House of Commons

Science and Technology Committee

The Work of the Biotechnology and Biological Sciences Research Council

Report, together with formal minutes, oral and written evidence

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The Science and Technology Committee

The Science and Technology Committee is appointed by the House of Commons to examine the expenditure, administration, and policy of the Office of Science and Technology and its associated public bodies

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The current staff of the Committee are Chris Shaw (Clerk), Emily Commander (Second Clerk), Alun Roberts (Committee Specialist), Ana Ferreira (Committee Assistant) and Christine McGrane (Committee Secretary)

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Report

Summary

We undertook this inquiry as part of our rolling programme of scrutiny of the seven Research Councils. We examined all aspects of the Council's work, notably: its support for research and researchers; the role of its eight sponsored institutes; public engagement activities and knowledge transfer.

BBSRC has maintained a good success rate for grant applications in responsive mode despite a large increase in applications. However, we concluded that it could do more to manage demand, by following best practice as identified at other Research Councils, and by publishing the success rates of individual institutions.

We welcomed BBSRC's imaginative approach to the challenges posed by new, interdisciplinary areas of scientific research, notably its introduction of "Discipline Hopping Awards" and initiatives designed to increase the supply of trained biomathematicians. However, we identified problems with grant administration for research at the boundaries of BBSRC's remit, and urged closer collaboration with other Research Councils to ensure that excellent grant applications in these areas receive the funding they deserve.

We congratulated BBSRC on the steps it has taken to reduce the number of its staff employed on short term contracts and urged it to work with universities to ensure their support of its stance on this issue. We were also pleased to note that BBSRC offers studentships at a higher rate of stipend, in line with the recommendations of the Roberts Review.

BBSRC has worked hard to improve its engagement with the public on scientific issues but we identified a shortage of resources that hampered its success in this area. We found communication to be a problem more generally, with awareness of the full range of BBSRC activities and opportunities quite low amongst members of its community.

Over the course of this short inquiry we have found much to praise at BBSRC: its strategy closely adheres to priorities set by RCUK, and it is, for the most part, administered transparently and efficiently with the support of its community.

1 Introduction

1. This Committee is appointed by the House of Commons to examine the expenditure, administration and policy of the Office of Science and Technology (OST) and its associated public bodies.[1] These "associated public bodies" are not clearly defined: the non-Departmental Public Bodies associated with OST are, strictly speaking, sponsored by its parent Department, the Department of Trade and Industry (DTI) rather than by OST itself. We have taken the term to mean the seven Research Councils and the Council for Science and Technology, and (in part) the Human Genetics Commission and the Agriculture and Environment Biotechnology Commission.[2]

2. As part of our scrutiny of OST's associated public bodies, we are holding separate scrutiny sessions with each of the Research Councils, with the objective of calling in all seven over the course of the Parliament. So far, we have published Reports on four of the seven: the Particle Physics and Astronomy Research Council (PPARC), the Medical Research Council (MRC), the Natural Environment Research Council (NERC) and the Engineering and Physical Sciences Research Council (EPSRC).[3] In our *Annual Report 2003* we were pleased to note that our scrutiny of the Research Councils has played a positive role in promoting self–analysis and best practice.[4] We announced our inquiry into the Biotechnology and Biological Sciences Research Council (BBSRC) on 10 September 2003 and invited evidence from interested parties.

3. We received 12 memoranda of written evidence and held one oral evidence session on 1 December 2003 with the Chief Executive of BBSRC, Professor Julia Goodfellow; the Director of Finance and Administration, Mr Steve Visscher; the Director of Science and Technology, Professor David White and a BBSRC Council Member, Professor Robert Freedman. We subsequently received further memoranda of evidence from BBSRC in answer to supplementary questions. The evidence received and a transcript of the oral evidence session are published with this Report.

4. We are very grateful to all those who submitted evidence to this inquiry and to BBSRC for the co-operative manner in which staff there have responded to our many requests for information.

1 House of Commons Standing Order No. 152

2 The Human Genetics Commission is jointly sponsored by OST and the Department of Health. The Agriculture and Biotechnology Commission is jointly sponsored by OST and the Department for Environment, Food and Rural Affairs.

3 First Report of the Science and Technology Committee, Session 2002–03, *The Work of the Particle Physics and Astronomy Research Council*, HC 161; Third Report, Session 2002–03, *The Work of the Medical Research Council*, HC 132; Fifth Report, Session 2002–03, *The Work of the Natural Environment Research Council*, HC 674; HC (2002–03) 936

4 First Report of the Science and Technology Committee, Session 2003–04, *Annual Report 2003*, HC 169, p 10

2 Background

Origins and structure

5. The Biotechnology and Biological Sciences Research Council (BBSRC) was established following the 1993 White Paper *Realising Our Potential*, which created the current Research Council structure.[5] It was established by Royal Charter as an independent, non-departmental public body under the Department of Trade and Industry and took on the work previously funded by the Science and Engineering Research Council and the Agricultural and Food Research Council. The revised Research Council structure was introduced in 1994.

6. BBSRC policy and strategy are determined by BBSRC Council, which consists of the Chairman, Dr Peter Ringrose; the Chief Executive, Professor Julia Goodfellow; and between 10 and 18 other members representing Government, industry and universities. All members are appointed by the Secretary of State for Trade and Industry. Council is advised by a Strategy Board on key scientific, training and financial issues. The Strategy Board is in turn advised on scientific issues by seven specialised standing committees:

- Agri–Food
- Animal Sciences
- Biochemistry and Cell Biology
- Biomolecular Sciences (joint with EPSRC)
- Engineering and Biological Systems
- Genes and Developmental Biology
- Plant and Microbial Sciences

BBSRC's Audit Committee monitors standards of internal control and financial propriety. BBSRC employs 234 staff in Swindon, of whom 63 carry out cross–council functions, and supports 2,000 university researchers, 3,200 institute staff and 2,000 postgraduate students.[6]

5 Department of Trade and Industry, *Realising Our Potential: A Strategy for Science, Engineering and Technology*, May 1993, Cm 2250

6 www.bbsrc.ac.uk

Mission and aims

7. BBSRC summarises its mission as follows:

BBSRC Mission

- To promote and support, by any means, high–quality basic, strategic and applied research and related postgraduate training relating to the understanding and exploitation of biological systems.
- To advance knowledge and technology (including the promotion and support of the exploitation of research outcomes), and provide trained scientists and engineers, who meet the needs of users and beneficiaries, thereby contributing to the economic competitiveness of the United Kingdom and the quality of life.
- To generate public awareness, communicate research outcomes, encourage public engagement and dialogue, disseminate knowledge and provide advice.[7]

8. BBSRC has identified six strategic priorities for the period 2003–08:

BBSRC Strategic Priorities

- To prioritise and deliver world class science in the non–clinical biosciences.
- To develop the basic tools, resources and new technologies to further understanding of the biosciences.
- To invest in people to provide a motivated scientific community trained in relevant skills to meet national needs.
- To promote innovation and knowledge transfer from BBSRC–funded science and training for the economic and social benefit of the UK.
- To seek new and stronger partnerships with a range of other funders and stakeholders, national and international, where there is benefit to the science base, engaging the public in awareness and dialogue about BBSRC science.
- To utilise resources effectively and responsibly to maximise funding for science.[8]

7 As above

8 BBSRC, *World Class Bioscience: Strategic Plan 2003–2008*, p 5

Income and Expenditure

Table 1: BBSRC income and expenditure for 2002–03

£k	OPERATING PLAN	OUTTURN
INCOME Income: Grant–in–aid	241,510	241,510
Less applied to capital purchases	(1,850)	(2,771)
Other income	29,505	31,873
TOTAL INCOME	**269,165**	**270,612**
EXPENDITURE Research grants	260,173	257, 712
Staff costs	5,600	5,552
Other operating costs	4,900	7,386
Staff restructuring	250	375
Depreciation	4,924	4,727
TOTAL EXPENDITURE	**275,847**	**275,752**
SURPLUS/DEFICIT Operating surplus/(deficit) for year	(6,682)	(5,140)
Gain/(loss) on sale of fixed assets	1,650	(57)
Transfer from capital reserves for depreciation	4,924	4,727
Retained surplus/(deficit) for year	(108)	(470)
Retained surplus (deficit) brought forward	(1,719)	(1,719)
Transfers between reserves on sale of fixed assets	2,925	95
RETAINED SURPLUS/(DEFICIT) CARRIED FORWARD	**1,098**	**(2,094)**

Source: BBSRC, Operating Report 2002–03, p 48

9. Almost 90% of BBSRC's funding comes in the form of grant–in–aid from central Government. For the 2003–04 financial year, BBSRC's resource budget is £267.8 million, with an uplift of £17.2 million for the 2004–05 financial year.[9] In 2002–03, BBSRC invested £275.8 million to support research and research training, of which approximately 10% was spent on studentships, 1% on fellowships and 72% on research funding.[10] Table 1 (above) summarises income and expenditure against operating plan targets in 2002–03.

9 Office of Science and Technology, *Science Budget 2003–04 to 2005–06,* p 36

10 Biotechnology and Biological Sciences Research Council, *Annual Report & Accounts 2002–2003*, HC 803, p 31

Spending Review 2002

10. Over the 2002 Spending Review (SR 2002) period BBSRC's grant–in–aid will grow by 46% in cash terms, from £242 million in 2003–04 to £353 million in 2005–06, an increase broadly in line with that of other Research Councils.[11] Of its total grant, BBSRC will receive £91.1 million in specific allocations for top–priority cross–Council programmes and other special initiatives:

- **Stem cells**, £10.6 million (MRC, BBSRC, EPSRC, the Economic and Social Research Council (ESRC), Council for the Central Laboratory of the Research Councils (CCLRC))
- **Rural economy and land use**, £7.5 million (BBSRC, NERC, ESRC)
- **Brain science**, £4 million (BBSRC, MRC, EPSRC, CCLRC)
- **Infectious diseases of animals**, £10 million (BBSRC)
- **Post–genomics and proteomics**, £49 million (MRC, BBSRC, NERC, EPSRC, ESRC, CCLRC)[12]
- **E-science**, £10 million (all Research Councils)

Over the SR 2002 period, BBSRC will receive £11.2 million to enhance PhD stipends in line with the recommendations of the Roberts Review, and £6.8 million for capital investment in institute facilities and equipment.[13] In 2005–06 it will also receive a portion of the £120 million allocated to all the Research Councils by OST for research sustainability.

Table 2: Spending Review 2002 allocations to BBSRC

	Resource				**Capital**			
	Baseline	SR2002 allocation			Baseline	SR2002 allocation		
Year	2003–04	2003–04	2004–05	2005–06	2003–04	2003–04	2004–05	2005–06
Total Allocation (£ million)	267.262	0.580	17.155	53.935	-2.820*	0.000	6.265	10.810
of which: Stem cells	0.000	0.000	2.450	8.150	0.000	0.000	0.000	0.000
Rural economy and land use	0.000	0.000	1.735	5.765	0.000	0.000	0.000	0.000

* Negative figure results from planned asset disposal in that year
Source: OST, Science Budget 2003–04 to 2005–06, p 36

11 OST, *Science Budget 2003–04 to 2005–06*, p 8

12 Proteomics is the branch of genetics that studies the full set of proteins encoded by a genome.

13 OST, *Science Budget 2003–04 to 2005–06*, pp 36-7

Spending Review 2004

11. BBSRC's bid for Spending Review 2004 (SR 2004) will focus on "systems biology", "providing further support to enable researchers to work across disciplines and institutions".[14] In its *Strategic Plan 2003–2008*, BBSRC acknowledges that "Council will have to make hard choices over the course of this planning period to decrease funding in some areas in order to redirect effort to the higher priorities".[15] When asked about the areas of research that would see a decrease in funding, BBSRC described the losses as part of a continuing process of "sunsetting". Professor Goodfellow told us that "the community is not good at sunsetting but they are beginning it and it is something we have to do, we cannot fund everything".[16] BBSRC uses a number of measures to establish its scientific priorities:

- annual audit of grant portfolios and identification of gaps by Research Committees;
- horizon scanning with researchers and end–users (industry/policy); and
- wide consultation, including input from BBSRC's Advisory Group on response to public concerns.

BBSRC's consultative approach to priority–setting is laudable. It is not clear, however, that the consultative process incorporates a consideration of areas of funding that might be cut as well as those that might receive a new injection of funding. The inclusion of such considerations is essential if stakeholders are to make an informed and balanced decision about the areas of work that should receive support, and at what cost. **Whilst we welcome BBSRC's realistic approach to funding priorities, we would encourage the Council to consult its community about those areas of science which are likely to see a decrease in funding and communicate the outcome of its decisions in a clear and transparent way.**

14 Ev 22

15 BBSRC, *World Class Bioscience: Strategic Plan 2003–2008*, p 1

16 Q 99

3 Research Support

Funding modes

12. BBSRC's grant funding can be broken down as follows:

- 48% is awarded as responsive mode grants (mainly to universities);
- 31% is awarded as core strategic grants to BBSRC's eight sponsored institutes (and Horticulture Research International);[17] and
- 21% is awarded through managed research initiatives in areas of strategic importance.[18]

BBSRC increased the amount spent on responsive mode grants from £53 million in 1997—98 to £83 million in 2002–03 "in order to maintain a strong portfolio of basic and enabling research".[19] Discounting core funding to institutes, a 2:1 ratio between responsive and managed mode funding is broadly comparable with the funding allocations at both NERC and EPSRC.

13. BBSRC currently operates three responsive mode grant application deadlines per year, in July, November and January/February. It funds in responsive mode "across all areas of our remit on the basis of scientific merit", although research committees also give some weight to BBSRC priorities by identifying "areas in which they particularly welcome applications".[20] This is similar to EPSRC's policy of "signposting" areas of research where applications would be well received.[21] There is some concern that this practice directs a greater proportion of funds to strategic research than is reported by BBSRC. In a submission to the Committee, the Institute of Food Research (IFR) suggested that "special initiatives […] should have distinct application and assessment procedures, rather than 'hybrid' processes grafted onto the RG1A responsive–mode application form".[22] Whilst the establishment of separate procedures for priority research grant applications might unduly restrict BBSRC's flexibility and ability to pursue its stated aims, it is clear that greater openness on this issue is required in order to secure the confidence of the research community. **In the interest of greater transparency we recommend that BBSRC publishes data on the proportion of responsive mode funding that it earmarks for special initiatives and its priority areas of science.**

17 See table 4 for list of institutes

18 Ev 17

19 Ev 17, 26 [Annex 5]

20 Ev 17

21 HC (2002–03) 936, 14

22 http://www.ifr.ac.uk/science/consultations/bbsrcscrutiny.html

14. BBSRC breaks down its grants awarded in responsive mode as follows:

Table 3: Breakdown of responsive mode funding

Year	Basic research		Strategic/applied research		Total expenditure	
	£M	%	£M	%	£M	%
1997—98	32.5	61	20.7	39	53.2	100
1998—99	31.1	61	20.0	39	51.1	100
1999—00	38.1	63	22.8	37	60.9	100
2000—01	47.6	66	24.5	34	72.1	100
2001—02	53.1	69	24.2	31	77.3	100
2002—03	58.0	69	26.2	31	84.2	100

Source: BBSRC Ev 63

15. Some of the evidence we received expressed concern that the BBSRC grant application process is biased toward research, whether basic or strategic/applied, that offers a guaranteed application or output. The British Biophysical Society noted that "funding committees do not admit using the criteria of 'guaranteed productivity per proposal' (£/publication) or the 'expense per project', but such observations are widespread informally".[23] It is difficult for us to assess the truth of these claims because BBSRC does not itself maintain statistics on the proportion of research it funds that could be regarded as "risky". This is in contrast to EPSRC, where peer reviewers tick a box if they consider a research proposal to be adventurous. EPSRC told us that it aims for 10% of the research it funds to be classified in this way.[24] BBSRC told us that its policy was not to ring–fence money for "risky" research because, when it attempted such a scheme in the past, it

> "found little difference between the riskiness of applications for that scheme and our normal responsive mode. Our experience is that applications which are sound but unadventurous simply do not get funded through our responsive mode system because they are not competitive".[25]

Nevertheless, the promotion of innovation is one of BBSRC's six strategic priorities, and the adventurousness of the research that it funds would be a useful index with which to measure its success in this area. If, as it asserts, BBSRC is routinely funding adventurous research in responsive mode, it could only gain support from its community by publishing the facts to verify this claim.

16. **We recommend that BBSRC publish statistics on the proportion of its grants awarded in responsive mode to high risk projects. Such a step would serve to reassure its research community as well as providing a useful tool for self–evaluation.**

23 Ev 44

24 HC (2002–03) 936, 15

25 Ev 63

Grant application success rates

17. Responsive mode grant applications to BBSRC increased from 770 in 1997–98 to 1,680 in 2002–03 because, as Professor Goodfellow put it, "biology is actually a success story".[26] This rise in applications has led to a drop in success rates, from an average of 40% in 1997—98 (with a high of 48% in the third funding round) to an average of 30% in 2002—03, and a rate of 29% in the first funding round of 2003–04.[27] In written evidence BBSRC acknowledged that "increasing numbers of applications for funding threaten unacceptably low success rates and peer review overload".[28] In oral evidence, Professor Freedman from Warwick University stated that a success rate of 40% would "represent an ideal situation", but Professor Goodfellow stated that "to maintain a 30% success is very high".[29] Whilst 30% is undoubtedly a reasonable success rate, the downward trend is more worrying.

18. BBSRC's current attempts to manage grant demand include:

- meetings with senior staff around the country to discuss the BBSRC *Vision* and implementation of the *Strategic Plan*;
- an annual meeting with the heads of the 30 highest funded bioscience departments;
- periodic letters to all UK Vice Chancellors;
- a joint policy meeting, involving all BBSRC's research committees, in September 2003;
- ongoing discussions with the chairs of the research committees;
- bilateral discussions with individual institutions; and
- discussions at the Strategy Board and BBSRC Council.

Dialogue, however, is not always the most effective way of reducing demand. As Professor Freedman noted, "I can imagine members of my department who would give me a dusty answer if I tried to tell them not to apply".[30] In our Report on the work of EPSRC, we praised EPSRC for the measures it had taken to reduce demand, including the use of University Interface Managers, mock peer review panels and visits to EPSRC by academics and administrators.[31] Given the rate at which applications in the biosciences are increasing, BBSRC would be wise to consider implementing some of these measures. **We recommend that BBSRC take further steps to manage demand more effectively, including the introduction of University Interface Managers and mock peer review panels.**

19. BBSRC does not publish data on the success rates of individual institutions. BBSRC showed us, in confidence, a table giving the success rates for the 26 highest scoring universities. We noted that, whilst the five institutions at the top of the scale had an

26 Q 13

27 Ev 26 [Annex 4b]

28 Ev 18

29 Qq 13, 17

30 Q 13

31 HC (2002–03) 936, 33

impressive average success rate of 44%, the five institutions at the bottom of the list managed an average of only 26%. For institutions outside the top 26, success rates must be even lower than the lowest cited rate of 17.4%. The institutions with the highest success rates did not necessarily submit a larger number of applications, indeed many submitted fewer than their less successful counterparts. It is clear from the table that the large number of rejected applications from certain institutions is contributing to the decline in BBSRC's overall success rate. Publishing individual success rates might encourage the worst offenders to take action to reduce wasted applications, which simply overburden both them and the system. BBSRC professes itself keen to publish individual success rates but Professor Goodfellow told us that it cannot take this measure "unilaterally, we need to get buy–in from the university community […] and we also, I think, need to get buy–in from the other research councils".[32] This reluctance to take the first step is somewhat surprising given that BBSRC has not been afraid to take the lead in changing Research Council practice in other areas.

