on research into the health of bees and other insect pollinators.
- *Food Security*: BBSRC will lead a public consultation and develop a strategic roadmap for research in this area,
- *Ageing: Lifelong health and wellbeing*: With other Research Councils, BBSRC will commit additional funds for research aimed at maintaining health across the lifecourse through the Lifelong health and Wellbeing programme. BBSRC will also take forward the recently established partnering award scheme for collaborative research with the USA on the biology of ageing.
- *Global Security*: BBSRC will fund research directly relevant to security, with emphasis on animal and plant diseases, and will allocate funding for a joint research programme with DfID and the Scottish Government in animal health for international development.
- *Nanotechnology*: BBSRC will protect our current annual investment of £5M in bionanotechnology, where £1M will be earmarked to strengthen our portfolio, boost science networks and forge partnerships with industry.

As part of our continuing commitment to ensuring the development and availability of the necessary tools and resources to underpin academic and industrial bioscience research in the UK, BBSRC will allocate in the region of £6.5M of Bioinformatics and Biological Resources funding. We will also invest in the region of £2.5 for pump-priming technology development and computational approaches, and for establishing networks in areas of unmet need, via the Tools and Resources Development Fund and other mechanisms as appropriate.

Responsive mode funding will increase to £178M, to include commitments to strategic longer, larger grants through a revised scheme. In tandem we will develop a strategy to identify, collect, maintain and manage information on BBSRC-generated economic impact.

Science in Society

BBSRC remains committed to realising the impact of research through effective public engagement with the UK research base, and playing our part in the delivery of the RCUK Science in Society strategy, including enhanced access to science for young people. Our activities include developing a public engagement programme on bioenergy, focused on the work of the BBSRC Bioenergy Centre; with EPSRC, taking forward public engagement around synthetic biology; responding to the recommendations of the BBSRC/MRC-commissioned Stem Cell Dialogue, conducted by Sciencewise; and leading the RCUK public exhibition to celebrate Darwin's bicentenary. We will also develop and provide new specialist training courses in public engagement for BBSRC-funded researchers.

Sustaining the National Capacity

Ongoing support by BBSRC for the sustainability of the national capability and appropriate facilities and infrastructure for the UK research base will include an additional £4M resource and capital funding to BBSRC institutes.

BBSRC will finalise plans for the redevelopment of facilities at IAH, including the re-provision of facilities currently located at IAH Compton.

BBSRC will lead the implementation of the Norwich Science Vision, to include the strategic positioning of IFR within the Norwich Science and Innovation Partnership.

Knowledge Transfer and Exploitation

As part of the step-change in the economic impact of UK bioscience and related research BBSRC will be committing at least £12M to industrially relevant research, with at least £8M to be complementary or collaborative with the Technology Strategy Board, including at least £5M through Research Technology Clubs. We will also engage with companies and TSB to discuss potential new clubs.

BBSRC will launch new activities in collaboration with business, including, for example, new clubs, Innovation platforms, Innovation and Knowledge Centres or collaborative R&D competitions, working with other Research Councils and TSB as appropriate. BBSRC will also be working with TSB in sectors new to the Board, including agri-food.

Other activities will include: continuing to increase the number of participants in Biotechnology YES competition; awarding at least £2.5M through the Follow-on Fund; and awarding up to 10 Industrial Impact Fellowships.

As part of our activities to effect culture change in universities around the concept of excellence with impact, BBSRC will launch a second 'Innovator of the Year' competition; monitor progress of the 'Excellence with Impact' competition which runs until December 2010, with awards being made in March 2011; and pilot strategic partnerships with leading universities.

Training

In order to ensure BBSRC continues to attract the highest calibre candidates to pursue research careers, we will increase investment in studentships to a total of c£47M, and will also double the number of undergraduate Vacation Bursaries to 200.

We will re-allocate investment within the training budget to provide additional support for research training in *in vivo* skills, in order to support this high-cost and strategically important area of skills training.

BBSRC will allocate £3.6M to the delivery of professional and transferable skills training and career development for PhD students and postdoctoral researchers through the Vitae career development programme (replacing UK Grad), and through direct support to universities

We will continue to support a culture change in the BBSRC community with regard to the importance of demonstrating the impact of bioscience research through the activities of our Excellence with Impact competition.

We will hold a 'niche' skills consultation with the UK research base in order to better identify and address areas of research expertise which are strategically important for UK bioscience, but which may for a variety of reasons be becoming vulnerable.

We will work with partners in the agricultural, horticultural and food sectors to develop Advanced Training Partnerships which will bring employers and providers together to address key skills issues in the support of the UK's future food security.

BBSRC will increase support to £8.9M for its fellowships portfolio of early career, career development and senior fellowships, including Industrial Impact Fellowships. We will also seek to work in partnership with the Royal Society to develop leadership and innovation skills in our early-career research fellows, who will become the research leaders of tomorrow.

