2011 INSTITUTE ASSESSMENT EXERCISE

OUTCOMES

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BACKGROUND

BBSRC makes strategic investments in eight research institutes[1] which are central to delivering its vision and strategic priorities. The institutes provide vital and sustained national capability in key strategic areas of agriculture, food, bioenergy, biomedicine, and diet and health.

From April 2012, BBSRC's strategic funding to these institutes is in the form of Institute Strategic Programme Grants (ISPGs), National Capability Grants (NCGs), awards for Knowledge Exchange and Commercialisation (KEC), and an Institute Development Grant (IDG). ISPG funding supports the core elements of broader Institute Strategic Programmes (ISPs), the other components of which are complementary and related to the ISPG but funded from other sources.

BBSRC is committed to the rigorous assessment of all its major investments. As the strategically funded institutes account for a significant proportion of BBSRC's total research investment, it is essential to ensure that they continue to have the capacity to produce excellent, strategically relevant research, that they are managed appropriately, and that they provide value for money. The assessment informs BBSRC's future funding decisions and enables BBSRC to comply with government policy. BBSRC carries out the Institute Assessment Exercise (IAE) every five years.

The latest IAE, carried out during 2011, concluded that institutes should continue to receive strategic funding from BBSRC: all the institutes have continuing and important roles to play in helping BBSRC to deliver its strategic priorities, as set out in its 2010-2015 Strategic Plan, and are performing well in many of the key areas of activity. The IAE process has, moreover, resulted in an improved alignment of Institute Strategic Programmes (ISPs) and associated ISPGs with BBSRC's strategic priorities.

The IAE comprised separate assessments by expert panels, each examining the institute's performance in key areas; the panels assessed:

- The quality of the research programmes
- The nature, quality and promise of the national capabilities
- Achievements in, and plans for, knowledge exchange and commercialisation
- Achievements in, and plans for, public engagement
- Extent of the development of strategic human resources capabilities

These assessments were followed by a short visit to each institute by an Institute Assessment Panel (IAP), an independent panel of experts, which reviewed the institute's overall performance and future strategy.

Details of the procedures are in the Annex.

[1] Babraham Institute; Institute of Biological, Environmental and Rural Sciences; Institute of Food Research; John Innes Centre; Roslin Institute; Rothamsted Research; The Genome Analysis Centre; The Pirbright Institute.

OUTCOMES FROM THE ASSESSMENT

The IAE strongly endorsed the need for BBSRC's strategically funded institutes. They all continue to have significant capabilities which are not readily available elsewhere within the UK bioscience research base. It is therefore important that BBSRC continues to invest in them.

The assessment also confirmed that BBSRC-funded research performed in the institutes is of the highest quality and that a number of the Principal Investigators (PIs) are world leaders in their field. The institute research programmes are internationally competitive and collectively they address all of BBSRC's strategic research priorities.

BBSRC Council approved funding for a total of 26 strategic research programme grants and 14 capability grants following rigorous peer review by the expert panels. Each of these awards is outlined in this report with further details on the institutes' websites.

In addition to the ISPGs and NCGs, institutes will receive a Knowledge Exchange and Commercialisation[2] (KEC) grant and an Institute Development Grant (IDG). The KEC grant will be used to enable the successful application of the intellectual assets of the institutes to maximise their public benefit and impact. It will support the essential core infrastructure and capability to deliver institute-wide knowledge exchange and commercialisation activities from the ISPGs and NCGs, and to ensure the Institute's programme remains sensitive to the needs of users. All institutes will use elements of the KEC grant to support core capability in KEC, including expert staff, and activities to manage and develop the intellectual assets (including intellectual property) that arise from the research programmes. Each institute has developed a strategy for KEC that sets out the overall vision and approach, which will be published on institute websites.

The IDG is a flexible grant that will enable institutes to be responsive to new opportunities within its mission. It might be used, for example, to explore new research ideas, pump-prime recruitment of key positions, underpin international strategies, support public engagement activities, and support staff training and development.

Details of allocations within the different funding streams are given in the table below. Allocations after the Comprehensive Spending Review (i.e. after 2014-15) will be subject to confirmation following a mid-point review of programmes.