20. BBSRC strictly regulates the number of responsive mode grants that can be awarded to its sponsored institutes by means of a capping system, under which institutes can apply for grants up to a set financial limit. This has had the effect of reducing the number of applications overall. Professor Goodfellow told us that "their success rate is 8% higher than the average success rates and this is because they are capped […] they have to be much more careful which grants they put in".[33] When asked why a capping system could not be introduced for grant applications from universities, BBSRC responded that it had not established sufficiently close relationships with all the 100+ universities it funds to allow for the smooth introduction of such a measure.[34] However, the threat of a cap for those institutions that were persistently submitting a high volume of applications with little success might be sufficient to persuade university departments to monitor grant applications more carefully.

21. **We understand the need for BBSRC to retain the confidence of its community but believe that it is being unduly reticent about taking the steps necessary to manage the demand for grants more effectively. We recommend that it lead the way for other Research Councils by publishing the success rates of individual institutions. We also recommend that BBSRC introduces a cap on the number of applications permitted from those university departments that have persistently low success rates.**

Research concentration

22. 25% of BBSRC grants go to four universities, 50% to 12, 75% to 26 and 100% to 102. Figure 1, below, shows the distribution of BBSRC's grant spend by Research Assessment Exercise (RAE) score from data analysed for the 26 highest funded universities in 2003. In common with the other Research Councils we have scrutinised, BBSRC claims that it does not take account of RAE scores when making awards to universities.[35] Nevertheless a number of factors make it more likely that bioscience research grants are concentrated in a

32 Q 39

33 Q 51

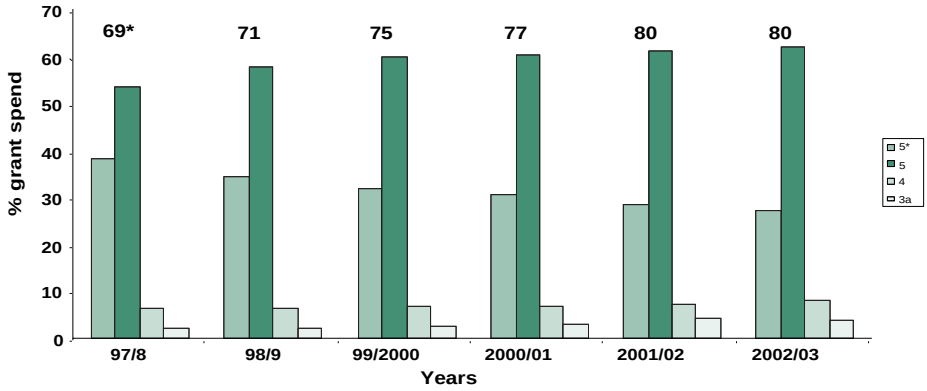
34 Ev 54

35 Ev 17, Q 31

few successful universities. Firstly, the RAE itself directs most funds toward the highest rated institutions, a trend that was reinforced by the Higher Education White Paper, which envisaged the concentration of research in a smaller number of elite universities. Secondly, the expansion of the biosciences into "big science" is likely to "drive the creation of large teams in fewer universities".[36] Thirdly, as Lord Sainsbury has noted, increased research concentration is partly "what happens if you just accumulate all the decisions made by the research councils".[37] BBSRC's assertion that "we put grants into where the best science is", although accurate, is too simplistic: decisions made by Research Councils tend to reinforce the trend away from a diversity of funding.[38]

23. The case for a diversity of funding rests partly upon the argument that a strong regional identity is an important factor for competitiveness. The Lambert Review notes that businesses flourish in proximity to good universities, thereby according universities a central role in sustaining the economic viability of their region and, in turn, the nation.[39] If this line of reasoning is correct, there are strong economic incentives to reverse the trend toward a greater concentration of research in fewer regions and universities. Added to which, a recent Science and Technology Policy Research (SPRU) review concluded that "in terms of research productivity or output per unit input, there seems to be no evidence that larger departments or larger units are more "efficient" in their use of resources, perhaps even the reverse".[40]

Figure 1: Distribution of BBSRC's grant spend by RAE score (2003)



Source: Ev 28 [Annex 6d]

24. **Although BBSRC should continue to fund the best science, it cannot ignore the contribution of its policies toward increased research concentration in an ever smaller number of elite institutions. We recommend that BBSRC proactively works with other Research Councils and the Department for Education and Skills to support excellent science across a broad range of higher education institutions.**

36 Ev 46

37 Office of Science and Technology Scrutiny Session 2003, Minutes of Evidence, Q 16, (to be published in HC 316)

38 Q 32

39 HM Treasury, *Lambert Review of Business–University Collaboration*, pp 69-73

40 SPRU, *The Effects of Size on Research Performance*, p 4

Grant administration

Peer review

25. BBSRC uses a peer review committee system to assess grant applications. Specialist committees convene three times a year to consider responsive mode applications in their area of expertise. In our Report on the work of EPSRC, we commented on its introduction of a peer review college, similar to that already established by NERC. The peer review college system allows specialist panels drawn from a college with a broad range of expertise to convene on an ad-hoc basis to consider grant applications. Members of EPSRC's peer review college are nominated by its research community on a three–year cycle. Grant applicants nominate three expert referees, at least one of whom is chosen to review the application. At least two members of the peer review college are also selected. Whilst several individuals complained about the new system, Dr David Clark of EPSRC noted that it was "cheaper to administer, easy to understand and transparent" and feedback from a survey carried out by the Research Council indicated that most of EPSRC's community thought that the new system was an improvement.[41] The Arts and Humanities Research Board (AHRB), soon to gain Research Council status, recently announced that it would adopt a hybrid model of peer review. Under the new system, AHRB's eight existing peer review panels would continue to be maintained in order to award applications their final grade. A peer review college of approximately 400 members would be drawn upon at earlier stages in the assessment process to eliminate applications that were unlikely to be successful, thus reducing the workload of the standing peer review panels.[42]

26. When asked about its grant administration processes, BBSRC said that it had "no reason to change at the moment" because "our community is behind us".[43] Yet in evidence to the Committee, Professor John O'Reilly, Chief Executive of EPSRC, suggested that the research community's views were not always disinterested: "many people who are strongly embedded and engaged with the old system of committees think that that system was very good. If you listen to people who were not so involved, they felt that it was something of a closed shop or a closed club".[44] The peer review committee system has often been praised because it allows committee members to accumulate experience and expertise. A disadvantage is that it can also lead to the entrenchment of established views on the standing committees. The peer review college system aims to build greater flexibility into the system to ensure that applications are not prejudged on the basis of previous, unsuccessful attempts to gain funding by the same applicant. Members of the research community served by EPSRC and NERC have been cautiously positive about the changes to peer review. We are not convinced that the needs of the biosciences research community are any different from those of the communities supported by the other Research Councils. Furthermore, it is clear that the research community as a whole would welcome greater uniformity of practice within RCUK.

41 HC (2002–03) 936, 20–21

42 The Arts and Humanities Research Board, *Changes to the way in which AHRB conducts peer review*, see www.ahrb.ac.uk

43 Q 19

44 HC (2002–03) 936, 21

27. **We do not understand why BBSRC continues to stand alone in its support of the peer review committee system, which has been abandoned or modified by other Research Councils. We recommend that it review the system in the light of changes made elsewhere, and consider introducing a peer review college in its place.**

Frequency of application rounds

28. BBSRC currently operates three grant application deadlines per year, in July, November and January/February. In oral evidence, BBSRC strongly defended this system. Professor Goodfellow explained that, because all the committees met simultaneously, "we can then use our strategy board to get a proper balance across the committees", enabling BBSRC to distribute its grants fairly across all areas covered by its remit.[45] Professor Goodfellow also told us that BBSRC's research community was supportive of the current system.[46] Some of the evidence we received, however, suggested that it was placing undue strain on those Principal Investigators submitting grant applications. The British Biophysical Society stated that it "makes it slower to get research off the ground and makes it more difficult to retain good post–docs" because of breaks in funding and uncertainty between grant rounds. Newly tenured staff were also seen to be at a disadvantage because "a new academic […] would only get four or five attempts to get a grant" before they were expected to become independent researchers, significantly reducing their chances of gaining support during their probationary period. Contrary to BBSRC's assertion that the system was performing its function well, it was felt by some organisations that the telescoping of committee work into several intense periods each year "hinders their performance".[47] In a submission to the Committee, IFR also suggested that BBSRC should use a shorter cycle for receiving and processing applications, with committees meeting more frequently.[48]

29. It is difficult to assess the merits of complaints about BBSRC's grant administration system because the 70% of researchers who are not awarded funding in responsive mode are liable to find fault with the process rather than with their own applications. Whilst we agree with Professor Goodfellow that the BBSRC system of balancing grant application success rates across disciplines is "rather fair and transparent", it does appear that the current system of three grant rounds per year unduly impedes the process of research. We see no obstacle to increasing the number of deadlines, whether or not BBSRC eventually adopts a collegiate model of peer review.[49]

30. **We urge BBSRC to consider the introduction of a fourth grant round between the rounds in January/February and July, to distribute funding opportunities more evenly across the year and speed up the process for applicants. The measures we recommend for moderating demand for grants would also help this process.**

45 Q 18

46 Q 19

47 Ev 43

48 http://www.ifr.ac.uk/science/consultations/bbsrcscrutiny.html

49 Q 19

Duration of support

31. In written evidence, the British Biophysical Society recommended that "opportunities for longer–term (5–year) support become more routinely awarded".[50] On its website BBSRC advises potential applicants that "grants are usually awarded for three years".[51] However, BBSRC already accepts applications for five–year grants. Professor Goodfellow told us that "people are coming in with three years; there is nothing to stop them coming in with five years; they can tick the 60–month box on the computer […] I have gone round the country […] pleading with people to put in for five–year grants".[52] There is evidently some confusion amongst BBSRC's community about BBSRC policy that is insufficiently addressed by the information made available to applicants in BBSRC literature. **Whilst we applaud the flexibility of grant length that BBSRC has built into its application process, we are concerned that some sections of its community remain unaware of the full range of opportunities available to them. We urge BBSRC to do more to promote these opportunities, perhaps including prominent web postings, letters to interested groups and press notices.**

Cross–Council Co-ordination

32. As science develops in new and unexpected directions the boundaries between individual disciplines are becoming increasingly blurred. It is, therefore, imperative that the Research Councils work together to ensure that their remit boundaries are clearly defined and between them encompass all emerging areas of work at the interfaces between disciplines. There is concern that some grant applications are being rejected on remit grounds by one Research Council and not being found a home elsewhere. GlaxoSmithKline warned that Research Councils need to be "flexible in the interpretation of their remits to help ensure that key areas of research do not 'fall between the cracks'" and sought reassurance that BBSRC has "moved away from what may have been a 'rule–book mentality' in how some of its staff interpreted the remit of the BBSRC".[53] The Biosciences Federation observed that "although clearly not unique to BBSRC, there are still problems with supporting research at the interface between disciplines".[54] The Association of the British Pharmaceutical Industry also expressed a hope that "RCUK will continue to develop to ensure that grant applications that do not fall fully within the remit of a single council, are still considered for funding".[55] Roger Corder, Professor of Experimental Therapeutics at St Bartholomew's and the Queen Mary's School of Medicine and Dentistry, supplied specific evidence of grants being rejected by BBSRC on remit grounds without being found a home at another Research Council and without adequate explanation.[56]

33. Although we would not comment on the propriety of BBSRC's rejection of individual grant applications, we are concerned by anecdotal evidence that the process by which grant

50 Ev 43

51 www.bbsrc.ac.uk

52 Q 24

53 Ev 33

54 Ev 46

55 Ev 36

56 Ev 37–38

referral takes place is confusing and sometimes works against applications that fall into the remit of more than one Research Council. In answer to supplementary questions on the subject, BBSRC stated that "proposals on the edges of the BBSRC remit are discussed with the most appropriate Council and, if necessary, referred to that Council", and that "all complete applications are found a home either within the BBSRC or with another Council".[57] It also said that "very occasionally, when an application is quite obviously outside the BBSRC remit, it will be returned to the applicant, with advice to apply to another council".[58] We find it hard to reconcile these two statements. Whilst we can understand why BBSRC might choose to return applications obviously outside its remit rather than engaging with the lengthy consultation and referral process, we have evidence to suggest that neither the process nor the BBSRC remit is as clear–cut as BBSRC claims. One witness reported that his grant application had been returned to him with advice to apply to MRC because it fell outside the scope of the BBSRC remit. This statement was contradicted at MRC, where the applicant was advised that, in the view of one member of staff, "the application fell within MRC's remit, but was clearly within the BBSRC's as well".[59] This unnecessary confusion about remit boundaries and the referral process causes delay, frustration and additional work to the applicant, which could be avoided by the implementation of one consistent and transparent process.

34. **We recommend that BBSRC uses one consistent policy for the treatment of grant applications at the edge of its remit and desists from rejecting some applications on remit grounds without referral to the appropriate Research Council. A more transparent system of feedback in such cases is required in order that applicants understand the reasons for the referral of their applications. BBSRC should also liaise with other Research Councils to ensure that their remits are mutually understood, clearly defined and well advertised.**

35. Some of our evidence alleged a "complete lack of joined up thinking" between BBSRC and MRC and suggested that "overlap between BBSRC and MRC calls and priorities has created a situation where most arbitrary criteria are applied to define whether an application falls within the BBSRC remit".[60] This situation is partly to be attributed to the problems with grant funding flow at MRC highlighted in our 2002 Report on their work.[61] In oral evidence, Professor White told us that applications to BBSRC from medical departments had increased: "the overall average has been about 63 per cent increase [in grant applications] since 1998–99 but, for medical departments, it has been exactly double that".[62] He also told us that many of MRC's usual applicants relied on apocryphal evidence of problems at MRC when deciding to apply to BBSRC. In the November 2003 grant round, BBSRC referred 10% of its grant applications to MRC. Of the 25 applications referred, MRC accepted 21, suggesting that the problem of misdirection of MRC grant applications is quite widespread.[63] Nevertheless, there are some areas of work where it is

57 Ev 52, 56

58 Ev 53

59 Ev 37

60 Ev 36, 38

61 HC (2002–03), 132

62 Q 4

63 As above

genuinely unclear which Council should be the funder. One witness pointed in particular to a BBSRC call for applications in proteomics and cell function, where the boundary between medical and enabling research is blurred and confused.[64]

36. **It is imperative that BBSRC and MRC work closely together to make the biomedical research community aware of the scope of their remits to avoid wasted applications. Calls for applications in specific areas should make clear exactly how the topic relates to the remit of the Research Council in question, and give details of initiatives sponsored by other Research Councils which may be more appropriate.**

37. One of the terms of reference of the RCUK Strategy Group is to "secure harmonisation or commonality of operational and administrative functions where this is to the advantage of the stakeholder community or will improve the collective efficiency or effectiveness of the Councils".[65] In its evidence, Warwick University observed that "the diversity of administrative practice between Research Councils is a considerable inconvenience and burden to universities (and individual researchers) who deal with several of the Councils".[66] We note that a business analyst has been tasked with an assessment of the grant–awarding processes of all the Research Councils under the joint Council Electronic Research Administration programme. **We look forward to the findings of the investigation into Research Council grant–awarding processes being carried out under the joint Council Electronic Research Administration programme, particularly if it is able to recommend a harmonisation of administrative practices across the Research Councils.**

Interdisciplinary research

38. The well–documented shift in the biosciences away from "wet" biology toward a more integrative, interdisciplinary model demands not only that the Research Councils co-ordinate to find grant applications the most suitable home, but also that they work together to fund projects that are interdisciplinary in nature.[67] There has long been a connection between the biological and medical sciences and, in BBSRC's *Annual Report 2002–2003*, Professor Goodfellow also singles out links "between the biosciences and the mathematical and physical sciences".[68] The number of cross–council initiatives in which BBSRC participates increased from three under SR 2000 to six under SR 2002. BBSRC contributes to the maintenance of interdisciplinary centres on nanotechnology (£18 million total) and tissue engineering (£10 million total), which are funded in partnership with EPSRC and MRC.[69] Having identified a need for "highly numerate bioscientists and biomathematicians", BBSRC has implemented a number of measures to train postgraduate students in this area, including the allocation of 31 places on Masters courses in bioinformatics and biometry, and a number of Research Committee Studentships in

64 Ev 37

65 www.rcuk.ac.uk

66 Ev 52

67 "Wet" biology is a term used in reference to traditional, laboratory–based biology.