International

BBSRC will continue to deliver against its international strategy and the RCUK International Strategy implementation, and input to GSIF activities. We will publish calls for proposals for workshops and international partnering awards to provide an international dimension to BBSRC-funded research. As the managing sponsor of the UK Research Office in Brussels, we will continue to ensure that UKRO meets the needs of subscribers and sponsors. Similarly we will fulfil our role as sponsor of the RCUK offices in China, USA and India. We will establish closer co-ordination with DfID, Research Councils and others through the UK Collaborative for Developmental Science, and will maintain close links with EU funders via the European Commission and its Standing Committee on Agricultural Research and Working Groups. We will strengthen our relationships with counterpart organisations in Brazil.

UPDATE OF ECONOMIC IMPACT BASELINE

The 2009 update to the Economic Impact Baseline is published as a separate document, available at: http://www.bbsrc.ac.uk/publications/policy/bbsrc_delivery_plan.html

SCIENCE AND SOCIETY

Interactions with the RCUK Science in Society Unit

BBSRC continues to support and fund the activities of the RCUK unit including increased embedding of public engagement within councils' activities, and demonstrating the value of public engagement.

THE GERSHON EFFICIENCY PROGRAMME

This year BBSRC delivered efficiency savings worth £23.5M against a target of £28.3M. Accumulated savings were derived from: reprioritisation of programmes including training (£1.3M); reduction of administration costs (£0.6M); improved assets use (£4.0M); increased co-funding (£17.6M)

Efficiency Savings in 2009-10

Total efficiency savings in 2009-10 of £24.9M are expected to be derived from reprioritisation of programmes (£7.6M); reduction of administration costs (£0.75M); improved assets use (£1.5M); and increased co-funding (£15M).

SUMMARY FINANCIAL TABLE

2008-09 £M	Outturn*	Allocation	Difference
Near Cash	348.6	340.1	(8.5)
Non Cash	18.9	17.1	(1.8)
Capital Grants	80.5	75.5	(5.0)
Capital	(3.2)	0	3.2
Total DEL	444.9	432.7	(12.1)

* subject to final audit adjustment (if any)
DEL = Departmental Expenditure Limit

Table 1: BBSRC expenditure over the CSR period for major 'mechanisms' of funding

Expenditure	£M	CSR2007			
		2007-08	2008-09	2009-10	2010-11
Administration/Programme & SSC Costs		17.8	17.4	15.4	14.7
Institute Programme costs					
- National Research Capacity		65.8	58.5	69.4	75.9
- Other Programmes					
International subscriptions		1.3	1.4	1.3	1.3
Postgraduate training		40.5	44.2	47	51.1
Fellowships		5.8	6.3	8.9	10.5
Grants		196.9	233.6	229.5	236.8
Capital		60.3	63.9	68.2	51.6
KT Transfer, Science & Society & Other		11	10.0	17	21.4
Total Expenditure		399.4	435.3	456.7	463.3
CSR07 DEL Allocation			2008-09	2009-10	2010-11
Near Cash			362.1	379.6	391.1
Non cash			17.1	19.4	20.5
Capital Grants			28.9	34.2	39.6
Capital Grants			18.9	19.4	19.9
Total DEL Allocation			427.0	452.6	471.1
BBSRC Expenditure					
Near Cash			332.1	354.3	361.1
Non cash			24.3	20.9	21.9
Capital Grants			83.9	86.7	84.5
Capital Grants			(13.7)	(5.2)	(4.2)
Total DEL Expenditure			426.6	456.7	463.3
Difference					
Near Cash			30.0	25.3	30.0
Non cash			(7.2)	(1.5)	(1.4)
Capital Grants			(55.0)	(52.5)	(44.9)
Capital Grants			32.6	24.6	24.1
Total Under/(Overspend)			0.4	(4.1)	7.8

Table 2: Summary of BBSRC research expenditure over the CSR period by main science themes

BBSRC research expenditure (£M) by main science themes from 2007/08 baseline over the CSR period.

	£M	CSR2007			
		2007/08	2008/09	2009/10	2010/11
Ageing, Diet and Health		33.2	36.8	39.8	42.8
Stem cells and technologies underpinning medicine		23.9	25.5	26.2	27.4
Nanotech		3.8	4.3	4.7	5.1
Animal diseases and welfare		31.5	35.3	38.1	39.3
Sustainable Agriculture and climate change		29.0	31.1	33.0	34.8
Bioenergy		7.2	9.4	13.9	15.6
Plant & microbial sciences		52.4	56.7	60.4	63.3
Physiology, neuroscience and behaviour		21.4	22.4	24.0	25.8
Biomolecular and cell biology		54.2	56.0	56.6	56.3
Genomes and development		30.5	31.8	33.3	33.6
Engineering & methodologies		22.0	25.4	26.9	24.8
Other Expenditure (Including International Subscriptions; Institute Capital; Administration & SSC: Science & Society)		90.4	91.9	99.9	94.7
Total Expenditure		399.4	426.6	456.7	463.3