£M	2012-13	2013-14	2014-15	2015-16	2016-17	TOTAL
Institute Strategic Programme Grants	56	55	55	55	55	**277**
National Capability Grants	14	16	14	16	17	**78**
Knowledge Exchange & Commercialisation Grants	4	4	4	4	4	**20**
Institute Development Grants	6	6	6	6	6	**32**
Funding to HEIs for joint grants	2	2	3	3	3	**13**
TOTAL	**83**	**83**	**84**	**85**	**85**	**420**

[2] IBERS and RI, as institutes embedded within universities, are not eligible for a KEC grant as they have access to university resources to support KEC.

BABRAHAM INSTITUTE

The Babraham Institute (BI) research portfolio is led by world-class scientists and carried out within a stimulating research environment. BI's research and research goals are very relevant to BBSRC's research priority in Basic Bioscience Underpinning Health, particularly healthy ageing. In this context the following awards have been agreed.

Institute Strategic Programme Grants

Nuclear dynamics

This research will provide new information and understanding of the processes of ageing in immune cells and other cells of the blood. It will study the effects of ageing in haematopoiesis and the immune system through an integrated systems biology approach designed to characterise genome-wide effects of ageing.

Epigenetics

The focus of this programme is on understanding principles and effects of epigenetic gene regulation in early development and in genome and epigenome stability during life and ageing. This work will make an important contribution to revealing the biological mechanisms underlying normal physiology and homeostatic control during early development and throughout life and ageing.

Signalling

The overall aim of this programme is to understand the molecular and system principles by which intracellular signals regulate cell and organismal processes crucial to life-long health and wellbeing, including adaption to changes in nutrient availability, the ability to resist infection, and cellular and organismal longevity.

Lymphocyte signalling and development

This work aims to increase understanding of the normal ageing process by studying the fundamental mechanisms of lymphocyte development and homeostasis through a combination of molecular, cellular and whole animal studies. Using integrated approaches, the team will characterise the mechanisms by which the immune system influences the functional integrity of other organ systems including the intestine and the associated microbiota.

Campus Capability Grant

The purpose of the Campus Capability is to provide facilities for animal breeding, holding and experimentation for use by both institute researchers and the companies based on the Babraham Research Campus. Its aim is to combine a controlled microbiological status with the flexibility to accommodate a wide range of experimental approaches, and it will make a valuable contribution to the capacity for the derivation of novel GM strains of mice, which is currently limited in the UK.

Knowledge Exchange and Commercialisation Grant

The institute's KEC strategy is designed to facilitate a two-way flow of knowledge between the institute and its external partners and stakeholders. The KEC grant will enable the institute to build on its successful record of commercialising its science and to enhance the KE activities that will contribute to delivering impact from the science. This will include, for example, support for core expert staff, funding for internal KEC grants to develop early stage projects that have commercial potential, and improvements to information management. The grant will also be used to enable activities to engage business and other users, for example, through supporting a series of annual seminars focused on ageing research.

INSTITUTE OF BIOLOGICAL, ENVIRONMENTAL AND RURAL SCIENCES

There is a clear need for the Institute of Biological, Environmental and Rural Sciences (IBERS). Its research is of very high strategic relevance, and the Institute has the facilities and capacity to carry out long-term research programmes unavailable in other institutions. Its research programmes address key challenges within BBSRC's strategic priorities, particularly in Food Security and Bioenergy; moreover the Institute has an excellent reputation for bringing together research expertise across the animal and plant kingdoms with environmental research in a successful and productive way. The following will be funded.

Institute Strategic Programme Grants

Crop genetics, genomics and germplasm

This work focuses on major forage crops: perennial ryegrass, the most important forage grass in the UK and temperate areas worldwide; white and red clovers, increasingly important to sustainable grassland based agriculture, providing high quality protein to the grazing animal; and oats, which benefit the human diet and are more environmentally benign than other cereals. The research will help to improve the efficiency of the breeding process itself as well as the breeding potential of the underlying germplasm, using IBERS' large collections of different grasses, clovers and oats.

Energy grasses and biorefining

This programme is designed to develop energy grasses that are high yielding and can grow on marginal lands with low inputs. It aims to replace fossil fuels with 'next generation' carbon and nitrogen efficient perennial crops that can grow on low grade land. To make the most efficient use of biomass and increase the economic, social and environmental benefits of bioenergy, the project is also characterising biomass to make materials and chemicals, including plastics, which are normally made from oil. The giant grass Miscanthus, a primary candidate energy crop, will be a main focus of the programme.