68 Biotechnology and Biological Sciences Research Council, *Annual Report & Accounts 2002–2003*, HC 803, p 2

69 Ev 17

biomathematics at doctoral level.[70] From October 2004, PhD students whose projects lie at the interface between the biological sciences and the physical, mathematical and engineering sciences, including students of biomathematics, will receive an annual stipend uplift of £2,000.[71] **We commend BBSRC for the imaginative measures it has taken to encourage students to train in biomathematics and bioinformatics.**

39. BBSRC's "Discipline Hopping Awards", in partnership with EPSRC and MRC, enable researchers funded in either the biological or physical sciences to spend a year at the end of a grant term working within another, relevant discipline to develop new interdisciplinary areas of research. BBSRC has contributed 16% of the total cost of the scheme. It is important that BBSRC use the scheme to maximum effect, ensuring that researchers receive funding to carry on their interdisciplinary work after the expiry of their award. Evidence from the Biosciences Federation suggested that there might be a problem with grant applications in such areas of research: "if peer reviewers used by individual Research Councils are less familiar with cross–disciplinary work they tend to regard it as being 'risky' and are more inclined to turn down such proposals".[72] As outlined in paragraphs 15–16 above, there are no statistics to support claims that BBSRC peer review committees are overly risk–averse. It is nevertheless important to ensure that BBSRC peer reviewers have a range of expertise that is broad enough to adequately assess the merits of interdisciplinary grant applications. **We applaud BBSRC for its introduction of "Discipline Hopping Awards" and hope that it will work with other Research Councils to ensure that the awards later bear fruit in grants awarded for interdisciplinary areas of research. To this end, we recommend that BBSRC routinely appoints peer reviewers from other relevant disciplines to ensure that committees have sufficient expertise to assess interdisciplinary grant applications.**

Equipment costs

40. In its *Strategic Plan 2003–2008*, BBSRC states that "new tools, resources and technologies are very important in advancing the biosciences, particularly as they become increasingly data–rich and multidisciplinary".[73] It also notes in written evidence that "biosciences […] are increasingly dependent on access to very costly facilities […] we recognise that a step change in funding will be required to prevent a serious decline in research volume in future".[74] BBSRC's spending on equipment and facilities rose from £20 million in 1997–98 to £38 million in 2002–03, and further increases are planned.[75]

41. Some of the evidence reported insufficient BBSRC funding for equipment used to carry out BBSRC research, making competition on the world stage difficult. Professor A Watts of the University of Oxford complained of insufficient support for equipment once it had been purchased: "without this, instruments are under–used, under–developed and do not

70 Ev 19

71 Ev 56–57

72 Ev 46

73 BBSRC, *World Class Bioscience: Strategic Plan 2003–2008*, p 16

74 Ev 23

75 Ev 26 [Annex 5]; Q 48

reach their full potential".[76] In response to supplementary questions, BBSRC indicated that it did provide training in the use of equipment via the indirect costs paid on all grants and had supported running costs through research grants, the Joint Infrastructure Fund (JIF) and the Science Research Infrastructure Fund (SRIF). However, "BBSRC supports few grants where equipment is of sufficient size to warrant specific support in the form of dedicated personnel". The nuclear magnetic resonance facility run by Professor Watts falls into this category. BBSRC claims that support at this level should be considered as part of "procurement best practice" and is the responsibility of the institution in question.[77] Whilst we accept that BBSRC cannot afford to offer lifetime support for large–scale equipment and facilities, we are concerned that the higher education institutions and the Research Councils may not be working together to provide the ongoing support necessary to maintain world–class facilities. **It is clear that BBSRC needs to co-ordinate with individual institutions to provide "joined–up" ongoing support and maintenance for equipment and facilities used to carry out BSBRC research. It also needs to ensure that these institutions are aware of their rights and responsibilities under "procurement best practice".**

76 Ev 42

77 Ev 61

4 Research Institutes

BBSRC support for institutes

42. BBSRC sponsors eight institutes, which also draw funding from a diversity of other sources. Between them they have an annual turnover of £150 million, approximately half of which derives from BBSRC. The institutes employ 3,200 BBSRC staff. BBSRC is responsible, together with governing bodies, for "ensuring high standards of accountability, propriety and efficient use of resources".[78] The eight institutes comprise:

Table 4: BBSRC institutes

Institute	Location	Website	Areas of work
Babraham Institute	Cambridge	www.bi.bbsrc.ac.uk	Research supporting the biomedical, biotechnological and pharmaceutical sectors
Institute for Animal Health	1) Compton Laboratory: Newbury, Berkshire 2) Neuropathogenesis Unit: Edinburgh 3) Pirbright Laboratory: Pirbright, Surrey	www.iah.bbsrc.ac.uk	Work to improve the health of farm animals and safeguard the human food chain
Institute of Food Research	Norwich	www.ifr.bbsrc.ac.uk	Food safety; diet and health; food materials and ingredients
Institute of Grassland and Environmental Research	1) Aberystwyth Research Station: Aberystwyth 2) North Wyke Research Station: Okehampton, Devon 3) Bronydd Mawr Research Station: Trecastle, Brecon 4) Trawsgoed Research Farm: Aberystwyth	www.iger.bbsrc.ac.uk	Sustainable grassland systems; the wider managed environment
John Innes Centre	Norwich	www.jic.bbsrc.ac.uk	Plant and microbial research with relevance for food, health, sustainable agriculture and industrial innovation
Roslin Institute	Edinburgh	www.roslin.ac.uk	Livestock genetics, breeding, welfare and biotechnology
Rothamsted Research	1) Rothamsted: Harpenden, Hertfordshire 2) Broom's Barn Research Station: Bury St Edmunds	www.iacr.bbsrc.ac.uk	Sustainable plant–based agriculture and the environment
Silsoe Research Institute	Silsoe, Bedfordshire	www.sri.bbsrc.ac.uk	Bio-systems engineering for the agricultural, food, environmental and biomedical sectors

78 BBSRC, *World Class Bioscience: Strategic Plan 2003–2008*, p 24

BBSRC also gives Horticulture Research International (HRI), an institute sponsored by the Department for Environment, Food and Rural Affairs (DEFRA), grant–in–aid of £3 million per year. The Environment, Food and Rural Affairs Select Committee recently published a Report on HRI, recommending that the Government take action to resolve the uncertainty surrounding the organisation's financial future.[79]

43. Since 1997–98, BBSRC has reduced the percentage of its total spend on its institutes from 38.1% to 31.2% in 2002–03. It has consistently provided just over 50% of the total institute income in that period, while income from government departments as a percentage of total institute income has dropped from 26.2% in 1997–98 to 20.3% in 2002–03.[80] There is evidence that in recent years BBSRC has experienced some difficulty in providing financial support for its sponsored institutes: in 1999 it "refocused the Institute of Food Research on a single site", jargon for site closure.[81] The Silsoe Institute is also currently under review.[82] Institute funding problems are likely to be associated with a drop in their levels of funding from DEFRA, which is dealt with in the following section of this Report.

44. BBSRC Institutes are assessed by BBSRC on a four–yearly basis in the Institute Assessment Exercise (IAE), which helps to establish funding levels for the next four years. The IAE measures overall institute performance in terms of research quality and strategic relevance, looking also at knowledge transfer, training and career development.

45. Institutes receive a Core Strategic Grant from BBSRC. They can also apply for grant funding in responsive mode. The number of applications which they can submit is capped by a financial limit, which Professor Goodfellow told us helped them to maintain a success rate 8% higher than that achieved by universities (see paragraph 20, above).[83] In a submission to the Committee, the Institute of Food Research (IFR) claimed that this system "can discourage external collaborations, particularly with universities which are not subject to the 'cap' rule" and urged BBSRC to review the mechanism.[84] Although the total number of applications made by each institute is capped, there is no limit to the number of collaborative grants that they can apply for under the cap. The proportion of grants awarded in this way thus reflects choices made at the institutes. We are satisfied that there is no discrimination against collaborative applications inherent within the system and, as institute success rates remain high, are not convinced that the current system needs further review, except as part of the routine IAE. **We are satisfied that the financial capping system, which limits the number of grant applications that can be made by each institute, is fair and we encourage institutes to continue submitting proposals for collaborative grants as part of their quota of grant applications.**

79 Tenth Report of the Environment, Food and Rural Affairs Select Committee, Session 2002–03, *Horticulture Research International*, HC 873

80 Ev 28–29 [Annexes 7a, 7b and 7c]

81 Ev 18

82 Qq 53–56

83 Q 51

84 http://www.ifr.ac.uk/science/consultations/bbsrcscrutiny.html

Funding from DEFRA

46. DEFRA is a major financial contributor to seven of BBSRC's sponsored institutes as well as to Horticulture Research International (HRI). In both 2001–02 and 2002–03, funds from DEFRA and the Food Standards Agency made up approximately 20% of total institute income. Yet total income from DEFRA has been steadily dropping, from £32.7 million in 1997–98 to £29.1 million in 2002–03.[85] At HRI, where DEFRA is the main sponsor, income from the department dropped from £13 million in 1995–96 to £10 million in 2000–01. The drop in central government funding at this institute was offset by increased income from non–governmental sources, from £3 million in 1995–96 to £6 million in 2000–01.[86] This was the line taken by Professor Goodfellow in oral evidence: "some of the losses in funding we have had from DEFRA have been ameliorated because the institutes have got money from elsewhere".[87] Nevertheless, some of the evidence we received suggested that the cuts in DEFRA's research budget were having an adverse effect on the institutes. The Biosciences Federation observed that "BBSRC has coped well despite budget cuts at DEFRA, but some research institutes have suffered […] and it has become harder for the BBSRC to provide the science to underpin policy".[88] It is clear that, if funding from DEFRA continues to decline, improved income from other sources notwithstanding, BBSRC's core grants to the institutes will come under increasing pressure and further "refocusing" may be required.

47. In written evidence BBSRC stated that "We work closely with DEFRA's Science and Policy units to help ensure stability and synergy in institutes' funding".[89] Yet answers to oral questions suggested a slightly less influential relationship with the department. Professor Goodfellow told us that "[DEFRA] are certainly reducing funding in certain areas, but it is their right as a department to choose where they want to put their money".[90] Whilst we can only concur with Professor Goodfellow that DEFRA alone dictates its research policy, the uncertain funding situation at the institutes merits a more proactive stance from BBSRC. **We encourage BBSRC to ensure that it actively maintains an effective dialogue with governmental funders of its institutes in order to determine long–term plans for institute funding.**

Crisis management

48. BBSRC institutes, particularly the Institute of Animal Health (IAH), work in a field which has in recent years been blighted by national crises, such as BSE and foot and mouth disease. The Biosciences Federation claimed that BBSRC's sustainable agriculture programme:

85 Ev 30 [Annex 7d]

86 National Audit Office, Session 2002–03, *Reaping the Rewards of Agricultural Research*, HC 300, p 21. See also Tenth Report of the Environment, Food and Rural Affairs Select Committee, Session 2002–03, *Horticulture Research International*, HC 873

87 Q 87

88 Ev 45

89 Ev 18

90 Q 86

> "is being undermined by a lack of co-ordinated planning among the major funders, i.e. the BBSRC, Government departments and industry. For example, research funding is often redirected during crises such as the BSE outbreak, with consequent cut backs in longer–term strategic work."[91]

Professor Goodfellow insisted that crisis work was not having an adverse effect on BBSRC's financing of research, noting that "we actually run small initiatives, that is initiatives with a small 'i' and we actually build into the budget enough money for those things to become timely or critical".[92] Yet there is evidence that the foot and mouth crisis overtaxed resources at the Pirbright Laboratory, which is part of IAH. In oral evidence, Professor Goodfellow told us that, during times of crisis, "the basic science takes a backburner whilst [researchers] go on and do the job".[93] Dr Iain Anderson's inquiry into the foot and mouth outbreak of 2001 goes further than this, stating that "the Pirbright Laboratory met the huge demand placed on it as the result of extraordinary effort by those concerned, including a number of former staff and research students who volunteered to return to the laboratory to help".[94] Diverting scientists from their main line of work every time a crisis arises is not an efficient use of resources. Such measures might be rendered less necessary if effective national contingency plans were in place but, as Dr Anderson observes, the Pirbright Laboratory did not have a contingency plan of its own to cope with foot and mouth, nor was it consulted when the national contingency plan was drawn up.[95]

49. **The Pirbright Laboratory is to be commended for the remarkable effort it put into tackling the outbreak of foot and mouth disease. Whilst national contingency planning is the responsibility of Government, BBSRC has a role to play in making its institutes aware of their responsibilities in this area. We recommend that BBSRC work with Government and its institutes to identify future sources of concern and put in place pre-emptive research measures and contingency plans to cope with them.**

91 Ev 46

92 Q 100

93 Q 101

94 Dr Iain Anderson, *Foot and Mouth Disease 2001: Lessons to be Learned Inquiry*, p 17

95 As above

5 Researchers and staff

Postdocs and fellowships

50. BBSRC runs three fellowship schemes, designed to "provide stability and dedicated research time for high calibre researchers at different career stages".[96] Each year it awards ten David Phillips awards to young scientists who have demonstrated potential in postgraduate and postdoctoral research; six Research Development Fellowships to younger members of university teaching staff and one or two Professorial Fellowships to enable outstanding scientists to carry out full–time research at the height of their careers.

51. In our Eighth Report of Session 2001–02, *Short Term Research Contracts in Science and Engineering*, we expressed concern at the number of scientific researchers employed on short–term research contracts and recommended that all the Research Councils allowed contract researchers to apply for their own grants without delay.[97] We are therefore pleased to note that BBSRC has taken action to reduce the number of employees on short–term contracts. In its own institutes, BBSRC has reduced the number of employees on fixed term contracts by 23% from 2000–01 to 2002–03 and aims to make a further reduction of 60% by 2005–06.

52. In universities, the problem of short–term contracts is more difficult for BBSRC to tackle because it is not the employer. BBSRC has, however, implemented two relevant measures. The "recognised researcher" scheme enables Research Assistants to be named on grant applications if they have made a significant contribution to the original proposal. This is intended to enhance their career progression by associating them with specific pieces of research. BBSRC funds approximately 2,000 Research Assistants through grants, of which 328 currently have "recognised researcher status". It is unclear, however, what effect such acknowledgement will have on the ability of researchers to apply for grants on their own behalf if universities fail to alter their status and offer them a permanent position as a result of their recognised status.

53. The New Investigators scheme offers more concrete help by allocating a grant funding stream to young scientists with strong potential who have not yet had time to establish a good track record. In order to encourage universities to support these researchers, BBSRC only makes New Investigator awards "where there is evidence that the university will contribute to setting up a laboratory for the applicant".[98] The success of this scheme will partly depend on the willingness of universities to undergo the expensive process of setting up new laboratories for promising young researchers. We look to BBSRC to do all that it can to persuade universities of the case for doing so.

54. **BBSRC is to be congratulated for the measures it has introduced so far to improve the status of contract researchers, both in its own institutes and in universities. It is clear, however, that very little further progress can be made in this area until**

96 Ev 19

97 Eighth Report of the Science and Technology Select Committee, Session 2001–02, *Short Term Research Contracts in Science and Engineering*, HC 1046

98 Ev 58

universities adopt the same approach. We urge BBSRC to work closely with universities to promote its new schemes and persuade them to provide the complementary funding support necessary for such schemes to be a success.

Postgraduate training

55. BBSRC operates five main funding programmes for postgraduate students at doctoral level:

- **Doctoral Training Awards**, a pilot scheme to assess the benefits of four–year research studentships and flexible funding;
- **Quota Research Studentships**, studentships allocated to university departments and other research organisations;
- **Research Committee Studentships**, studentships awarded annually by the research committees to individual researchers for research training in high–priority areas;
- **Collaborative Awards in Science and Engineering (CASE)**, studentships that are jointly funded by a university and another organization; and
- **Industrial CASE**, studentships awarded to companies, who take the lead in selecting projects and academic partners–most of these are allocated on a quota basis to specific companies but some are awarded annually.[99]

56. It has long been established that many PhDs take longer to complete than the standard three–year funding allocation allows, particularly in the biosciences. In addition, many undergraduate courses in biology now take only three years to complete, giving students a total of six training years if they undertake a three–year PhD. Professor Goodfellow observed that seven years post–A-level was a "reasonable amount of study" for a career scientist.[100] The British Biophysical Society stated that "like many, we would like to see a 4 year or 1 + 3 year studentship scheme, which would allow for broader training, as well as more realistic project support".[101] We are, therefore, pleased to note BBSRC's introduction of a pilot Doctoral Training Accounts scheme in October 2002. The duration of Doctoral Training Accounts, which otherwise function as normal PhD studentships, is set at three or four years by the university according to their own, and their students', needs. The flexibility of the new system was valued by Professor Freedman, amongst others.[102] **It is too early to judge the success of the pilot Doctoral Training accounts scheme but we are encouraged by BBSRC's introduction of a more flexible and realistic approach to studentship funding.**

57. BBSRC currently funds PhD stipends at a rate of £9,500 per annum, which is above the Government minimum. It will stage increases, to £10,500 in October 2004, and to £12,000 in October 2005. It has followed NERC's lead in awarding PhD stipend uplifts of £2,000

99 BBSRC, *Draft BBSRC Postgraduate Training and Research Career Development Strategy*, p1

100 Q 66

101 Ev 44

102 Q 66

per annum for those students undertaking research in priority areas of science in order to manage demand more effectively.[103] In oral evidence Professor Goodfellow indicated that the higher rate of stipend was of greater importance to BBSRC than an increase in the total number of studentships awarded.[104] Nevertheless, BBSRC's spend on studentships has not been increasing in line with increases in the spend on research grants. Between 1997–98 and 2002–03, the studentship spend went from £23 million to £31 million, an increase of 35%. In the same period the responsive mode grant budget increased by 60% from £52 million to £83 million.[105] We see no reason why studentships should not see funding increases proportionate to increases in the responsive mode grant budget, particularly as BBSRC will receive £11.2 million from central Government over the SR 2002 period to increase PhD stipends in line with the recommendations of the Roberts Review.[106] Were funding of studentships to increase in line with responsive mode research grants, BBSRC would be able to afford both to maintain a higher rate of stipend, and to increase the number of studentships it awards. **BBSRC should not be complacent about the number of studentships it currently awards. We recommend that it review the balance between grants and studentships in its overall budget, and consider funding more studentships to complement growth in the biosciences.**

103 HC (2002–03), 674, 18

104 Q 63

105 Ev 26 [Annex 5]

106 See paragraph 10

6 Science and Society

Public engagement

58. BBSRC aims to "understand public attitudes, and identify needs or concerns amenable to research, so that these can be considered by our Boards and Research Committees in deciding policy and funding".[107] To this end it spends an estimated £1 million on public engagement activities per annum, half of which is allocated to centrally managed activities, and the other half is spent by institutes and grant holders as part of the terms of their funding. BBSRC also runs a small grants scheme, totalling £60,000 per annum, for public engagement work.

59. BBSRC disseminates information about the research that it is involved in through its website, media briefings and releases, touring public exhibitions, publications and school-scientist links. When determining policy and funding it also uses:

- web consultations (e.g. gene flow, crop science);
- focus groups (e.g. bioremediation, animal health);
- input from the Advisory Group on BBSRC Response to Public Concerns; and
- dialogue with special interest groups (it is seeking ways of working directly with organisations such as Genewatch and Compassion in World Farming).

Table 5, below, details the number of public engagement activities carried out by BBSRC between 1998–99 and 2002–03. We are concerned to note that BBSRC currently uses media releases as an indicator of the level of public engagement activity that it undertakes. A substantial proportion of BBSRC media releases contain announcements about appointments and awards rather than information on research, and could justifiably be classed as a public relations, rather than a public engagement, exercise. **We recommend that BBSRC differentiates between public relations and public engagement activities when compiling and publishing performance indicators.**

107 Ev 21

Table 5: BBSRC public engagement activities, 1998–99 to 2002–03

	98–99	99–00	00–01	01–02	02–03
Media releases	28	29	24	23	35
Corporate publications	9	8	6	7	6
Exhibitions	2	6	8	6	7
Grants for Science Week events	24	22	15	20	16
Grants for public access resources	-	8	7	9	10
Research students school placements	65	150	100	154	135
BBSRC Schools Club membership	5954	4259	5089	6580	6317
Local schools co-ordinators	16	20	19	25	25
Science Communication courses	-	2	9	10	10

Source: BBSRC, Annual Report & Accounts 2002–2003, HC 803, p 18

60. For most of the public, awareness of scientific research comes filtered through the media, which can sometimes be hostile to new developments. If science is to have a positive public profile, scientists have to be trained communicators and media savvy. BBSRC currently sends postgraduate students on media courses on a voluntary basis. Professor Goodfellow attended one such course and remarked that "it was absolutely great fun and I would recommend it to any scientist".[108] However, BBSRC does not oblige the students it funds to attend because of a worry "that their transferable skills training will get bigger and bigger at the expense of the project they are doing".[109] Whilst we share BBSRC's concern to maintain the integrity of postgraduate research projects, we believe that effective communication is so central to the success of future research projects that courses in media awareness and public dialogue should be an integral part of every scientist's training. **We recommend that some training in communication skills becomes a compulsory component of all BBSRC PhD studentships.**

61. The response of witnesses to BBSRC's public awareness initiatives was positive although there was a general feeling that "considerably more effort should be devoted to it".[110] GlaxoSmithKline indicated that BBSRC funding for public engagement activity was restricted, noting that "within the limitations of its budgetary provisions, we hope that the Council will be able to increase its activities in this field, working with colleagues in other Research Councils to share best practice and make full use of limited resources".[111] The current lack of resources for public engagement activities was partly attributed by Professor Goodfellow to "staff resources dwindling […] we are really under–resourced at the moment".[112] It is important that the increased budget for research is matched by a proportional increase in resources for activities that are supportive of research, such as

108 Q 84

109 Q 85 [Professor Goodfellow]

110 Ev 51

111 Ev 35

112 Q 80

public engagement. BBSRC is currently very efficient in its use of resources: administration, for example, accounts for only 2.5% of its budget, which is comfortably less than the 4% limit set by OST.[113] Whilst the goal of efficiency is admirable, this must not be pursued at the expense of valuable non–research areas of BBSRC activity. Funds saved by BBSRC in its administrative spend could be directed to address shortfalls in public engagement spend. There is also some evidence that funds already invested in this area of work could be used more efficiently. In oral evidence Professor Goodfellow told us that "for me it is a matter of joining up better at the moment rather than putting a lot more money into it".[114] We are inclined to agree with her that the Research Councils currently lack a single coherent public engagement strategy and would welcome any attempt that BBSRC makes to improve the situation. **We recommend that BBSRC review its administrative spend to ensure that there are sufficient resources available for important non–research activity. In addition, we recommend that BBSRC work with RCUK to create a harmonised public engagement strategy that makes maximum use of the resources available and prevents duplication of expenditure.**

62. Limited resources were a particular problem for BBSRC–sponsored institutes. In a submission to the Committee, IFR complained that, although institute scientists were required by BBSRC to demonstrate the communication of scientific outputs and enter into public dialogue, this was a "'non–research overhead' that also requires time and energy from already overstretched scientific staff".[115] In oral evidence Professor Goodfellow admitted that BBSRC's budget for public awareness activities "does not reflect the amount of effort and people's time that goes into it […] The scientist's time is not taken into account".[116] It is an issue of some concern that BBSRC's policy of not allocating extra resources to institute researchers for public engagement has the effect of eroding the time spent on their research work. It is also worrying that the resources to be used in this way have not been quantified, so that the amount of public engagement activity that takes place within the institutes cannot be precisely measured. **BBSRC's decision not to provide institutes with specific resources for compulsory public engagement activities is a false economy. We recommend that BBSRC consider appointing a media officer at each of its institutes to ease the burden on research staff.**

The GM debate

63. One memorandum of evidence raised the issue of public awareness with specific reference to GM. Although one witness stated that the GM Nation debate displayed a "sampling anomaly" that biased its findings, he was able to reliably conclude that, on both sides of the debate "people consistently expressed a very strong wish—almost a longing—for more information about GM from sources they could trust". He identified the opportunity for BBSRC "to respond positively to the clear public desire for more research and information in […] disputed and incomplete areas".[117] A recent Report by the Environment, Food and Rural Affairs Select Committee concluded that the GM Nation

113 BBSRC, *2002/2003 Operating Plan*, p 85

114 Q 81

115 http://www.ifr.ac.uk/science/consultations/bbsrcscrutiny.html

116 Q 79

117 Ev 48

debate had failed in its aim to stimulate constructive public debate because the unrealistically tight deadline set by the Government and a lack of sufficient resources meant that the majority of the general public was not engaged.[118] BBSRC has carried out a number of activities designed to stimulate constructive dialogue about GM research, including the publication of several documents, sponsorship of the "DNA in the Garden" exhibition at Kew and the Eden Project, and support of the Consensus Conference in 1994. Yet, as is repeatedly pointed out in the media, public opinion is still hostile to GM, and the national strategy for research in this area has lost impetus amid the controversy. Negative reports are undoubtedly sometimes exaggerated—there is little evidence, for example, to support claims that the anti–GM climate in the UK has created a "brain drain"—but there is clearly a need for improved public engagement to create a climate of mutual respect and informed debate. One witness identified a problem with scientists' understanding of the concept of public engagement, noting that some still used the "failed 'deficit model' of 'educating the public' into accepting an innovation" and pointed out that, by taking public opinion seriously at an earlier stage in the scientific process, scientists would be more likely to generate the climate of mutual trust needed for innovation to flourish.[119] This is clearly an issue for the entire scientific community, not just one organisation, but as a major funder of controversial areas of research, BBSRC must not pass up the opportunity to pave the way for better public understanding of, and trust in, the science research base.

64. BBSRC appears to have reassessed its public awareness strategy in the light of the GM debate and we are pleased to note that it has taken the lessons learnt from GM into account when considering how best to engage with the public about nanotechnology.[120] However, it is clear that BBSRC and the other Research Councils still have a long way to go before they can recover public trust.

65. **There are difficult lessons to be learnt from the failure of BBSRC to win public trust in its ability to determine a socially acceptable agenda for GM research. BBSRC must use these lessons to inform its future public engagement policy to prevent any repeat of the stalemate which has hampered research in this field. In particular, BBSRC needs to engage more in public dialogue, not simply public education, activities.**

118 Eighteenth Report of the Environment, Food and Rural Affairs Select Committee, Session 2002–03, *Conduct of the GM Nation Public Debate*, HC 1220, p 18

119 Ev 51

120 Q 71

7 Knowledge Transfer

Knowledge transfer strategy

66. BBSRC plans to commit 2% of its funding portfolio to knowledge transfer and innovation activities in the period 2003–08, of which it will allocate half to LINK grants.[121] This figure does not represent BBSRC's total contribution to knowledge transfer: approximately one third of the studentships funded by BBSRC are currently awarded through the CASE and Industrial CASE schemes, and one in four of its PhD students move into industry or commerce upon completion of their studies. BBSRC funds and sponsors a range of other knowledge transfer activities, including Faraday partnerships; the Royal Society's Industry Fellowship Scheme; the Bioscience Business Plan Competition; the Biotechnology Young Enterprise Scheme (YES); and the Small Business Research Initiative. In order to train researchers in the identification, exploitation and protection of Intellectual Property (IP), BBSRC supports IP workshops run by technology transfer offices at universities and its sponsored institutes. Unlike MRC, it does not manage IP centrally. A 2002 Report by the Public Accounts Committee found that there is no evidence to suggest that one approach is more successful than the other.[122]

Collaboration with industry

67. As part of its funding in responsive mode, BBSRC awards collaborative research grants that enable academic/industrial collaborations in any area of science within BBSRC's remit. Collaborations with a minimum cash contribution of 15% from industry are given priority above grant applications with no industrial funding, although BBSRC has recently removed the minimum threshold for industrial contribution so that an assessment of grant quality is based on more than "simply the amount of money that is involved".[123] GlaxoSmithKline was strongly supportive of the initiative, although cautioned that "awareness of this scheme is low amongst individual researchers [and] companies (especially SMEs) and we would suggest that Council should promote it more widely".[124] This is perhaps another communication issue: on BBSRC's website, the scheme is outlined under the heading "Industrial Partnerships", and is not given a name to differentiate it from the proliferation of other schemes and awards offered by the Research Council. **We recommend that BBSRC give its collaborative research grants an identity that makes them easily recognisable, and that it actively promotes the scheme to individual researchers and SMEs in its literature and publications.**

Commercialisation

68. In the university sector, the level of commercialisation activity that takes place varies greatly between institutions. A survey of 125 universities conducted in 2002 showed, for

121 BBSRC, *World Class Bioscience: Strategic Plan 2003–2008*, p 1

122 Fifty–ninth Report of the Public Accounts Committee, Session 2001–02, *Delivering the Commercialisation of Public Sector Science*, HC 689, p 11

123 Q 97

124 Ev 35

example, that 347 patents were issued to a total of 41 universities in 2002–03, while 84 universities had not had a single patent issued. Similarly, 62 of the 125 universities executed a total of 648 licence or option agreements, with 59 universities not executing any at all.[125] Clearly there are universities where technology transfer is a strength, but there are others where the level of activity in this area is unacceptably low. Commercialisation of university research is the responsibility of the university concerned, in conjunction with all the Research Councils and other funding bodies. The Lambert Report identified a need for improved rates of technology transfer in the biosciences in particular.[126] A recent Report by the Trade and Industry Committee concluded that improved technology transfer offices were required in universities if commercialisation of research in the biosciences were to reach its full potential.[127] BBSRC relies on technology transfer offices to run workshops on the management of IP. Such offices thus play a central role in BBSRC technology transfer strategy. **We recommend that BBSRC work with universities to ensure that all its researchers have adequate access to commercialisation support facilities such as well-resourced technology transfer offices.**

69. The institutes are very successful at generating and incubating small new businesses. The Babraham Institute, for example, has a "bioincubator" that houses 17 small companies, employs over 150 people and has plans to expand. Nevertheless, the key output and performance indicators show an overall decrease in commercialisation activity at BBSRC institutes (see table 6, below).

Table 6: Key output and performance indicators for commercialisation activity

	2000–01	2001–02	2002–03
Patents awarded to BBSRC–sponsored institutes	25	26	19
Institutes' commercial licensing agreements	98	94	77
Income to institutes from intellectual property (£k)	1351	1116	1273
Institute publications co-authored with industry	53	62	45

Source: BBSRC, Annual Report & Accounts 2002–2003, HC 803, p 21

Mr Visscher told us that, although the figures show a decrease in the number of institutes' commercial licensing agreements, the income from such agreements had increased by 85% in the last six years, generating capital for a "virtuous cycle of reinvestment".[128] In a submission to the Committee, the Institute of Food Research (IFR) did not feel that the trend was so positive and raised concerns about conflict between the priorities of the Institute Assessment Exercise (IAE) and the technology transfer strategy mapped out for the institutes by BBSRC, noting that institutes "are charged with undertaking A-rated science, in parallel with getting funds from external sources, particularly industry, but judged in the IAE primarily from an academic viewpoint".[129] This view was reinforced in a

125 UNICO, NUBS, AURIL, UK University Commercialisation Survey Financial Year 2002, pp 15–16, 18

126 HM Treasury, *Lambert Review of Business–University Collaboration*, p 48

127 Twelfth Report of the Trade and Industry Select Committee, Session 2002–03, *UK Biotechnology Industry*, HC 87, pp17–20

128 Q 91

129 http://www.ifr.ac.uk/science/consultations/bbsrcscrutiny.html

more general context by the Public Accounts Committee in its Report on the commercialisation of public sector science, which found that "scientists believe that involvement in commercialisation activity is often not adequately recognised in staff appraisals and may affect their career adversely because of a perceived conflict between publishing research results and the confidentiality that commercialisation often requires".[130] Technology transfer is a consideration in the IAE, but it is assessed by a separate panel from that used to rate research quality and strategic relevance, making it difficult for assessors to determine whether attainment in one element of the exercise is compromised by attainment in another. **We recommend that the performance indicators used in the IAE are adjusted to better reflect attainment in the area of knowledge transfer.**

70. Both the low number of commercial licensing agreements executed in universities and the decrease of such agreements in BBSRC institutes are of concern, particularly when weighed against a continuing emphasis on spinning out new companies. The Lambert Review stated that "too many spinouts are now being created, some of low quality", with many failing to reach the market, partly due to the unfavourable market conditions for start-ups that we identified in our 2003 Report on renewable energy sources, the so called "funding gap" between seed and revenue stages.[131] In written evidence, GlaxoSmithKline noted that "the formation of spinouts is only one part of the technology transfer process, and it would be concerned if the focus of the Council's business–support activities moved too far further in this direction".[132] **We agree that the number of spinouts should not necessarily be the prime indicator of commercialisation activity.**

71. BBSRC, in conjunction with EPSRC and NERC, has recently launched a follow on fund to provide extra funding for research with potential commercial applications before it reaches the proof of concept stage. The scheme is designed to support licensing activity as well as the formation of spinouts, allowing researchers the time to decide which option is most appropriate. The Lambert Review observes that, in many cases, licensing would be preferable since it is "less resource–intensive than spinning out new companies—both in terms of people and funding—and has a higher probability of getting technology to market".[133] In oral evidence Mr Visscher described the follow on fund as "a very limited scheme—so it neither solves the problem of the gap, nor addresses the question of whose responsibility it is to fund the gap".[134] We are not convinced that BBSRC need concern itself about the funding gap and would suggest instead that this should be the responsibility of the Department of Trade and Industry and the Regional Development Agencies. It is, however, important that BBSRC encourage researchers to consider the full range of options for commercialisation of their research, and the follow on fund is a positive step in this direction. **Until DTI are able to provide adequate support for new business ventures spun out of research institutions, the number of unsuccessful spinouts will remain**

130 Fifty–ninth Report of the Public Accounts Committee, Session 2001–02, *Delivering the Commercialisation of Public Sector Science*, HC 689, pp6–7

131 HM Treasury, *Lambert Review of Business–University Collaboration*, p 58; Fourth Report of the Science and Technology Select Committee, Session 2002–03, *Towards a Non–Carbon Fuel Economy: Research, Development and Demonstration*, HC 55-I, p 23

132 Ev 34

133 HM Treasury, *Lambert Review of Business–University Collaboration*, p 60

134 Q 93

unacceptably high. We commend BBSRC for its support of research up to the proof of concept stage and hope that its follow on fund will be used efficiently to maximise the commercial potential of new technologies, particularly through licensing agreements.

8 Conclusion

72. Over the course of this short inquiry we have found much to praise at BBSRC: its strategy closely adheres to priorities set by RCUK, and it is, for the most part, administered transparently and efficiently with the support of its community. Unlike other Research Councils that we have scrutinised, BBSRC's finances are in good order. There are, however, some areas in need of improvement, particularly in the area of grant administration. We also detect a reluctance to take any steps that are unlikely to win the immediate support of BBSRC's research community, which becomes a problem when it impedes progress, for example in the reconfiguration of peer review or the effective management of grant application success rates. We expect to re-scrutinise the work of BBSRC in the next Parliament and hope to see an improvement in the problem areas that we have identified.

Conclusions and recommendations

1. Whilst we welcome BBSRC's realistic approach to funding priorities, we would encourage the Council to consult its community about those areas of science which are likely to see a decrease in funding and communicate the outcome of its decisions in a clear and transparent way. (Paragraph 11)

2. In the interest of greater transparency we recommend that BBSRC publishes data on the proportion of responsive mode funding that it earmarks for special initiatives and its priority areas of science. (Paragraph 13)

3. We recommend that BBSRC publish statistics on the proportion of its grants awarded in responsive mode to high risk projects. Such a step would serve to reassure its research community as well as providing a useful tool for self–evaluation. (Paragraph 16)

4. We recommend that BBSRC take further steps to manage demand more effectively, including the introduction of University Interface Managers and mock peer review panels. (Paragraph 18)

5. We understand the need for BBSRC to retain the confidence of its community but believe that it is being unduly reticent about taking the steps necessary to manage the demand for grants more effectively. We recommend that it lead the way for other Research Councils by publishing the success rates of individual institutions. We also recommend that BBSRC introduces a cap on the number of applications permitted to those university departments that have persistently low success rates. (Paragraph 21)

6. Although BBSRC should continue to fund the best science, it cannot ignore the contribution of its policies toward increased research concentration in an ever smaller number of elite institutions. We recommend that BBSRC proactively work with other Research Councils and the Department for Education and Skills to support excellent science across a broad range of higher education institutions. (Paragraph 24)

7. We do not understand why BBSRC continues to stand alone in its support of the peer review committee system, which has been abandoned or modified by other Research Councils. We recommend that it review the system in the light of changes made elsewhere, and consider introducing a peer review college in its place. (Paragraph 27)

8. We urge BBSRC to consider the introduction of a fourth grant round between the rounds in January/February and July, to distribute funding opportunities more evenly across the year and speed up the process for applicants. The measures we recommend for moderating demand for grants would also help this process. (Paragraph 30)

9. Whilst we applaud the flexibility of grant length that BBSRC has built into its application process, we are concerned that some sections of its community remain

unaware of the full range of opportunities available to them. We urge BBSRC to do more to promote these opportunities, perhaps including prominent web postings, letters to interested groups and press notices. (Paragraph 31)

10. We recommend that BBSRC uses one consistent policy for the treatment of grant applications at the edge of its remit and desists from rejecting some applications on remit grounds without referral to the appropriate Research Council. A more transparent system of feedback in such cases is required in order that applicants understand the reasons for the referral of their applications. BBSRC should also liaise with other Research Councils to ensure that their remits are mutually understood, clearly defined and well advertised. (Paragraph 34)

11. It is imperative that BBSRC and MRC work closely together to make the biomedical research community aware of the scope of their remits to avoid wasted applications. Calls for applications in specific areas should make clear exactly how the topic relates to the remit of the Research Council in question, and give details of initiatives sponsored by other Research Councils which may be more appropriate. (Paragraph 36)

12. We look forward to the findings of the investigation into Research Council grant–awarding processes being carried out under the joint Council Electronic Research Administration programme, particularly if it is able to recommend a harmonisation of administrative practices across the Research Councils. (Paragraph 37)

13. We commend BBSRC for the imaginative measures it has taken to encourage students to train in biomathematics and bioinformatics. (Paragraph 38)

14. We applaud BBSRC for its introduction of "Discipline Hopping Awards" and hope that it will work with other Research Councils to ensure that the awards later bear fruit in grants awarded for interdisciplinary areas of research. To this end, we recommend that BBSRC routinely appoints peer reviewers from other relevant disciplines to ensure that committees have sufficient expertise to assess interdisciplinary grant applications. (Paragraph 39)

15. It is clear that BBSRC needs to co-ordinate with individual institutions to provide "joined–up" ongoing support and maintenance for equipment and facilities used to carry out BSBRC research. It also needs to ensure that these institutions are aware of their rights and responsibilities under "procurement best practice". (Paragraph 41)

16. We are satisfied that the financial capping system, which limits the number of grant applications that can be made by each institute, is fair and we encourage institutes to continue submitting proposals for collaborative grants as part of their quota of grant applications. (Paragraph 45)

17. We encourage BBSRC to ensure that it actively maintains an effective dialogue with governmental funders of its institutes in order to determine long–term plans for institute funding. (Paragraph 47)

18. The Pirbright Laboratory is to be commended for the remarkable effort it put into tackling the outbreak of foot and mouth disease. Whilst national contingency

planning is the responsibility of Government, BBSRC has a role to play in making its institutes aware of their responsibilities in this area. We recommend that BBSRC work with Government and its institutes to identify future sources of concern and put in place pre-emptive research measures and contingency plans to cope with them. (Paragraph 49)