Rumen systems biology

To help ensure food security, the increasing demand for ruminant products must be met by production from existing land area, meaning that livestock production must increase the efficiency with which it uses feed. A core focus of this programme will be the development of a computer model of the rumen ecosystem to explain why some nutrients are used more efficiently in the rumen than others. This will help to understand how metabolism might be made more efficient by feeding the animal specialised forage with key quality traits.

National Capability Grant

National Capability for Crop Phenotyping

The Crop Phenotyping Centre is a new national centre for plant phenotyping. Building on recent developments in robotics, computation and image analysis, this resource will allow academic researchers, industry and policymakers to access rapid analyses of different traits in plants and crops that have important industrial and agricultural uses. This will help to overcome significant bottlenecks in current crop breeding approaches by relating desirable traits to their underpinning genetics.

INSTITUTE OF FOOD RESEARCH

The Institute of Food Research (IFR) operates on the Norwich Research Park in a highly relevant area and makes an important contribution to major challenges in global food security and to meet the BBSRC's strategic priorities in Food Security, Basic Bioscience Underpinning Health and, in part, Bioenergy & Industrial Biotechnology. The research programmes are long-term and multidisciplinary. The following awards have been made.

Institute Strategic Programme Grants

Gut health and food safety

This programme is aligned with BBSRC's strategic priorities in Food Security, and Basic Bioscience Underpinning Health. It aims to develop knowledge-led intervention strategies to reduce the incidence and burden of food poisoning and gastrointestinal (GI) disease by increasing understanding of the biology of bacterial foodborne pathogens, the requirements for establishing and maintaining a healthy GI-tract, and the complexity of food safety and gut health. The programme brings together experts from IFR, the University of East Anglia and Imperial College, London.

Food and health

This work contributes to: the need for a sustainable food supply that can meet the nutritional requirements of all parts of the population and which promotes healthy ageing; the use of food waste to extract high value products and as a source of bioethanol to reduce our carbon footprint; and the provision of underpinning science to the UK food and drink industry. The programme brings together a multidisciplinary, cross-institutional team to address these complex issues.

National Capability Grants

ComBase

ComBase is a web-based tool that collects, stores and makes available food microbiology data for analysis and modelling by other researchers. It is a systematically formatted database of quantified microbial responses to the food environment, together with validated predictive models on the growth and survival of food-borne organisms under various environmental conditions. These can be used for predicting and improving the microbiological safety and quality of foods, designing, producing and storing foods economically, and assessing microbiological risk in foods.

Food Databanks

This capability draws together three unique, but inter-linked databases: UK Food Composition, which describes food eaten in the UK in terms of macro-nutrients (energy, protein, carbohydrates, fats, etc); eBASIS, which provides information on non-nutrients with putative health benefits or detrimental effects in humans; and InformAll, with information on food allergy and the proteins responsible. The capability is vital for understanding patterns and trends in food composition and consumption, their effects on health and the development of healthier food products.

National Collection of Yeast Cultures (NCYC)

Yeasts are used in many biotechnological processes and in world-leading academic research. As well as collecting and preserving biodiversity that might otherwise disappear, the Collection also has a programme to improve yeast characterisation. NCYC experts have identified over 4,000 different strains and are describing and classifying hundreds more, making the NCYC one of the largest yeast collections in the world.

Knowledge Exchange and Commercialisation Grant

IFR will use the KEC grant to promote its science and expertise to the food and allied sectors through an expansion of its networking activities, primarily through the Food and Health Network. In addition, the grant will enable further delivery of institute science to the food industry via applied projects and consultancies through IFR Extra. The grant will be used to encourage research leaders to take forward outcomes from their research to practical application and to support science translators – Industry Captains – embedded within each of the programmes. The KEC grant will also support work with partners on the Norwich Research Park to increase scientific and business networking, develop an integrated approach to research and KEC, and embed a culture of innovation and enterprise.

JOHN INNES CENTRE

The John Innes Centre (JIC), which operates on the Norwich Research Park, offers an exceptionally high quality and vibrant environment for research and training, to support world-leading research scientists. The research portfolio is central to the delivery of BBSRC's strategic priorities, with relevance to all three themes (Food Security, Bioenergy & Industrial Biotechnology, and Basic Bioscience Underpinning Health), with all four separate programmes working very effectively together. The following have been awarded.