19. BBSRC is to be congratulated for the measures it has introduced so far to improve the status of contract researchers, both in its own institutes and in universities. It is clear, however, that very little further progress can be made in this area until universities adopt the same approach. We urge BBSRC to work closely with universities to promote its new schemes and persuade them to provide the complementary funding support necessary for such schemes to be a success. (Paragraph 54)

20. It is too early to judge the success of the pilot Doctoral Training accounts scheme but we are encouraged by BBSRC's introduction of a more flexible and realistic approach to studentship funding. (Paragraph 56)

21. BBSRC should not be complacent about the number of studentships it currently awards. We recommend that it review the balance between grants and studentships in its overall budget, and consider funding more studentships to complement growth in the biosciences. (Paragraph 57)

22. We recommend that BBSRC differentiates between public relations and public engagement activities when compiling and publishing performance indicators. (Paragraph 59)

23. We recommend that some training in communication skills becomes a compulsory component of all BBSRC PhD studentships. (Paragraph 60)

24. We suggest that BBSRC review its administrative spend to ensure that there are sufficient resources available for important non–research activity. In addition, we recommend that BBSRC work with RCUK to create a harmonised public engagement strategy that makes maximum use of the resources available and prevents duplication of expenditure. (Paragraph 61)

25. BBSRC's decision not to provide institutes with specific resources for compulsory public engagement activities is a false economy. We recommend that BBSRC consider appointing a media officer at each of its institutes to ease the burden on research staff. (Paragraph 62)

26. There are difficult lessons to be learnt from the failure of BBSRC to win public trust in its ability to determine a socially acceptable agenda for GM research. BBSRC must use these lessons to inform its future public engagement policy to prevent any repeat of the stalemate which has hampered research in this field. In particular, BBSRC needs to engage more in public dialogue, not simply public education, activities. (Paragraph 65)

27. We recommend that BBSRC give its collaborative research grants an identity that makes them easily recognisable, and that it actively promotes the scheme to individual researchers and SMEs in its literature and publications. (Paragraph 67)

28. We recommend that BBSRC work with universities to ensure that all its researchers have adequate access to commercialisation support facilities such as well resourced technology transfer offices. (Paragraph 68)

29. We recommend that the performance indicators used in the IAE are adjusted to better reflect attainment in the area of knowledge transfer. (Paragraph 69)

30. We agree that the number of spinouts should not necessarily be the prime indicator of commercialisation activity. (Paragraph 70)

31. Until DTI are able to provide adequate support for new business ventures spun out of research institutions, the number of unsuccessful spinouts will remain unacceptably high. We commend BBSRC for its support of research up to the proof of concept stage and hope that its follow on fund will be used efficiently to maximise the commercial potential of new technologies, particularly through licensing agreements. (Paragraph 71)

Formal minutes

Monday 2 February 2004

Members present:
Dr Ian Gibson, in the Chair

Paul Farrelly	Mr Robert Key
Dr Evan Harris	Bob Spink
Dr Brian Iddon	Dr Desmond Turner

The Committee deliberated.

Draft Report (The Work of the Biotechnology and Biological Sciences Research Council), proposed by the Chairman, brought up and read.

Ordered, That the draft Report be read a second time, paragraph by paragraph.

Paragraphs 1 to 72 read and agreed to.

Resolved, That the Report be the Third Report of the Committee to the House.

Ordered, That the Chairman do make the Report to the House.

Ordered, That the Appendices to the Minutes of Evidence taken before the Committee be reported to the House.

[Adjourned till Monday 9 February at half past Three o'clock.

Witnesses

Monday 1 December 2003

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Second Report	Annual Report 2002	HC 260
Third Report	The Work of the Medical Research Council *(Reply Cm 5834)*	HC 132
Fourth Report	Towards a Non-Carbon Fuel Economy: Research, Development and Demonstration *(Reply HC 745)*	HC 55-I
Fifth Report	The Work of the Natural Environment Research Council *(Reply HC 1161)*	HC 674
Sixth Report	UK Science and Europe: Value for Money? *(Reply HC 1162)*	HC 386-I
Seventh Report	Light Pollution and Astronomy *(Reply HC 127, 2003-04)*	HC 747-I
Eighth Report	The Scientific Response to Terrorism *(Reply Cm 6108)*	HC 415-I
Ninth Report	The Work of the Engineering and Physical Sciences Research Council *(Reply HC 169, 2003-04)*	HC 936

Session 2001-02

First Report	Cancer Research – A Follow-Up *(Reply Cm 5532)*	HC 444
Second Report	The Research Assessment Exercise *(Reply HC 995)*	HC 507
Third Report	Science Education from 14 to 19 *(Reply HC 1204)*	HC 508-I
Fourth Report	Developments in Human Genetics and Embryology *(Reply Cm 5693)*	HC 791
Fifth Report	Government Funding of the Scientific Learned Societies *(Reply HC 53)*	HC 774-I
Sixth Report	National Endowment for Science, Technology and the Arts: A Follow-Up *(Reply HC 276)*	HC 1064
Seventh Report	The Office of Science and Technology: Scrutiny Report 2002 *(Reply HC 293)*	HC 860
Eight Report	Short-Term Research Contracts in Science and Engineering *(Reply HC 442)*	HC 1046

Oral evidence

Taken before the Science and Technology Committee

on Monday 1 December 2003

Members present

Dr Ian Gibson, in the Chair

Dr Evan Harris
Dr Brian Iddon
Mr Robert Key
Mr Tony McWalter
Mr Neil Turner

Witnesses: **Professor Julia Goodfellow,** Chief Executive, **Mr Steve Visscher,** Director of Finance and Administration, and **Professor David White,** Director of Science and Technology, BBSRC, and **Professor Robert Freedman,** Chair of Department of Biological Sciences and Professor of Biochemistry, University of Warwick, Member of BBSRC Council, examined.

Q1 Chairman: Can I welcome you, Professor Goodfellow, to our session here today. You have your team around you. I will call on you to speak for the group, but you are certainly welcome to allow others to jump in if they want to correct or amplify what you might say. Thank you very much for coming. We take our scrutiny of research councils very seriously and we know that you take this session particularly seriously too. I will start off with a nice lobby question for you to begin with to get the ball rolling. You will hear about interdisciplinary interfaces between research and so on. How do you prevent the grant request falling down the hole between different research councils? What have you done to prevent that happening? It is said, for example, that a grant is just passed around until the time of expiry has been met and, three years later, they might find somebody who looks at it seriously. Is that still the situation? Are you prepared to tell us how you might prevent that?
Professor Goodfellow: That certainly is not the situation. Within the BBSRC, we have two committees that look at areas on the boundary with the physical sciences. One is the Biomolecular Sciences Committee which really falls on the molecules/chemistry side and we have another one on the engineering and biological systems side which is higher level physics, engineering and maths. Both those committees have been in existence for a long time. If we take the Biomolecular Sciences Committee or in fact both those committees, EPSRC send people along, programme managers, quite senior level people, who are empowered to fund grants above those that the Committee actually grant. To give you some idea, 45% of the grants in the Biomolecular Sciences Committee go to chemistry departments, although one would expect that the BBSRC would be just funding biosciences. In fact, altogether, 13% of grants go to non-bioscience departments.

Q2 Chairman: Is that interface assessment of grants increasing? Has it doubled in the last few years or will it double?
Professor Goodfellow: That part has been going since BBSRC started and is there. Obviously we are getting a lot of grants into that area, but we are also doing things in different ways. It is increasing mainly through the initiatives, through the spending reviews. As you will be aware, the science budget, partly because of you and your colleagues, has been going well in the last spending reviews and in fact most of the new money for science has actually gone into areas which are joint through research councils—stem cells was one—and I think that the only single Council new money that really came in last time, new initiative, was infectious diseases which was BBSRC. I do not know if you would like my colleague, David White, to answer.

Q3 Chairman: I am interested in the two-way traffic if it is part and parcel of the operating in your job. If you get a grant and you say, "Well, that is perhaps more appropriate to that research council."
Professor Goodfellow: I will ask my colleague, Professor White, to answer that one.
Professor White: When a grant comes in that we think might be more for another council, then the programme managers, that is the first level, if you like, of scientists in the administration in Polaris House, will contact the council they think it is relevant to and discuss it and then, if there seems to be a case, that grant will then get sent to the other council for consideration. Then there is an interaction between the two programme managers who then determine where its proper location is.

Q4 Chairman: For example, MRC has reputedly been having a little difficulty recently. Have you found more applications which once might have gone to the MRC?
Professor White: We think we have and indeed the evidence for that is I think really three-fold. One is that we have had quite a large increase in the number of grants we have received at the Council over the last few years. The overall average has been about 63% increase since 1998–99 but, for medical departments, it has been exactly double that, so we have received a much larger increase in grants from

medical departments. Two is anecdotal. We get a lot of stories of people to whom we say, "You should be in MRC" and MRC agree and they say, "But we cannot get to MRC because of blocks in MRC." Third, if we take the last round for example, in one committee, we had 25 grants out of about 240 that we thought were MRC and MRC agreed that, out of that 25, 21 were theirs and four we took back ourselves.

Q5 Chairman: So, have you come to some kind of agreement with them since the episode in the last few months?
Professor Goodfellow: I met with Colin Blakemore, who as you know is the new Chief Executive, and pointed out that this clearly was a problem area. We think one of the reasons has been these collaborative awards that you may have looked into when you did the MRC scrutiny. As you are aware, Colin Blakemore has been going round the country doing lots of road shows to talk to people and a review has been undertaken on these and we understand they are highly likely to disappear. So, I think that the medical community will actually find it easier. But that is not MRC policy, there is a review on their webpage at the moment.

Q6 Chairman: Would you like to say something about the discipline hopping awards?
Professor White: Those are awards that are done jointly with MRC and EPSRC and the intention of those is that they enable somebody at the end of their grant to spend a further year where they cross disciplines into the other relevant discipline.

Q7 Chairman: In these interdisciplinary areas, what happens when that period comes to an end, that year or whatever?
Professor White: That would then be the end of that award and the people concerned would be applying for other grants or whatever, but the intention has been that someone has been trained up in a discipline that is cognate to the one that they started in.

Q8 Chairman: It is often said that, in this area of interdisciplinarity, since you do work closely together, why do you not just cut the cackle and all join together in great harmony and love?
Professor Goodfellow: Just like MPs in the Government?

Q9 Chairman: And all end up at Swindon, of course!
Professor Goodfellow: Research Councils UK started 18 months ago and we are working a lot more together. A lot of the things we are doing are joined with other people. It is difficult to find single area things. Certainly, if you take the whole of biology, our vision and strategic plan for biology is that, if you need to solve a biology problem, you will need multidisciplinarity, you will need people who are trained in physics, trained in chemistry, trained in maths and trained in infomatics. We may be calling them biologists, so I think we are developing multidisciplinary approaches. Bio-nanotechnology, for instance; two centres jointly funded by three research councils. I think that we are getting anecdotal but we are getting more and more work which is multidisciplinary.

Q10 Chairman: In your wildest dreams, do you think RCUK is actually going to take all over functioning and disciplinarity contacts? Do you think that is what it is all about? Do you think that is the hidden agenda?
Professor Goodfellow: There is no hidden agenda with RCUK, is there?

Q11 Chairman: There is always a hidden agenda! In somebody's head, there is one!
Professor Goodfellow: Certainly, when we are looking to go into the spending review which is when we are mainly looking at topics, we have really homed in on the multidisciplinary areas. So, we, at the moment, have eight areas which are multidisciplinary but with each research council leading one of them. We are leading systems biology which will need buy-in from the physical sciences and medical sciences as well. There are eight of those and in fact the research directors have got it down from 54 to eight different multidisciplinary areas.

Q12 Mr McWalter: I guess that one part of our agenda is to learn something from one research council and ask another research council what they are doing about that. We notice that the average success rate for responsive mode applications now is a mere 29%. We have noticed that EPSRC have done quite a lot to try and avoid the wastage, and terrible efforts that go nowhere, that is involved in that low figure. Are you making every effort to try and minimise waste of effort and resources as well?
Professor Goodfellow: I would say that "mere" is an incorrect adjective. I think you should be very pleased with a success rate of 29/30%.

Q13 Mr McWalter: It used to be 48%.
Professor Goodfellow: It used to be 40%, basically. When my predecessor came in, it was very low, I think it was down about 24%. The first thing he did was to make sure that most of the money went into responsive mode and I think you can see from the figures we presented you with that it started with the current set of committees, which is why we chose 1997–98, for that year, the average was about 40%. That is Annex 4b in our submission. You can see that we have maintained it, we have been putting more money in, but we are getting a fantastically large number of grants coming in and this is because biology is so buoyant. Biology is actually a success story. We have a very large biology community in our universities—it is not surprising they are coming in—and we have been trying very hard to maintain it at these levels. Professor Freedman from the university might like to say something.
Professor Freedman: Most people in universities would believe that a success rate approaching 40% would probably represent an ideal situation in which the most really outstanding, not most good but most

really outstanding, proposals were being funded. There is a limited amount of funds available and no doubt other things could be cut but it is a question of balance and tension between the various demands. I think the real issue, as Professor Goodfellow has said, has been simply an increase in the number of applications. Professor Goodfellow has recently written to all heads of departments asking them, in a sense, to police applications more stringently in order to ensure that applications that come forward are not really weak and are certain not to be funded and that could have some impact on this. On the other hand, individual researchers will feel that they want the freedom, if they want to make a proposal, to make a proposal, and I can imagine members of my department who would give me a dusty answer if I tried to tell them not to apply.

Q14 Mr McWalter: So, in an outstanding proposal which you then have to turn down, perhaps several outstanding proposals which you then have to turn down, have you ever thought of using those as a lever to try and get more money into biology research in order that you do actually in the end make your case using in part the applications that you have been unable to . . .
Professor Freedman: I am sure Professor Goodfellow will have something to say, but I think we would be very cynical to, as it were, engineer a low success rate on those grounds. I do not think anybody would want to do that.

Q15 Mr McWalter: I was not asking that, I was asking whether things you have to turn down which are outstanding could actually be used, for instance, by a committee like ourselves to make the case for you more effectively than maybe it might have been done—
Professor Goodfellow: We have the interesting situation at the moment that applications from universities are confidential until they are funded.

Q16 Mr McWalter: So therefore you cannot do that.
Professor Goodfellow: All research councils have that rule. So, it is confidential at application.

Q17 Mr McWalter: So these outstanding turned-down applications remain apocryphal.
Professor Goodfellow: They are real, there are certainly files of some of them. To maintain a 30% success is very high. I do not think it is anything like that high in America. Even in NIH with all the money they have, it is not as high as that and I do not think other funders in this area will be funding at 30%. When I go around the country, most departments are very pleased at 30% funding.

Q18 Mr McWalter: What about these deadlines? People tell us that these three deadlines that you have every year means that there is an increase in workload, that people sometimes feel that their applications are not being dealt with as effectively as they might be if there was a steady flow so that, when people were in a position to make a submission, they made a submission. Why do you bump this extra piece of bureaucracy on it?
Professor White: We do it because we feel that it is optimal to get all the grants that we have coming in into the different committees in one go. So, what we do is coordinate all the committees to come in simultaneously. We can then use our strategy board to get a proper balance across the committees of funding in ways that we would not be able to do if we did it in the way you are talking about.
Professor Goodfellow: We have seven different committees and I think we have shown funding for them, certainly in our Annex 6a, and what we do is to try and maintain similar success rates across all areas of science in order that we are not penalising or particularly being favourable for any one area. If we had to decide that we will give agri-food x amount of money and we had very few applications, people might get funded when science was not of the highest quality whereas, in another area, we may have lots and lots of applications and we were not able to fund. So, we try and normalise our success rates in order that we have similar success rates across the different areas of science. That means that we have to, at some point, have them all coming in at the same time.

Q19 Mr McWalter: So you would agree that there are major disadvantages to this way of doing it and you just do not see any way out of it?
Professor Goodfellow: Our community is behind us and I do think that is important. We try and get changes agreed with our community when we feel we have to change and we have no reason to change at the moment, and I think they like what they see as a rather fair and transparent way of making sure that the breadth of biology gets funded equally across those areas.

Q20 Mr McWalter: Can I ask about contract researchers on grants. Can they apply in their own name for the funding or do they have to go through the great and the good?
Professor White: We do not allow contract researchers to apply directly for their own funds. We do have a scheme called "recognised researchers" and recognised researchers are contract researchers who must be on a grant, so their salary will be funded, and they are people who have contributed in a considerable way to the grant, so they get recognised in that way, but they are not technically applicants.
Professor Goodfellow: They tend to be fairly junior in that, so they go in with somebody else. If somebody is an experienced researcher in a university which the university is funding on an HEFCE contract, they can come in, there is absolutely no problem, they can always come in. So, you do not have to have lecturer status to come in. If you are recognised as a researcher in a university, you can come in.

Q21 Mr McWalter: So, a young blood with a fantastically wonderful idea has to work through an old cretin like me in order to get their money!
Professor Goodfellow: More like an old cretin like me! No, that is not true. After their PhD, they will most likely do, I would hope, one, or not more than two, spells on the contracts and hopefully they then will go in for fellowships. Certainly with the people I train, I try to get them into the fellowship group which is the way forward with PIs, if that is what they want.

Q22 Chairman: Are they encouraged to do that?
Professor Goodfellow: Absolutely.

Q23 Chairman: Are they mentored?
Professor Goodfellow: Yes. We have also fought universities in order to make sure that people who had fellowships were then given jobs within the university and did not then come back in again on research grants. So, we have actually said, to help these young people, "We will not allow you back in on a grant, the university needs to be taking you on."

Q24 Mr McWalter: Three years is a little short to gain meaningful results in biological research these days, is it not?
Professor Goodfellow: We would very much like people to apply for longer than three years. I have gone around the country with our new vision and strategic plan pleading with people to put in for five-year grants because I think that we need a balance. People are coming in with three years; there is nothing to stop them coming in with five years; they can tick the 60-month box on the form.

Q25 Chairman: What percentage of people that you fund, in terms of those we are speaking about now, are on those kind of contracts? Is it 40%, 50 or 60%, or is it ever increasing?
Professor Goodfellow: I am sorry?

Q26 Chairman: The number of people on research contracts doing this kind of work that you talked about who cannot bid for grants themselves but they are there. Some of them may have been on grants for about 20 years.
Professor Goodfellow: Very few. We will get the numbers; I do not have the numbers but I will happily get them for you.