Institute Strategic Programme Grants

Growth and development underpinning yield

The programme contributes to meeting the challenge of securing sustainable and secure supplies of affordable food and feed. It aims to maximise yield by focusing on a set of biological processes that currently limit crop production. These include the control of plant growth and development at multiple scales, from cells to the whole plant, and how the environment affects these. The outcomes of the programme will generate new knowledge and understanding of the key biological and developmental processes underpinning sustainable approaches for crop improvement.

Wheat Institute Strategic Programme

Led by the JIC, this programme is a collaboration with Rothamsted Research, the National Institute of Agricultural Biology, and the universities of Bristol and Nottingham, and will build on research carried out under a BBSRC Strategic LoLa award. The aim of the programme is to develop new wheat varieties which have higher yields with lower nutrient requirements, whilst retaining the quality of the grain. This work is central to BBSRC's strategic priority in Food Security, and contributes to the UK grand challenge to ensure global food security and to the G20 Wheat Initiative.

Biotic interactions for crop productivity

Working with The Sainsbury Laboratory, combining strengths in biotic interactions of plants, the programme will provide scientific understanding of plant-pest, pathogen and symbiont interactions. The work will underpin crop improvement to reduce crop losses by exploring the genetic components present within the plant kingdom that provide effective resistance to pests and pathogens, the mechanisms by which pests and pathogens avoid these resistances and the means by which plants and micro-organisms enter beneficial symbioses for nutrient acquisition. It will help to deliver sustainable agriculture, while maintaining or improving yields.

Understanding and exploiting plant and microbial metabolism

The aim of this programme is to improve the fundamental understanding of metabolism, and to exploit this information in the context of agriculture, bio-based industries and health, thereby addressing all three of the BBSRC's strategic priorities. It has two interconnected themes: primary carbon metabolism, which investigates how plants and bacteria acquire carbon from their environments and use it to synthesise their main cellular components; and understanding and exploiting natural product biosynthesis, which investigates how plants and microbes are able to make such an enormous variety of natural products.

National Capability Grant

Germplasm Resources Unit

The Germplasm Resources Unit comprises unique public germplasm collections of arable crop species, including the UK's largest and most accessible collections of wheat, barley, oats, peas and beans and growing resources of Brassica napus. These are the most representative collections of UK developed germplasm and include material from around the world. The capability has the potential to be a key resource both in the UK and internationally and to play a significant role in the UK's contribution to the international conservation of plant genetic resources for food and agriculture.

Knowledge Exchange and Commercialisation Grant

The grant will be used to support core business development staff and to introduce new mechanisms to encourage research leaders to identify and take forward potential opportunities to translate their research. This includes support for 'Innovation Clusters', for advancing and translating scientific breakthroughs to practical application, and a competitive 'Innovation Fund' to support internal proof-of-concept projects for research outcomes with commercial potential. JIC will also increase its provision of knowledge and skills and, in partnership with the University of East Anglia, will develop accredited CPD courses to address the high-level skills needs of industry. The KEC grant will also support work with partners on the Norwich Research Park to increase scientific and business networking, develop an integrated approach to research and KEC, and embed a culture of innovation and enterprise.

ROSLIN INSTITUTE

Now fully and successfully embedded in the University of Edinburgh, the Roslin Institute (RI) is operating very effectively. The research portfolio addresses major challenges in livestock productivity, an area in which the Roslin Institute is a world leader. It also addresses BBSRC's strategic priorities in Food Security and some aspects of Basic Bioscience Underpinning Health. In addition, the Institute is planning to move into research related to Industrial Biotechnology, through the identification of new enzymes for bioprocessing, and the production of therapeutic proteins. The following awards have been made.

Institute Strategic Programme Grants

Pathogenesis and resistance in viral diseases of livestock

This programme will study the genetics of host resistance to virus infection and disease, outstanding fundamental questions on virus pathogenesis and novel strategies for the control of virus diseases. The aim is to address important gaps in fundamental knowledge in specific diseases and to translate the outputs into new control strategies. The programme includes studies of endemic viruses important to food production in their natural hosts and studies on animal model systems to define the pathogenesis of virus diseases.

Innate immunity and endemic disease

The research programme will investigate infections in farm animals, or specific cell cultures derived from these animals, to generate data for the design of control strategies, for example new vaccines. Its main focus will be on animal pathogens, including those causing tuberculosis in cattle and Johne's disease in cattle and sheep, those causing mastitis and avian disease, and food-borne pathogens such as Salmonella and Campylobacter. The programme will sustain and extend nationally-important models and expertise to deal with ongoing and future threats, and will provide key data to industry, policymakers and other stakeholders.

Livestock neurobiology

The livestock neurobiology programme will investigate basic questions about prion diseases, such as how and why new forms arise and what distinguishes them from the classical forms, and whether new strains are likely to be more or less transmissible than classical strains, both within a species, leading to propagation of the disease in livestock, and to humans. It will investigate how natural transmission of TSE disease occurs in conditions related to those found in farms, and consider how these insights will help understanding of how the brain stays healthy during normal life and ageing in humans and in farm animals.

Control of development and reproduction traits

The aim of this work is to address the challenge of food security within the UK and internationally through high-quality research underpinning the production of animals that are better suited to modern day food demands. The research is structured around interconnected themes of animal reproduction, control of sexual identity in animals, how normal growth is achieved, and innovative reproductive biotechnologies. Through investigating how the underlying genetic makeup of an animal interacts with the environment it lives in, the research aims to improve animal fertility and post-conception survival leading to the life-long well being of livestock.

Analysis and prediction in complex animal systems

The multi-disciplinary team on this strategic programme aims to deliver: high quality, annotated, sequence information on major livestock species; computational algorithms for rapidly summarising and visualising the information; advances in understanding which genes are important for key traits and how the expression of these genes shape the trait; new ways to summarise the information and select the best candidates for breeding; and better methods to reduce the impact of animal diseases to reduce losses and enhance welfare and well-being.

National Capability Grants

National Avian Research Facility

This capability, which is being developed in close collaboration with The Pirbright Institute, will provide access to cutting-edge technologies and unique lines of chickens for research into the biology of disease in the chicken and the development of new vaccines and therapeutics that will impact on human health and on the health and welfare of the approximately one billion chickens reared in the UK every year. It will also help understanding of the role of genes and pathways in embryonic development, for which the chicken is a widely used model.

The ARK-Genomics Centre for Comparative Functional Genomics

Established in 2000, ARK-Genomics is a world-leading capability in functional genomics and genomics technologies for scientists engaged in research on farmed animal species. It conducts and enables research into genome structure, genetic variation, gene expression and gene function with a focus on systems of relevance to animal health and food security. It is also a key capability supporting the BBSRC enabling theme New Ways of Working.

ROTHAMSTED RESEARCH

There is an ongoing strategic need for Rothamsted Research (RRES). It is an institute which conducts research of high scientific quality and of huge strategic relevance and it is central to BBSRC's strategic priorities in Food Security, and Bioenergy & Industrial Biotechnology. The portfolio of Institute Strategic Programme Grants and National Capability Grants will ensure the Institute remains well placed to meet its, and BBSRC's, strategic objectives. The following awards have been agreed.

Institute Strategic Programme Grants

Delivering sustainable systems

This programme aims to deliver sustainable farming systems by: understanding how plants and insects become resistant to chemical sprays and how this might be overcome, developing innovative approaches to pest management that do not use chemicals; improving the supply of nutrients, especially nitrogen and phosphorus, from the soil, fertilisers and manures to crop plants and livestock; and developing new ways to describe and show what sustainable farming practice is.

Cropping carbon

The aim of this research is to improve the value of willow biomass by increasing the range of extractable products and/or calorific value and to improve soil carbon stocks through plant inputs. These developments offer ways to provide sufficient food, water and fuel for a rapidly expanding population, whilst conserving biodiversity and mitigating climate change. With the IBERS programme 'Energy Grasses and Biorefining', this programme will fill knowledge gaps and underpin UK science in bioenergy, biorenewables and carbon sequestration under perennial cropping systems.

Designing seeds for improved nutrition and health

The focus of this work is on understanding and optimising the nutritional composition of seeds, with the primary goal of improving the direct nutritional impact of two target crops: wheat and Brassicas. This will be achieved by making a number of specific enhancements to the nutritional composition of the seeds, which will allow the ingestion of improved foodstuffs which help to reduce the risk of common illnesses such as heart disease, obesity and type-2 diabetes.