Q27 Chairman: Could you provide them for us because we are still concerned. We did an inquiry on this Committee into research contracts and we are very concerned that nothing much seems to be happening in some research councils than in others. Would you like to comment on that? PPARC, for example, are making some ostentatious predictions about what we are going to do in this area.
Professor Goodfellow: At the risk of you looking rather deeply at our figures, which I should think you ought to do, we are of course also employers because we employ people in institutes. In fact, we employ about 3,000 people in institutes. There we have the problem that our staff do get money from different sources, so we are like a mini university, if you like. They are not just getting funding off us, they will be getting short-term contract funding, and we now have a policy to reduce the number of people on fixed-term contracts within our institutes. We are trying very hard to reduce it and it is going down. At one institute I was looking at earlier this week, the numbers are coming down very, very steeply indeed and we are really trying to drop them.
Mr Visscher: I think we are forecasting a 60% fall in the next two years. It has already come down about 20% and so there is another dramatic fall coming over the next two years as a result of changes in policy and approaches.
Professor Goodfellow: There are two things that are happening. One is that, in the universities, if the dual-support reform goes through to get full economic costs and we can get the £120 million which came up in the last spending review for year 2005–06 to help with part of the dual-support system, if we can get that into the universities, they will be in the position of being better employers and should be able to take more people on on indefinite contracts and they will then come in for grants.
Professor Freedman: If I may add to that from a university point of view. I think that all these points that Professor Goodfellow makes are relevant but there are some others as well, the first of which is of course the Roberts Fellowships. We do not know how that will play through the system, but it will obviously establish more personal fellowships which the brightest researchers will move into. In the biological sciences, the 20-year figure is very, very unusual. It is a fact that most people move through in two or three bites of three years. So, I think there is the Roberts Fellowships, and also simply the turnover in staff. One of the problems is that there has been little turnover in academic posts but there will, in the next few years, be substantial retirements in biological sciences which will open up new positions in universities. So, I think a combination of those factors, changes in university employment practice and changes in the availability of permanent academic positions and increased numbers of fellowships will all make an impact on this problem.

Q28 Chairman: What is going to happen in universities in the future is a dream. The whole thing is in the melting point at the minute—how much money you are going to get or nothing depending on some Back Benchers.
Professor Freedman: I understand that.
Professor Goodfellow: We have been reading the newspapers!

Q29 Chairman: The cynic would say that all your policies are related to preventing you having to pay redundancy payments. What do you say to that? You are cutting the number of contracts.
Professor Goodfellow: There are 3,000 employees in our institutes and of course we pay redundancy payments.

Q30 Chairman: But you are not trying to cut the overall bill of redundancy payments in the future by cutting the number of contracts?
Professor Goodfellow: No because if the business plan for the institute was such that they were losing a lot of money and had to make people redundant, then we would have to pay to make people redundant. The university sector is slightly different, who should pay for redundancy costs for people in universities? If the university is the employer within the dual-support system which is being discussed at the moment, that would obviously be potentially part of the full economic cost but, under the current rules of the dual-support system, I would have thought that would be provided from the indirect cost, so the university would have to fund redundancy out of the 46% overhead on salary.

Q31 Mr McWalter: I would like to pursue that but I think we will move on to something else. We have been concerned as a Committee about the way in which there seems to be a greater focus on a smaller number of universities particularly as time has gone on and indeed, 25% of your funding goes to only four universities. Do you think that you have an obligation to keep a wider number of research-active departments going or would you happily see concentration on fewer and fewer league departments?
Professor Goodfellow: We are very happy with the current diversity of which 100% goes to 102 universities.

Q32 Mr McWalter: Well, yes . . .
Professor Goodfellow: Listen, you chose a number, so I can choose a number. The four universities are not the ones you think; one is in the north of England.
Professor White: Also, we take applications for grants from any university at all and academic analogues and we do not assess the grants on the basis of where they come from, we assess the grants on the merits of the case. So, we do not, as it were, put grants into four universities because that is a policy, we put grants into where the best science is.
Professor Goodfellow: We also gave you statistics on diversity of funding according to RAE grade which you asked for. This caused us the most difficulty of any question you asked us because we do not ask the applicants what their . . .

Q33 Chairman: So, you do not get the money to the great names, the great scientists, which some organisations are now thinking of doing.
Professor Goodfellow: Of course we give them to the best scientist if they come in with the best project.

Q34 Chairman: Yes, but the best name does not always produce the best science.
Professor White: And they do not always get funded!

Q35 Chairman: How do you choose? Do you put the money after the science or do you put it after the individual?
Professor Goodfellow: You look at the track record of the individual. On a peer review committee, you will be looking at the track record of the individual. Will they produce, assuming that they are of mature years and not very young? They have a chance to say what they have actually done in the past, where they have published and what the results are. Also, what they are proposing to do. Is it actually feasible? Is it exciting? Is it going to make a change to the science base?

Q36 Mr McWalter: So, you do not think that big science will have a detrimental effect on the smaller research groups over time?
Professor Goodfellow: Of course it will have an effect on it and possibly it is a necessary effect to have. I think the question is the tensioning between how much we put into big science versus small science. We did consult very widely—and I have about a half-an-hour conversation on how we consulted which I will not tell you about—to come to the new vision and strategic plan. We have been around the country talking to people who mainly endorsed that biology is changing towards this big science, but we have to balance it. We went to the States in early September on a five-day visit, first of all to the east coast but then we went out to the west coast to look at some of the new big systems biology centres that have been set up, and really the amount of money they are putting in these areas is very noticeable. We feel, as we have already said, that biology in the UK ought to do that and we just saw it happen in the States; so we have speeded up what we are doing and we hope to announce something in the next year.
Professor White: If I can give you a little more about big science in biology. Big science in biology is going to be, in part, where one has to provide facilities for the scientists to do their work, so these might well be genomics facilities, post-genomics facilities, but the science that has been done with those facilities will still be done by smallish groups of people. So, I think you will find that, let us say, ten years down the line, the best science departments that are doing biology will have people of different disciplines in them, they will have a lot of expensive equipment but not expensive equipment on the basis of big telescopes in the sky or big ships but very big by comparison with what biology has been, but the people doing the science will still be small groups making use of those technologies and making use of those facilities. You ask whether big science will replace these small groups. My answer to that would be that, unless you get these facilities into universities, you will not be able to do science at the cutting edge. So, it is essential to provide that resource in order that the groups you are talking about can survive in modern biology.
Professor Goodfellow: And also so that we can get the multidisciplinarity which you started off talking about. It is necessary to get different types of expertise into these groups and there must be a way of doing that.

Q37 Dr Iddon: You have very kindly provided us with this table which shows that 75% of your funding goes to 26 universities but I am amazed that this has been provided confidentially. This is public money. Why should this information not be provided for all to see?
Professor Goodfellow: That is not confidential. The specific success rates per university is, at the moment, confidential and I say that because that is the process by which universities have put applications in. They have put in their grants knowing that it was confidential. We actually are minded to change this because we agree; we actually think that success rates of universities should be in the public domain and we are minded to do that, but we would have to go back to our community and obviously get backing. I have had preliminary talks with other chief executives, as I think it is something RCUK should be doing.

Q38 Dr Iddon: I am glad to have that qualification. Are you the only research council or is this across the research councils that the situation on success rates is kept confidential?
Professor Goodfellow: All of us keep it confidential. That is the basis on which universities bid for funds from us. The bid itself is confidential but, when it is funded, it goes in the public domain.

Q39 Dr Iddon: Why should that be? Why should it be confidential?
Professor Goodfellow: We agree with you. We actually think that the success rates should be in the public domain. So, we are very happy with that. We have been talking about it recently. We cannot do it unilaterally, we need to get buy-in from the university community and perhaps you might like to talk to Professor Freedman about that, and we also, I think, need to get buy-in from the other research councils.

Q40 Dr Iddon: Why are the universities unhappy that this information is not published? What is the university argument?
Professor Freedman: That is a very interesting question. I do not think that universities would necessarily be unhappy with the publication of success rates. I think they might be unhappy with the publication of the details of unsuccessful applications which would themselves of course contain confidential and, as it were, business-sensitive information.

Q41 Dr Iddon: I agree about the unsuccessful ones but I disagree because I think that all the details of the successful ones should be in the public domain.
Professor Goodfellow: All the details of the successful ones are in the public domain. The question is, if you put success rates in, you are telling them not only how many have come in, how many applications have been applied for, but how many of them succeeded. So, the successful ones are completely in the public domain and are on our website.

Q42 Chairman: Why can universities publish this information for themselves? Are they so helpless that they cannot do it and they need you guys to come in and do it for them? Would you welcome them doing it for themselves? There is nothing to stop them, is there?
Professor Goodfellow: I am perfectly happy whichever way.
Professor Freedman: Most universities do analyse their own success rates. What they do not have access to is the success rates in other universities. In my own institution, we would of course monitor how many applications we make each year to a particular funding source and how many of those are successful and that is the kind of management information that you need within a university. What is not available is the information of other universities.

Q43 Chairman: Would you welcome that?
Professor Freedman: That would be in many ways useful and helpful, absolutely.

Q44 Chairman: But you would welcome it, yes?
Professor Freedman: Yes.

Q45 Dr Turner: HEFCE have proposed new cost weightings for teaching of different sciences. What are your feelings on the reduced costs that they are alleging should apply to the teaching of biological sciences? Do you think this is accurate and realistic and is it going to have any knock-on effect of the research activities of departments you are funding?
Professor Goodfellow: I am very upset about the changes and I have written to HEFCE about this jointly with Colin Blakemore from the MRC because we think it is going to have a detrimental effect on biology at a time when we have tried to say that biology is getting more expensive. It used to be a cheap subject, something you could do with a test tube. You now need equipment that possibly costs hundreds of thousands of pounds and, of course, even at the teaching level, you need to get the people in the right type of labs trained when they are doing their projects with that type of equipment. So, we see biology getting more expensive, so we think it is the opposite of timely and I am sure that university biology departments have written as well.
Professor Freedman: Yes, both collectively and individually, university departments have expressed this concern. It is in a sense not based on any rationale other than on the rather curious one that numbers in the physical science have gone down and therefore unit costs in the physical sciences have gone up and, as a result, biology appears relatively cheap.
Professor Goodfellow: It is again because biology is successful.

Q46 Dr Turner: It is another example of the misuse of statistics! Cut it whichever way you will, biological science research is getting more expensive and is the funding keeping pace with the growth in

the biosciences anyway? It is getting more expensive and more people are doing it, so what are you doing to try and meet the increased cost?

Professor Goodfellow: There are several things that we are doing. Certainly during the negotiations after the spending review last summer, we obviously worked very hard within RCUK for the biology base. I think we ended up with a fair settlement for the biological sciences which reflected its diversity and we can go to David for the type of things that we funded after that. We are obviously going to be very robust going into the spending review 2004 but of course the bid does not just come from the biological sciences, in fact it does not come from the research councils, it comes from the DTI. So, we have to make our punch go through all the way through OST, and through the DTI bid to the Treasury.

Mr Visscher: I think that, in the biosciences, it is interesting to look at the growth in academics compared to the other disciplines and although we only have figures up to 2001–02, the growth in the biosciences has been 13% over the period when physics has gone up by 7% and chemistry by 0.3%, so there is a very dramatic increase in the biosciences and I think we anticipate that that is going to continue with the further investment that has taken place in biological facilities aided by the joint infrastructure fund grants.

Q47 Dr Turner: You inherited a rather sticky deficit in 2000–01 and it got as high as £8.7 million in 2001–02. What steps did you take to get that down to £375,000 by the last financial year?

Professor Goodfellow: I am sure that, if there was a deficit, it was a planned deficit and I will hand over to Mr Visscher, the finance director.

Mr Visscher: The overall funding we have had in recent years has been on a steady upward trend but we are able to and are indeed helped now by the new arrangement for resource accounting budgeting to have further flexibility at the financial year ends and there are also arrangements in place between the research council because typically one will spend a little bit more one year and one a little less, and we can, through the offices of OST, arrange to borrow money or lend money between research councils to even out the peaks and troughs. So, the BBSRC has been able to achieve a smooth flow of funding in terms of its awards to researchers and avoid any sudden changes in the amounts of money being awarded.

Q48 Dr Turner: Your strategic plan notes that new tools and resources are key to the future of biosciences as it moves more into the big science league. Are costs of this rising at a disproportionate rate compared with other fields of research and, if the 2004 spending review is tight as is predicted, is that going to give you a big headache?

Professor Goodfellow: Equipment obviously can be quite expensive, so, yes, there will be above inflation cost in terms of equipment and that will be across the whole of the science base. We are trying to plan for this, we do try and plan ahead and we look at our commitment and our planned expenditure over many years, for example five years ahead, because it is important that we maintain some flexibility in the future. We are aware of political predictions of the spending review being neutral and obviously, if we have to work within that, we will.

Q49 Dr Turner: What arrangements do you have with the CCLRC to make sure that your people get access to the big science facilities?

Professor White: We have mechanisms with the big facilities to get access by having committees which are across the board, so I am not sure that I really understand what is the basis of the question. I do not see a problem there particularly.

Q50 Dr Turner: There is no hidden agenda in the question.

Professor Goodfellow: Because of the quinquennial review of CLRC, there was a change in funding, we used to have £3 million which we gave them every year to provide resources for us and there was actually a baseline transfer last year when we gave our £3 million to them, so they now have to provide facilities, mainly the synchrotron and a little of the neutron source at RAL but it is mainly synchrotron, and we have committees set up to do that and it is no problem.

Q51 Dr Turner: So, they see fair play. A lot of your funding goes into your own research institutes. What is your feeling about the value for money and the quality of research that you are getting from your research institutes as compared to the work that you fund in your responsive mode?

Professor Goodfellow: First of all, you will notice from Annex 5, which we think is a key figure which shows our overall expenditure for different areas, if you actually look at the first block of figures, they are the amount of money that we put into our institutes. You will notice that the line is pretty flat. We have managed to control what is going to the institutes which we think is necessary but what we have allowed is for them to come in under a cap, under a restricted amount, for responsive grant funding. This allows us to tension the science they are doing against that in thee university base. We were very pleased, and actually we predicted, that their success rate is 8% higher than the average success rate and this is because they are capped—they are limited by how much they can apply for—they have to be much more careful which grants they put in. So, it may take a lot of care especially with younger people bringing the grants on saying, "No, it is not quite ready to go in, you have to do it again" and to work with people to get very high quality grants in, but they are more successful. We have also given you details of our review process to make sure that the quality is maintained.

Q52 Dr Turner: Does that imply that there is not a lot going on in the research institutes which is not of the same quality?

Professor Goodfellow: No because the core money that goes in is reviewed every four year in something which is analogous but not identical to the research assessment exercise.

Q53 Chairman: What is the future of the Silsoe Institute?
Professor Goodfellow: Silsoe is as you are aware being reviewed, we have put that in the public domain and there are statements about that. The review's preliminary outcome went to our council in October and the council will be looking at in December and again in February when there will be input from the governing board of Silsoe.

Q54 Chairman: Has the review considered the staff who work there, the secretaries, researchers and so on? Has it considered the trade unions?
Professor Goodfellow: Yes, the trade unions are coming to council in December to talk to us.

Q55 Chairman: So, they have actually talked to the trade unions?
Professor Goodfellow: Yes, Peter Swinburne, our Head of Human Resources, who cannot be here today, has talked to the unions and I met somebody coincidentally the other week and we have invited them to talk to our council in December.

Q56 Chairman: So, you do not think they have been kept in the dark at all?
Professor Goodfellow: They have had a lot of information.

Q57 Chairman: There is a website called "Sense about Science" and it lists the BBSRC, your organisation, and John Innes, Horticulture Research International, amongst its funder, so why are you giving them support?
Professor Goodfellow: I thought the institutes did.

Q58 Chairman: That is what we see on the website. Are you not prepared to confirm that?
Professor Goodfellow: I know what Sense about Science is and I thought our institutes had joined as individual institutes, which they are entitled to do through their own governing bodies. I did not think that the BBSRC had joined. I am sorry, I will check that information.

Q59 Chairman: If they had and if the institutes had, would it be right to associate with an organisation which has very strong views about various aspects of science which may be as contradictory to other groups? Have they a right to do that?
Professor Goodfellow: I think the institutes have a right to join that if they feel that is best for their science, if they wish to promote evidence-based policy decisions within Government based on their scientific evidence.

Q60 Chairman: Is the report in *The Observer* that the Sainsbury Lab within the John Innes complex has done rather well having quadrupled its budget since 1998 in contrast with a falling budget in the Institute of Food Research in the same study true or false?
Professor Goodfellow: What aspect of it and are you asking as a member of the governing board of IFR?

Q61 Chairman: No, I am not asking it as a member, I am asking a question about the funding that comes from the research councils to those organisations, your money, your budget.
Professor Goodfellow: The funding to the Sainsbury Lab is formally to part of the University of East Anglia. It is a university department and it comes in in responsive mode. It has been very successful within two of our committees; genes and development biology—
Professor White: . . . and plants and microbial sciences and, yes, it has increased in the way you said.
Professor Goodfellow: The Institute of Food Research has received in its core strategic grant the same increases of money as all the institutes which is a standard 4% increase per annum over this current four-year period.

Q62 Chairman: So, the differences are based on your same scientific criteria as before because, when one looks at different institutes, some rising and some going down, on what basis do you make that decision?
Professor Goodfellow: For the main core strategic grant that we give the institutes we have given a standard 4% per annum increase but the institute budget is much more complex because they get money from different areas as well as our own. In fact, the Institute of Food Research gets I think about 60% of its funding from BBSRC directly as does the John Innes Centre, but of course not the Sainsbury Lab, and as does Babraham. The other institutes do not, and there is a historical basis to this because of the Rothschild transfer in the mid 1970s.

Q63 Dr Iddon: I have a few questions on postgraduate training. Why has expenditure on students and fellowships not increased in line with the increase in responsive mode grant expenditure? I have increases of 35% here on the former compared with 60% on the latter.
Professor Goodfellow: I think we have been more worried about giving more money to individual PhD students rather than increasing the number of students. We fund 2,000 PhD students at any one time and we have been very worried. What we did about three years ago when I was on council was that the academics fought very hard, both on council and with the Office of Science and Technology, to up the stipends to students, so we were paying above the minimum that we were given by the Government. I think at the moment we still feel that we need to pay them better rather than increase the numbers above 2,000.

Q64 Dr Iddon: Does that explain why the PhD stipend is only going up in line with Government recommendations in 2005 compared with other research councils that have already increased PhD stipends?
Professor Goodfellow: We were already above the Government level and we were already paying this out of our baseline, so we were already, if you like cross-subsidising because we regarded this as an important area. We are going to move it up in line and we would hope that this level will go up.

Q65 Dr Iddon: We have heard that you are planning to restrict Research Committee studentships to holders of BBSRC grants. Can you explain why that is the case.
Professor Goodfellow: We are not and we do not. We have never discussed it even.