20:20 Wheat

This is a long term strategic research programme that aims to provide the knowledge and tools to increase the potential for UK wheat yields to 20 tonnes per hectare within the next 20 years. The research aims to deliver a step change in output by maximising and protecting yield potential, understanding soil resource interactions, and taking systems approaches to crop improvement. The programme will address the strategic goal of yield increase leading to improved understanding of the factors limiting yield in different environments.

National Capability Grants

The Rothamsted long-term experiments, sample archive and e-RA database

This brings together the historic and scientifically important long-term experiments (LTEs), some of which have been running continuously for over 150 years, with the Sampling Archive of soils, crops, fertilisers and manures applied in the experiments, and the Electronic Rothamsted Archive (e-RA), which collates information from the LTEs and the archived samples, into an accessible and useable database. The resource provides important insights into the long-term sustainability of cropping systems, particularly the impacts of intensive agriculture and environmental pollution, on sustainable agricultural systems, especially nutrient cycling, soil quality and plant diseases.

PHI-base: The Pathogen Host Interactions database

PHI-base contains expertly curated molecular and biological information on genes for which the effect on pathogen-host interactions has been tested experimentally. Published positive and negative results on tested pathogenicity, virulence and effectors are included in the database. PHI-base is the first on-line resource devoted to the identification and presentation of information on fungal and oomycete pathogenicity genes and their host interactions, and a valuable resource for the discovery of candidate targets in these medically and agronomically important pathogens.

The Rothamsted Insect Survey long-term trap networks and databases

This capability comprises two networks of traps which provide the most extensive long-term standardised data on terrestrial invertebrates in the world, used in many fundamental and applied studies by Rothamsted and other scientists. They provide unique, long-term, spatially extensive data on a range of insect species which can be used to provide up to date information on pest management of immediate benefit to crop growers, as well as examining changes in biodiversity over long time periods and large areas and understanding, and predicting the impacts of climatic and other environmental changes.

The North Wyke Farm Platform

The North Wyke Farm Platform is a new capability. It provides three farmlets, each consisting of five hydrologically isolated fields. The underlying principle is to manage each of these farmlets differently and record the impact on the environment. As a national capability, it will generate a set of core data, including the measurement of field and water chemistry and water flow rates, greenhouse gas emissions from soils, livestock and agronomic data, and farm management records from across the Platform. Access to the Farm Platform for experimental work or to data will be available to research users and collaborators.

Knowledge Exchange and Commercialisation Grant

The KEC grant will be used to support core specialist KEC staff and to develop the intellectual assets of the institute (including intellectual property), as well as providing opportunities for institute researchers to increase their involvement in KEC and to be recognised and rewarded for these activities. The grant will also be used to promote increased interactions with major agribusiness companies, and to improve contacts with trade organisations, food and feed processors and grain companies. In addition, the grant will be used to support activities to raise the institute's international profile and impact through, for example, international partnering meetings.

THE GENOME ANALYSIS CENTRE

The Genome Analysis Centre (TGAC), which operates on the Norwich Research Park, is working in a key area, both nationally and internationally, and its work is applicable to the three BBSRC strategic priorities: Food Security, Basic Bioscience Underpinning Health, and Bioenergy & Industrial Biotechnology. It is also central to BBSRC's enabling theme of 'Exploiting New Ways of Working'. TGAC has succeeded in establishing itself operationally as a community resource, initially focusing on sequencing, but with a growing bioinformatics capability to the community. The following will be funded.

Institute Strategic Programme Grant

Developing strategies for big data bioinformatics

This programme aims to address the gap that has developed between the capacity to generate large volumes of genomics data and the capability to process and interpret them, and will be done through the development of a range of bioinformatics tools. The objectives are focused on the processing of raw data into genomic information, the translation of this information into biological knowledge, and the development of an infrastructure to sustain these activities. Although the tools and strategies developed will be exploited in a number of different areas, there will be an emphasis on the analysis of plant genomes.