Q66 Dr Iddon: I am rather anxious about the following route to a PhD. If we increase the number of subjects studied at "A" level to five, people will go into universities with less knowledge obviously in your particular subject areas. If we then adopted the Bologna Agreement and you might say something about how you propose to adopt the Bologna Agreement, then we have three years, possibly, for a Euro-bachelor degree. Is that the reason why you are now introducing doctoral training accounts which are a little flexible but could increase the amount of time spent on a PhD to four years, altogether quite a long time, and can you say something about the doctoral training accounts? How will you be evaluating them and what has been the response of them so far in your area?
Professor Goodfellow: We were very aware in biology that most of the undergraduates were only doing three years. We felt, perhaps followed by a three-year PhD, that was not quite enough to make them competitive. So, BBSRC Council's policy over a number of years has been to say that we felt that seven years post "A" level was a reasonable amount of study, not too little, not too excessive. That could be either four years at university as an undergraduate, which you might do if you take physics or chemistry for example, or it might be three years plus a masters or it might be three years plus a four year PhD. So, the pilot that was set up a year or so ago enabled universities with departments with the highest number of PhD students to choose themselves which students they took on and which they gave a three year and which they gave the four year to. David, do you want to come in here?
Professor White: I do not really have much to add to that.
Professor Goodfellow: We are getting very positive feedback from the universities.
Professor Freedman: If I could come in at this stage, I head a department which is running a doctoral training account experiment and we are able to attract good-quality students. For those who only had a three year undergraduate training, they find the possibility of four years to PhD actually attractive because they know they maybe will not start with the level of practical skills that they need but it means that for students who have done a masters degree or possibly done a sandwich degree with a year working in industry, we can award them a three year doctoral training award and they are not ending up spending eight years between entering university and leaving with a PhD. So, the flexibility is something that we value and something that the students appear to value.

Q67 Dr Iddon: Can I just press you on the calibre of students who are opting for the new route. Is the calibre as good or better as on the existing PhD?
Professor Freedman: BBSRC did a survey on this after a very limited trial, I think only one year intake, but the evidence was that it was marginally better.
Dr Iddon: So, it is attracting the best. That is good to know.

Q68 Mr Key: Professor Goodfellow, what has gone wrong with the big conversation about genetic modification in agriculture in this country?
Professor Goodfellow: We wondered when that one was going to come up! I think it is a very interesting question. You may remember that BBSRC in its very early days set up one of the first consensus conferences.

Q69 Mr Key: That was in 1994.
Professor Goodfellow: . . . which got genetically modified tomato paste on the shelves of two supermarkets. Clearly, we have had programme after programme on the television that has tried to take us through all the things that happened and I am not going to go through that with you but clearly people have turned against this as a technique. Although it is obviously rather late, the process that the Government are going through at the moment I have warmed to. I would say that I was not a believer at the beginning that this was a process I could buy into, but I actually think—and it does take time—that if you read what has been produced, a socio-economic document, and certainly the science document that has come out of David King's committee and GM Nation, has taken us forward, and we are trying to discuss something which people disagree quite strongly about.

Q70 Mr Key: Do people understand the issue of genetic modification?
Professor Goodfellow: I think people take the issue to be many different things. As you are well aware, is this something against business? Is this something against science? Is this the way people want to live? People take it in many different ways. I do not think there is just one way.

Q71 Mr Key: With the wisdom of hindsight and following your 1994 consensus conference, what would you do differently now to persuade the public of the merits?
Professor Goodfellow: I think we are already starting to try and get things in the public domain in terms of dialogue and consultation much earlier. In fact, if

you will allow me to digress and go to nanotechnology, which I know your Committee is interested in, I have a committee called the Advisory Group on Responses to Public Concern and, 18 months ago, we decided that nanotechnology was going to be an area which would concern the public. We therefore decided to sponsor a conference at the Royal Institution in which we brought scientists and non-scientists and those interested in areas and effects of nanotechnology together and start actually talking to each other because a number of the scientists could not understand that people would be opposed to applications of nanotechnology. Obviously certain people did, so we have tried to bring in discussion earlier on and I think that this is one of the main things that we can actually do.

Q72 Mr Key: You have been thinking about this for a decade and one of the BBSRC missions is to generate public awareness, communicate research outcomes, encourage public engagement and dialogue, disseminate knowledge and provide advice. I have been through your annual report and accounts, I have been through your strategic plan for 2003 to 2008, I have been through your ten year vision and the words "genetic" and "modification" do not appear anywhere. It is as if it was not an issue that concerned the public. Why do you not discuss GM in this publication?
Professor Goodfellow: We do. We have produced several documents about GM and various technologies. In fact, Dr Monica Winstanley who runs this area has won an award this year—this is on animal welfare—for getting information in the public domain. She organises conferences in schools, our institutes all do a lot with the local population to talk about research and in fact, for the fiftieth anniversary of DNA this year, we sponsored and made an exhibition called "DNA in the Garden" which was all about DNA and plants which was at Kew and at the Eden Project.

Q73 Mr Key: It is not just that people see companies drifting away from Britain and from Europe in GM, it has been alleged that there is a brain drain of GM scientists going on and indeed you lost a distinguished scientist researcher from the John Innes centre to the United States recently. What are you doing to retain GM science expertise in the UK?
Professor Goodfellow: We do not actually believe the numbers of the GM scientists leaving the country or plant scientists. Dr Mark Tester, from Cambridge, is actually Australian and is returning to Australia. He has had the highest profile in the papers. Chris Lamb, an eminent plant scientist and director of John Innes, was actually in America and came back from America to do that. John Innes is recruiting against the best universities in America. We have very little evidence, indeed no evidence, that people, even in plant science, are leaving the country. This is because the UK is a very good place to be doing plant science and my worry is that, by doom and gloom, it will come home to roost. At the moment, plant science is very buoyant in the UK.

Mr Key: I happen to think that we live in an anti-science culture now in this country and I am very concerned about that for the long-term because it goes right back to teaching in schools and universities and so on. GM is one just one example and nanotechnology is another that you have mentioned that concerns this Committee. Do you think there is a role for the BBSRC to foster long-term trust between the public and scientists in these controversial interfaces?

Professor Goodfellow: Yes, I think we do but we have to do it in partnership with others because, as you are well are, there are a lot of people involved in this area. So we will work with the Royal Institution, I have done work with the Media Centre, we hold debates there, we work with the Royal Society, the British Association and the other research councils. We have a three-pronged approach to this: one is what we call exposition, putting information in, making it available for people, for schools or whatever, it could be an exhibition, it could be a booklet and we do that in a number of selected areas; dialogue, trying to get areas where we can talk with people about various things, focus groups is one way forward; and also consultation, I go to the Royal Agricultural Show of Great Britain where you do not normally find a scientist of my level, but it is important to go and talk to the people and find out what they are interested in.

Q74 Mr Key: Do you not think the scientific community has been hit by a double-whammy in the sense that not only do the public not trust science but the media and journalists are also seen to be anti-science and reporting anti-science?
Professor Goodfellow: I think they are no more unfair to scientists than they are to politicians.

Q75 Dr Harris: This is my first time on the Committee and I thought that my line of questioning may well be gazumped by the more astute members, as Robert has just done. I would like to develop some of the points that he has just raised. About 10% of your Annual Report is dedicated to public engagement and dialogue, two pages out of the twenty. What percentage of your budget is dedicated to this area that we have just been discussing and which I think you accept is urgent and important?
Professor Goodfellow: As you are aware from the numbers we have given you, it is around about £1 million depending on how you count it.

Q76 Dr Harris: I have seen a figure of £0.5 million in public dialogue here and I know there is other investment which is about 0.2%. Clearly you think it is important enough and I know you are sincere about what you have just said because you have put it in your Annual Report. Do you think that is adequate, and are you under pressure not to increase that spending because you feel you might be criticised on committees like this for spending money on something that is not considered cool or are there not enough good things to fund it on?

Professor Goodfellow: A two point answer to that. One is I think the funding does not reflect the amount of effort and people's time that goes into it. If you take some of the scientists at John Innes, there are people there who have worked very hard on many aspects of this. You can ring up almost any scientist in our Institute. I remember during the GM debate one local MP did contact us and we had a scientist go out and report within four days. So the scientist's time is not taken into account.

Q77 Dr Harris: You do not fund that.
Professor Goodfellow: We do fund their time.

Q78 Dr Harris: I have seen one memorandum suggesting that you do not fund that sort of thing.
Professor Goodfellow: We fund their salaries and it is actually part of the objectives of the Institute directors who report to me that they take part in various activities and they will cascade that down to their staff.
Professor White: It is also part of the conditions of grant for people getting responsivegrants in universities that they should spend some of their time doing that as well. So it is not only the money we spend it is also the breadth of who we expect to be doing this.
Professor Goodfellow: An average project grant is about £250,000[1] and we are not funding five grants. You are right, we only have a set amount of money and we go to Council every year with our expenditure plan. We are aware it is a very small amount of money.

Q79 Dr Harris: How does it compare with the other research councils, and do you feel you are more likely to succeed in defensively increasing the amount spent in this important area if you did it in unison with the other research councils?
Professor Goodfellow: We certainly should work in unison and we are. One of the joint committees that we have within the research councils is one in this area, so all the people involved in that meet together regularly and work together. I do not know off the top of my head how much other research councils put in, we can supply that information, but I do not think it is vastly different.
Dr Harris: I would also be interested to know whether the share of your spending on this area has increased or decreased. The media has been mentioned and leaving aside how unfair you think politicians are treated and whether or not you think we deserve to be treated worse than scientists in fact, I see that the number of media releases you report doing in a year averages about 30, 35 in the last year, that is less than one a week. I know the Department of Health does at least 35 in a week.
Chairman: You do 35 a day, do you not?

Q80 Dr Harris: If I had the personnel I would, but no, sadly not. What is the limiting factor? Is it that you do not have much to say or is there only a certain number of staff centrally who are able to do that, or do you think it is not your job to jump in and you leave it to the Science Media Centre or whoever to deal with the stuff that appears every day about Frankenstein foods or whatever?
Professor Goodfellow: Certainly it is a staff resources issue. You will also notice that our administration costs are very low, we are below 3% and if you look at equivalent organisations in America you will find they are a lot higher. We are really under-resourced at the moment. Along with the increases in funding, and the number of applications, I have people in universities like Robert's writing to us saying please employ more staff. So certainly spend on administration is one area where we could do more. I think we have got to be careful what resource we put into press releases. As you know, if you put in too many every day the media would ignore you, so I think we try and be careful and choose those areas we care about. Remember, the universities will be putting out media releases and the institutes will be putting out media releases as well.

Q81 Dr Harris: I think there is, as Robert has said, a conflict between science and scientific understanding and active anti-science in fact. There are organisations out there like Genewatch and they are probably more active with less funding in this area than 35 media releases and proactive activities a year. Do you think it might be worthwhile you looking at what the "opposition" is doing to see whether you need to raise your game because I suspect they have raised theirs?
Professor Goodfellow: I do meet with Genewatch and we do talk to them and we do invite them to events and participate in and have a dialogue with them and other NGOs. There is quite a lot of money altogether going in if you take account of what the Royal Society does, what the British Association does, what the Royal Institution does, what each of the research councils does and I think what we have got to look at is how we can work together to better spend that money and to me it is a matter of joining it up better at the moment rather than putting a lot more money into it.

Q82 Dr Harris: Is it being well spent? How do you evaluate how effective it is? Is it possible, firstly? How do you try to do it and what are the results of the evaluation in your own area let alone all those others about how effective some of the work you are doing is?
Professor Goodfellow: I do not think we have evaluated it rigorously at this level of spend of £1 million, perhaps we ought to. Certainly in terms of Dr Winstanley getting this prize for work that she was doing in animal welfare and getting information on work in that area out to the public, we got a national prize this year, that is very good and certainly I think the fact that the schools want to work with us and people keep coming to us and asking to work with us, the fact that we can get

[1] *Note by the Witness:* For every £1M spent elsewhere we are not funding four grants.

exhibitions effectively on GM into Kew Gardens and also into the Media Centre are anecdotal examples at least of our successes.

Q83 Dr Harris: One of the many issues in this conflict I think there is is this tension that exists between Government demanding that researchers get their departmental funding from industry to promote that partnership and then the allegation being made that those same scientists in and of themselves or when they are sitting on committees, which we rely on scientists doing to feed back, are somehow less than independent because they are tarnished for being funded by industry, it is these allegations coming off about people only being funded in salary terms by a pressure group and when these people are not getting any salary from industry. Are you aware of that conflict and is there anything that you can do in this area to ameliorate it?

Professor Goodfellow: We certainly make sure everybody on every committee fills in forms about any potential conflict and the one for the Council is on our website and you may have seen it on *Kenyon Investigates* on television because it was filmed.

Professor Freedman: I think the only solution here is openness. As you say, you expect a level of integrity from scientists and there is an expectation that they will contribute their knowledge to economic well-being which will mean working in partnership with industrial sponsors, I think that is something that most universities will encourage. I recognise that that will be used as a suggestion that they are not independent, but I think there is no way of preventing false inferences being drawn. Scientists will be independent, that is the basis of their reputation and their integrity and will work with sponsors in relevant areas. I do not think there is any way of stopping false imputations and false inferences being drawn from that.

Professor Goodfellow: I think it is also necessary to have a balance of people to look at the diversity of people that you have got on your committees. Certainly on Council we are basically instructed to have mainly academics and then three government department people and three people with an industrial background so we get a balance of people there. Any potential conflict of interest can go on the website and is declared during the meeting if it is appropriate and I think it is about making clear that we are transparent about those processes.

Q84 Dr Harris: You have put some resources in to training postgraduates in communication skills, implying that there is a problem to be solved in the way scientists communicate with the media and the public rather than, for example, there being a choice clearly and one argument is to invest that money in trying to get the media to be more responsive and understand risk and the language and what the scientific method is about. Again, what is the future of that? Do you think that is something you would want to do more of or do you think there is an argument for switching it into the area I have described?

Professor Goodfellow: I think you have to do both, that is the problem, you have to work with the media and explain and I think often when we talk to the media, if we talk to the science correspondent we find that is not a problem, they often understand the issues, it is when the issues get politicised and we have the political correspondents writing about it that we begin to see differences. I went on the course the postgraduate students did with the media and it was absolutely great fun and I would recommend it to any scientist.

Q85 Dr Harris: So your view is that this should be part of basic university training and it is not something you need to pick up if people are interested, it should be a compulsory part of undergraduate training that everyone is getting that training?

Professor Goodfellow: I would love to say yes but then I might say yes to a large number of things such as I would like them to do more mathematics, there are a number of things I would like them to do. What I do worry is that their transferable skills training will get bigger and bigger at the expense of the project they are doing and I think there needs to be a balance there. I think certainly speaking in non-science language to people is very important.

Q86 Mr McWalter: How well do you get on with Defra? You say they are major sponsors of several of your institutes and you work closely with their Science and Policy Unit to ensure stability and synergy in institutes' funding. That is alright then, is it?

Professor Goodfellow: As you will be aware, Defra funding to our institute has been dropping over a number of years and that is absolutely clear. Since the arrival of Professor Harold Dalton, who is in a senior post as their Chief Scientific Adviser, they now have a science policy, they have published that, they have a science advisory group which I have been on as an assessor and Howard is on our Council as well, so we have got much better communication at strategy level as to what is going on. It really depends on the area. If you look at the area of animal health, we did a review of Pirbright last year, which is in the public domain, which Professor Keith Gull at Oxford chaired for the Council and there we were quite surprised to see that the funding from Defra had been very constant over time, they really were continuing to put money into animal disease, which is what you would expect. I think other areas have been a challenge for them and they are certainly reducing funding in certain areas, but it is their right as a department to choose where they want to put their money.

Q87 Mr McWalter: I notice that you use the word "refocus" these days for cutting. It beats restructuring. Is it because of Defra that you have had to refocus some of the objectives of your institutes?
Professor Goodfellow: It can be a mixture. In fact some of the losses in funding we have had from Defra have been ameliorated because the institutes have got money from elsewhere, so the institute base is remarkably stable. If you look at their diversity of funding sources, which I think you have got figures on, they get money from the EU, they get money from the Food Standards Agency and from industry, but of course if consistently over a number of years we are not getting grants in certain areas from Defra we do have to make redundancies and we do that as any company would.

Q88 Mr McWalter: Were they greedy for your advice about GM crops? Were they delighted to make use of your expertise there?
Professor Goodfellow: I think they have a lot of expertise open to them, including all their formal committees as you are well aware.

Q89 Mr McWalter: So they did not make a pig's ear of it then?
Professor Goodfellow: Your words!
Chairman: What would your words be?

Q90 Dr Turner: Your Strategic Plan devotes a certain amount of attention towards knowledge transfer and you plan to commit 1% of your project to knowledge transfer activities. What made you decide that 1% of your budget was the right amount to devote to this area, and have you any objective procedures to try and assess whether or not that is the right amount to spend or whether you should be spending more or whether you are wasting it?
Mr Visscher: I think the 1% figure is rather misleading. That is a figure that relates directly to a small number of very important issues such as the Young Entrepreneurs Scheme that BBSRC piloted, the Business Plan competition and also Faraday Centres. In addition to that, the funding of CASE co-operative studentship awards with industry is a really important component of our knowledge transfer activity. We have about 600 of those out of our total studentship portfolio and something like 200 companies involved on projects and about 50 of those companies are SMEs. So we are trying to tackle that area of knowledge transfer as a prime area as well as putting additional funding into areas such as the Small Business Research Initiative. We are also currently bidding for additional funding arising out of the last Spending Review for knowledge transfer activities to assist public sector research establishments and institutes in particular. We are bidding for additional funds that are available there, sums of several million pounds and we think we have got a fairly strong bid in in two areas at the moment. One is in collaboration with other research councils under what we call the Rainbow Fund which was set up by three research councils and DSTL, the Defence Research Establishment. We see some merits in the scheme they have established and so we want to join with that and make it available to the bioscience community and particularly the institutes. So that is one important growth area. The Business Plan competition that I have just referred to is an area that has been growing in terms of the amount of interest that has been attracted. This BBSRC initiative is now being shared with other research councils and this year we have had 115 applications. We can see some of the outputs as well that have come from the earlier rounds where companies have actually been established, they have secured some venture capital funding. I think it is of the order of ten companies that have now been established arising from the Business Plan competition and they have raised over £2 million of venture capital. So we are starting to see the output from some early investment downstream from the Young Entrepreneurs Scheme through to the business planning and this is now starting to mature into real funding. An example from the Young Entrepreneurs Scheme is where Dr Tim Hart[2], who was successful in one area there, is now co-sponsoring that particular area as well.
Professor Goodfellow: There were two NAO reports on innovation in our institutes last year and I have been to the Public Accounts Committee twice in this area. There are a number of matrixes that we use.

Q91 Dr Turner: Your Annual Report shows that in the last year there was something of a reduction in the number of patents, the number of licensing agreements and joint publications with industry. Are these just variations without any particular significance or does it worry you?
Mr Visscher: There has been a small dip. In terms of patents, I think there is a slightly harder nosed attitude to managing patents and which patents are retained these days, but the overall income which is derived from patents and the licensing of them has been increasing steadily. If you look back just for the BBSRC institutes, I know the amount of licensing income and so on—this is excluding any equity sales—has increased by 85% in the last six years, a bit less if you take a shorter period and we are starting to see sales of equity coming through and value being derived there which in due course will be recycled back into the research base and start to establish a virtuous circle of reinvestment.