National Capability Grant

The TGAC National Capability

This grant will support the operation of TGAC as a national facility to promote the application of genomics and bioinformatics to advance bioscience research and innovation, with a primary focus on plants, animals and microbes. It will provide a national capability for UK bioscience researchers, enabling the generation of key resources underpinning strategic research programmes (for example, reference genome sequences and population variation data), providing opportunities for novel application development to explore and exploit functional genomics, and offering opportunities to investigate novel technology and computational platforms.

Knowledge Exchange and Commercialisation Grant

The grant will be used to support expert KEC staff and to manage and develop intellectual assets (including intellectual property) arising from the institute's research and capabilities. This includes support to enable proof-of-concept and translation activities, including bids for collaborative funding and the establishment of a business plan competition. Training programmes in bioinformatics and genomics will be developed and delivered, both for collaborators, through placements and modular training courses, and for institute staff. The KEC grant will also support work with partners on the Norwich Research Park to increase scientific and business networking, develop an integrated approach to research and KEC, and embed a culture of innovation and enterprise.

THE PIRBRIGHT INSTITUTE

The Pirbright Institute works in a crucial area addressing global challenges which are central to BBSRC's strategic priorities. Research in livestock viral diseases clearly needs to be carried out in an institute which possesses the highest quality containment facilities and the world-class intellectual critical mass required to drive forward the long-term, multidisciplinary research programmes. The Pirbright Institute has an exceptional track record in livestock viral diseases research with a number of world-leading experts and, with a major new investment in containment facilities, the Institute is now very well placed to make key contributions to delivering the BBSRC's strategic objectives. The following awards will be funded.

Institute Strategic Programme Grants

Vector borne viral diseases programme

The aim of this programme is to investigate important diseases in livestock, such as Bluetongue and African Horse Sickness, diseases which are transmitted by arthropods (biting midges, ticks and mosquitoes). Scientific expertise gained from this research will be applied to newly emerging diseases and will contribute towards the containment, control and eradication of exotic and zoonotic diseases of livestock, an essential component of UK national security.

Livestock viral diseases programme

The livestock viral diseases programme will address major scientific questions broadly relating to epidemiology, virology and immunology, including: why viruses emerge and persist, what determines their transmissibility and evolution, what are the viral determinants of infection and protective immunity, and how livestock immune systems combat viral infections. Answering these questions is crucial in ensuring the UK is able to contain, control and eradicate viral diseases of livestock, including those which can be transmitted to humans. The programme will focus initially on the most economically significant diseases including foot-and-mouth disease and swine influenza virus.

Avian viral diseases programme

This work will help to address the BBSRC strategic priority in global food security, by answering broad scientific questions at the heart of improving the health of poultry, thereby underpinning sustainable poultry production, crucial for ensuring healthy sources of protein in the coming decades. This will be achieved by examining virus biology and diversity, by understanding the molecular features of virus-host interactions in pathogenesis, and by identifying the major attributes of the avian immune system in responding to viral diseases and vaccines.

National Capability Grant

The Pirbright Institute National Capability Grant

The new centre for veterinary virology at Pirbright will provide a national capability for research on viruses of veterinary importance that must be handled in high containment facilities. Such research is integral to the ability of the UK to deal with livestock disease threats caused by viruses not normally present in the UK (exotic viruses), such as those

causing foot-and-mouth disease, African horse sickness virus, bluetongue, and peste des petits ruminants, and those with the potential to infect both livestock and man (zoonotic viruses), such as avian influenza virus. These diseases have enormous economic and social impacts and the viruses responsible must be handled in laboratories with the highest possible levels of biological security. As a national capability for veterinary virology, The Pirbright Institute will provide the UK with a unique complement of scientific expertise and physical resources that, for biosecurity reasons, cannot be replicated elsewhere within the higher education or commercial animal health sectors of the UK.

Knowledge Exchange and Commercialisation Grant

The KEC grant will enable the establishment of an in-house business unit that will coordinate and develop the institute's KEC activities. These will include, for example, enhancing the translation of research outcomes into high impact products and services, developing and making accessible the supply of the next generation of reagents, and improving communications with stakeholders. The grant will also enable the institute to enhance its role as a centre of excellence in specialist training in exotic disease control and diagnostic laboratory techniques and to expand into areas such as specialist biocontainment facility management (including biosafety).

ANNEX: ASSESSMENT PROCEDURES

Assessment of Institute Strategic Programme Grants (ISPG)

Institutes submitted proposals for ISPGs at outline and full stages. Outline proposals were assessed for strategic relevance to the BBSRC by an expert panel which provided detailed feedback to the institutes to shape the development of full proposals. These were subject to peer review, including external referee assessment, PI response and review by a different, more specialist, panel. This panel considered the extent to which the proposals met the following criteria: scientific excellence, relevance to BBSRC strategy, potential for economic and social impact, timeliness and promise, cost effectiveness, and staff training potential. The panel also considered the proposals within the context of the overall ISP, including the level of leveraged funding.

The full proposal panel identified the proposals to be recommended to Council for funding and reports on the ISPGs were provided to the relevant IAP.

Assessment of National Capability Grants (NCG)

As for the ISPGs, institutes submitted outline and full proposals. Outline NCG proposals were assessed for strategic relevance to the BBSRC alongside the outline ISPGs and by the same panel. However, full proposals were not subject to referee review and were considered by a separate NCG panel, against the following criteria: the extent to which the capability is required by the scientific community and how it will address key BBSRC strategic needs; the adequacy of plans for engagement with the external user community and for monitoring progress; governance, including skills and capabilities of the team, and quality of the scientific leadership; and whether the proposed future development will ensure sustainability.

The full proposal panel identified the proposals to be recommended to Council for funding and reports on the NCGs were provided to the relevant IAP.

Assessment of Knowledge Exchange and Commercialisation (KEC)

The KEC expert panel met twice to review draft and then final submissions. It considered the KEC vision and strategy, the institute's plans to implement the strategy, and the management of KEC activities.

Institute representatives discussed their KEC strategy with the panel at the second meeting after which each institute received generic feedback of relevance to all institutes and specific feedback for that institute. This feedback was also provided to the IAP. In parallel, institutes have continued to work with BBSRC Office to develop their KEC plans further.

Assessment of Public Engagement (PE)

The public engagement assessment was carried out by the BBSRC Bioscience for Society Strategy Panel (BSS). Each institute provided a written submission which institute representatives discussed with BSS when the panel met for the assessment.

The panel based its assessment on: the soundness and feasibility of the strategy for PE; the institute's approach to equipping, encouraging and supporting researchers to engage with

the public, and recognition and reward for doing so; and the outcomes and value for money of specific PE case histories and how they were evaluated and disseminated. It also considered the institute's contribution to BBSRC, RCUK and BIS strategies for PE and the added value gained from collaborative working.

Following the panel meeting, each institute received generic feedback of relevance to all institutes and specific feedback for that institute; this feedback was also provided to the relevant IAP.

Assessment of Strategic Human Resources Capabilities (SHRC)

Institutes submitted draft action plans for SHRC, focusing on the overall strategy for managing human resources capabilities, as applied to scientific leadership and management, succession planning, performance management, PhD training, and staff development, including postdoctoral fellowships training. BBSRC Office provided informal feedback on the draft plans, and the final submissions, along with supporting evidence, were assessed by an expert panel. Institute representatives discussed their submissions with the SHRC panel when it met.

Following the panel meeting, each institute received generic feedback of relevance to all institutes and specific feedback for that institute; this feedback was also provided to the relevant IAP.

Institute Assessment Panel (IAP)

The IAPs advised Council on the institutes' overall performance and strategic direction. Their assessment was based on the results of the five separate assessments, a further written submission from the institutes and their discussions with senior institute staff during the visit to the institute.

The IAPs were invited to report to Council on:

- The institute's overall success in delivering excellent and strategically relevant research and training, accessible to the main users
- The overall strategic direction of the institute in relation to BBSRC's The Age of Bioscience: Strategic Plan 2010-2015 and related priorities
- Whether the institute is operating as effectively as possible
- Whether there is a continuing need for the institute to deliver strategic research and training
- The elements of activity recommended for funding through the five assessment panels.

The IAPs were chaired by members of Council and included representatives from each of the separate expert panels and three members selected to provide an international perspective and strategic insight from senior users and research leaders. The IAPs were different for each institute and each spent a day and a half at the relevant institute. The reports from the IAPs were sent to the institutes and institute directors submitted formal responses to the recommendations.

The IAP reports and institute responses were considered by Council at its meeting in March 2012 at which funding for each institute was agreed.

October 2012