Q92 Dr Turner: Your own Babraham Institute has a bioincubator. How successful do you think it is? How are you measuring its success?
Mr Visscher: I think we would claim it is one of the most successful bioincubators in the UK. It has 17 companies which are actively involved in that incubator at the moment and it is employing over 150 people. In addition to it generating economic activity in that area and there is a real cluster of

[2] *Note by the Witness:* Dr Hart has now established a real company, Cybersense Ltd, and is now co-sponsoring the Scheme as well.

activity developing around the institute, the companies coming in have a degree of potential synergy with the researchers of the Babraham Institute and they can share some of the equipment that is there and it has been a very exciting development to the extent that we have now been able to secure additional planning consent for further bioincubators and research facilities. Building is due to start on the first one of these this month in fact. The BBSRC is assisting with that indirectly by guaranteeing a loan to the company and there is a heads of agreement to let 50% of the building, so the demand is there. We have also seen strong interactions with the East of England Development Agency where we had also identified another gap in the whole development process at the very early stage of an idea before it is big enough to set up a company that needs some mentoring capacity and general support. EEDA has put of the order of £700,000 into a scheme which the Babraham Institute refers to as "Bioconcepts". That has only been established for a few months and already there are two companies involved in that and the Babraham Institute will take something like a 10% equity share in those companies and help to nurture them. The hope is that they will grow. They can then go into the bioincubators and there is also planning permission for larger research buildings. So we have got a continuum of good innovation there.

Q93 Dr Turner: You have also just established a fund with the EPSRC and NERC to help the funding gap for small spin-off companies at the proof of concept stage. Do you think it appropriate that you as BBSRC should be funding this part of the business development process or should the DTI be doing this?
Professor Goodfellow: I think there is a mixture of issues there. Obviously the universities do get some money directly through various schemes through the DTI, but I do think there is a need there. Certainly when people have had funds from the BBSRC there seems to be a gap after. This scheme is very limited amounts of money and it is jointly with two other research councils. So I think we wait to see. We were pleased to fill a gap in the system.
Mr Visscher: We are only funding the actual grant holders, it is a very limited scheme.

Q94 Dr Turner: Do you feel that this gap is identifying a failure on the part of the DTI to do its job properly and do you feel resentful at having to use your money to plug it?
Professor Goodfellow: I think we want to make sure that our research in whatever area goes through to fruition, so I think at this level we are happy to do it. I think you will have to wait until tomorrow for the Innovation Review of the DTI and the Lambert Review to get an overview of that.

Q95 Dr Iddon: I just want to turn to collaboration with industry. Big business seems to do quite well out of your Partnership Industrial CASE award scheme, GlaxoSmithKline for example getting almost a third of the awards. Can you say something about how you promote the CASE scheme to small and medium enterprises and whether that has been at all successful?
Professor White: The issue with small and medium enterprises is that they are a very different type of organisation in the way that they have funding. They have far less funding, they fight to get venture capital money for themselves and they also tend to be much more focused on a small time into the future, so on the whole they are not such a successful collaborator for CASE awards as are companies of the kind that GSK is who have the capability for taking onboard studentships in a way that SMEs do not.
Professor Goodfellow: So if they have only got two years venture capital and it is a three-year PhD then most of the SMEs will not take part, it is that level of instability.

Q96 Dr Iddon: Both the industry and academia Collaborative Research Grants seem to have quite a low profile. Is there a reason for that? I think GlaxoSmithKline make a significant contribution. What about other companies?
Professor White: I am sad you think it is low profile. It is one that we have pushed from time to time. It is one that is to our way of thinking maybe not as successful as we would like but nonetheless it does get collaboration. We have actually just changed the way in which we work the system slightly to make sure that we get real collaborations into these Industrial Partnership awards rather than simply the cash contributions which we had before. So I think I would say that it is an important part of our portfolio of grants in responsive mode and one which we do push from time to time and we think works.

Q97 Dr Iddon: Industry makes a 15% contribution there.
Professor White: That has been the criterion up to now. We have just changed that as of the last meeting of the Strategy Board and so what we have now—I would have to check exactly what it says—are the words "an effective and substantial collaboration". We would use 15% still as a substantial collaboration but we intend to enable that scheme to have more collaboration than simply the amount of money that is involved.

Q98 Dr Iddon: So what you are saying is merit is more important than money in these applications?
Professor White: Yes. It is the way that the collaboration works. It is to try and make sure we get that collaboration working rather than simply using the money. We hope that it will develop in that way.
Dr Iddon: Thank you.

Q99 Chairman: We are rounding the bend into the home straight so you can relax! I have one last batch of questions to finish up. In your Strategic Plan you state that you will have to "decrease funding in some

areas in order in redirect effort to the higher priorities". When is this going to happen and what areas might they be?

Professor White: It is likely to happen soon I think in the area we are calling "systems biology". One of the areas that we are expected to put in for in the next Spending Round is this subject, but we are expecting to approve funding for that in a fairly major way before the Spending Review. It is so important to us that we will be funding in that area.

Professor Goodfellow: You asked about "sunseting", that is the jargon. There is a natural sunseting and this happens at two levels. One is that the committees are actually tending to look at very timely projects because we are only funding at 30% which we think is very high. There is certain science which is really boring and a bit old which is not going to get done, and things that do not take account of the revolution in biology over the last five or ten years are not going to get through. The committees look at their priority areas each year and those priority areas do change. They do not change everything every year but they do change over time to reflect different priorities. The community is not good at sunseting but they are beginning to do it and it is something we have to do, we cannot fund everything.

Q100 Chairman: How do you take up issues like BSE and foot and mouth when they come along and perhaps derail you from the whole strategy and project? You have been through it once or twice as a research council and it is bound to happen again. What mechanisms have you put in place to ensure that you can still handle both strategic planning and the short term?

Professor Goodfellow: We actually run small initiatives, that is initiatives with a small "i" and we actually build into the budget enough money for those things to become timely or critical. In the case of things like foot and mouth we can put money in there, it is part of our financial planning.

Q101 Chairman: Do you predict that there will be crises coming up where you will have to do that and how much money are we talking about?

Professor Goodfellow: There are always new areas of science. When that crisis occurs, it is not the basic science where you need to put the money in but actually the people, resources and the institutes. The basic science takes a backburner while they go on and do the job. During the foot and mouth crisis Pirbright research was put on hold while staff dealt with it, so all the scientists actually put their own work on a backburner.

Q102 Chairman: What process do you have in place to evaluate these decisions that you make short term and long term, do you leave it to your Council or are there other mechanisms?

Professor Goodfellow: The final decision-making body is Council but it is advised by the Strategy Board which in turn gets advised by the different committees we have. We do go out to stakeholders and we do a lot of consultation, so it is a pyramidic process.

Q103 Chairman: I am sure you will not want to answer this question. Was the money well spent in preparing for this session?

Professor Goodfellow: Absolutely, it could not have been spent better. They would not have done it without you!

Q104 Chairman: Professor Goodfellow, how much was it, was it millions of thousands?

Professor Goodfellow: For you, Ian, about £100!

Chairman: Thank you very much indeed for an illuminating session.

Written evidence

APPENDIX 1

Memorandum from the Biotechnology and Biological Sciences Research Council

1. Introduction

1.1 BBSRC's remit covers all aspects of the biosciences and biotechnology including many in which the UK is internationally competitive or a world leader, eg plant science; post-genomics[1]; biology of stem cells and nuclear transfer; animal health; and structural biology.

1.2 We fund research in universities and in eight sponsored institutes (Annex 1a). In 2002–03, we invested £275.8 million to support research and research training. We support university researchers (2000), institute staff (3200) and postgraduate students (2000).

Scope of research

1.3 We have a unique, three-fold role in supporting UK biosciences by funding research and research training that provides:

(i) basic and strategic research that pushes back the frontiers of human knowledge about how living things work;

(ii) longer term strategic research that informs policy, particularly in animal health, food quality and safety, agriculture and land use; and

(iii) a broad base of enabling research from molecular and cell biology to whole organism physiology and populations, that underpins applied research, eg in medicine, materials/technologies and environmental science, where MRC, EPSRC and NERC respectively are the principal funders, as well as in agriculture and food, funded by Defra and the Food Standards Agency.

Examples in Annex 2

1.4 Our research enhances understanding and wealth creation in areas of high public interest, eg healthcare, animal welfare, sustainable farming, and biodiversity. Examples include: new targets for drug design (eg new antibiotics); improved delivery of gene therapy; novel ways to grow crops with less water and fewer chemical inputs; new target for controlling E. coli, Campylobacter and Salmonella.

1.5 Following extensive consultation, we published our Ten-Year Vision and Strategic Plan (2003–08) in January 2003 (www.bbsrc.ac.uk/strategicplan). Our new strategic objectives are set out at Annex 3.

1.6 We have pioneered approaches to transferring knowledge generated by research to industry (eg the Bioscience Business Plan Competition, see 4.6) and promoting public dialogue (eg first UK Consensus Conference) to help ensure that research takes account of people's aspirations and concerns.

1.7 BBSRC's Grant-in-Aid from the Office of Science and Technology has increased from £189 million in 1997–98 to £242 million[2] in 2002–03, reflecting the rapid advances in biosciences, their myriad applications and the excellent UK research community.

1.8 We are addressing the challenges raised by this success: in developing and retaining skilled researchers (3.3); providing infrastructure for new and increasingly interdisciplinary ways of conducting research (2.9, 3.5, 3.6); and in prioritising increasing numbers of high quality applications for support. Despite increases of over 50% in applications for responsive mode support since 1999, we are managing to keep success rates at around 30% (Annexes 4a and 4b).

1.9 Progress in biosciences now drives innovation across traditional scientific disciplines, and itself depends on interdisciplinarity. Within Research Councils UK (RCUK) we are integrating our funding more and more with that of other Research Councils, from three cross-Council programmes under spending review allocations in 2001–02 to six in 2003–04. We also work collaboratively to fund research with international partners (8.8, 8.9).

1.10 BBSRC has been pleased to contribute to the RCUK Vision and Synthesis of Strategies, and also welcomes the opportunities afforded by RCUK for collaborative approaches to career development, knowledge transfer and public awareness.

1.11 Administration accounts for only 2.5% of our budget.

[1] post-genomics refers to a suite of technologies being used to make sens of the genomes (DNA sequences) or organisms.
[2] Excludes £29 million from Joint Infrastructure Funds, income from other Research Councils and miscellaneous income.

2. Grant Awards to Universities and Institutes

Balance

2.1 Of our current "grant" funding (first three categories of Annex 5):

- 48% is awarded as responsive mode grants (mainly to universities);
- 31% is awarded as core strategic grants to our eight sponsored institutes (and Horticulture Research International); and
- 21% is awarded through managed research initiatives in areas of strategic importance.

2.2 We use mechanisms to tension funding between:

- responsive mode and initiatives (2.12);
- university and institute-based research (short and longer-term research);
- established and new researchers (3.9); and
- large awards to networks/consortia and individual project grants.

2.3 We have increased the proportion of funding we award in responsive mode in order to maintain a strong portfolio of basic and enabling research (Annex 5).

2.4 Our awards to universities and institutes can be mapped to seven funding areas (Annex 6a). Although most of the awards to universities go to bioscience departments, 16% go to other disciplines, including mathematics, physical sciences, engineering and veterinary research.

2.5 We accept applications on the merits of individual proposals, and do not take account of the Departments' Research Assessment Exercise scores. Our grant funding is focused: 25% of grants go to four universities, 50% to 12, and 75% go to 26.

2.6 We target a proportion of studentships and fellowships to priority areas such as mathematical biology, stem cells and whole organism physiology.

Networking

2.7 To facilitate "joined up" funding, we are active within RCUK, and participate in networks including the Genomics Coordinating Committee, the Funders Forum for Transmissible Spongiform Encephalopathies, the National Cancer Research Institute. We recently extended eligibility for BBSRC funding, eg to the Royal Botanic Gardens, and to NERC institutes.

2.8 We encourage regional networking and sharing of expertise and facilities. For example, with industry and under the Joint Research Equipment Initiative, we funded a £1 million proteomics facility for studying protein profiles in cells from crop to product quality to human diet and health, for institutions on the Norwich Research Park.

2.9 We support research through virtual centres (Annex 1b), plus interdisciplinary centres on nanotechnology (£18 million total) and tissue engineering (£10 million total) funded jointly with EPSRC and MRC. We are funding a virtual centre for metabolomics at Rothamsted Research.

2.10 We work closely with other public sector funders, especially Defra, FSA and SEERAD, and operate several joint funding arrangements at research project and programme levels.

Priorities

2.11 BBSRC Council and Strategy Board review scientific areas and strategic needs in setting our top level priorities, as outlined in our Vision and Strategic Plan; this is further informed by:

- annual audit of grant portfolios and identification of gaps by our Research Committees (2.12, 2.13);
- horizon scanning with researchers and end-users (industry and policy); and
- wide consultation, including input from our Advisory Group on BBSRC Response to Public Concerns.

2.12 We use Research Initiatives (often cross-disciplinary) to invite applications in the highest priority areas (eg 6.1). Research Committees fund in responsive mode across all areas of our remit on the basis of scientific merit, although they also identify areas in which they particularly welcome applications.

Peer review and award processes

2.13 We operate a robust peer review process for grant applications, based on the Research Committees and assessment by referees, and have always provided feedback to applicants.

2.14 Committee members include academic and industry-based researchers who provide a breadth of expertise to cover BBSRC's remit. They are appointed for personal knowledge and expertise and not as "representatives" of different interests.

2.15 Increasing numbers of applications for funding (Annex 4a) threaten unacceptably low success rates and peer review overload. This is an area of concern to BBSRC.

2.16 We require our Committees to alert us to any potential ethical and social issues surrounding successful applications, for consideration by the Advisory Group (2.11).

2.17 We publish details of: funding opportunities; Committees' remits, membership and priorities; and cross-Council priorities on our website. Information is also provided in a quarterly magazine (BBSRC Business) and a free-registration monthly e-mail service.

2.18 We introduced Resource Account Budgeting (RAB) with minimal disruption to our funding for research. BBSRC-sponsored institutes have used RAB-style accounting for several years.

Institute funding

2.19 Our sponsored institutes receive core strategic grants (CSG) from BBSRC Council. They can also bid for grant awards, up to a cap that controls our overall ratio of university and institute funding. The proportion of BBSRC expenditure that is invested in the institutes is shown in Annex 7a.

2.20 Our four-yearly Institute Assessment Exercise (IAE) contributes to the setting of the level of funding for each institute for the next four years. It covers overall institute performance in terms of research quality and strategic relevance as judged by Visiting Groups of independent assessors, as well as assessment of knowledge transfer, and training and career development by separate panels.

2.21 We make further adjustments to institutes' funding in the light of annual reports to Council on institutes' progress in meeting IAE recommendations.

2.22 The institutes derive income from various sources (Annexes 7b, c, d). This reflects the nature of their research and the mix of basic, strategic, applied and industry-sponsored work. The level of income from BBSRC also partly reflects institutes' different historical roles, and the roles of other funders.

2.23 Defra is a major sponsor at several of the institutes. We work closely with Defra's Science and Policy units to help ensure stability and synergy in institutes' funding.

2.24 We regularly review the fitness for purpose of our sponsored institutes. We refocused the Institute of Food Research on a single site in 1999. This year we completed a £30 million (£23 million from BBSRC) restructuring of Rothamsted Research (the former Institute of Arable Crops Research). This facilitates interdisciplinary working around new, world-class facilities. Recently, we reviewed the Pirbright laboratory of the Institute for Animal Health, the high-containment laboratory which undertakes research on highly infectious exotic viral disease of livestock, and Council is recommending major rebuilding jointly with Defra. We also reviewed current and projected requirements for research to underpin sustainable agriculture. These reviews are enabling us to enhance and focus institutes' strategic value within the UK science base. We are establishing an Estates and Equipment Committee that will define a 10-year investment programme to ensure they remain sustainable, and fit for purpose.

2.25 Institutes sponsored by BBSRC contribute to national and international networks. Examples are Defra's Crop Genetic Improvement Networks (on wheat, oilseed rape and willow/poplar) where Rothamsted Research, the John Innes Centre and Horticulture Research International are working with partners from universities and industry, and the SAFE consortium, a European network set up to provide independent research and information on food safety issues. IAH Pirbright is an important international hub for research into exotic animal diseases.

3. Research Training and Career Development

Studentships

3.1 BBSRC supports a total of around 1900 PhD and 100 masters students, many in collaboration with industry (Annex 8b). Specific schemes to enhance industrially relevant training are described at 4.13.

3.2 Last year we introduced Doctoral Training Accounts that enable university departments to offer different patterns of three- and four-year training and higher stipends. Our first review indicates these are attracting high calibre students. We contributed to a new Training and Accreditation Programme for Postgraduate Supervisors to support professional development.

3.3 To compete for the ablest students, we must continue to enhance the attractiveness of PhD training and its value in research and non-research careers. We already pay PhD stipends above the Government minimum and are making further staged increases from our current level of £9,500 to £12,000 for 2005–06. All our PhD students will have an opportunity to enhance their transferable skills training through attending a UKGRAD graduate school.

3.4 We are reviewing and consulting on our portfolio of support for PhD, MRes and MSc courses, to ensure that we have the appropriate mix to provide the skilled scientists needed in academic research, industry and other science-based professions. The consultation is at www.bbsrc.ac.uk/funding/consult.

3.5 We need to find optimal ways of training young researchers to work at the interfaces between scientific disciplines, particularly between biosciences and the physical sciences. In partnership with the EPSRC and MRC, we provide "Discipline Hopping" awards that enable researchers funded either in the biological or physical sciences to take their expertise across the disciplinary boundary to develop new areas of research.

3.6 We need to train highly numerate bioscientists and biomathematicians to work in the biosciences and particularly in areas such as e-science, bioinformatics and nanotechnology. We are liaising with the university sector and within RCUK to facilitate the development of such individuals.

Fellowships

3.7 BBSRC's Fellowships schemes are designed to provide stability and dedicated research time for high calibre researchers at different career stages. Our David Phillips awards support young scientists who have demonstrated high potential during their research training and postdoctoral research; Research Development Fellowships support younger members of university teaching staff; and our Professorial Fellowships enable outstanding scientists to conduct full-time research at the height of their research careers.

3.8 We welcome the announcement of the Roberts Fellowship schemes, and are working within RCUK to optimise their effectiveness for career development in the biosciences.

New researchers and research assistants

3.9 Our New Investigators scheme enables our Research Committees to fund grant applications from top-flight young scientists who have not yet established a track record in research. A recent survey of young researchers shows strong support for the approach we have taken.

3.10 Since 1997 we have allowed Research Assistants to be identified and included on grant applications, thus enhancing their career progression by ensuring their association with specific pieces of research.

Institute researchers

3.11 Within the institutes, researchers' career progress is based on personal contribution to the institute's scientific programmes. This can be achieved through personal promotion schemes. We have also recently introduced a new merit pay system that enables the institutes to make additional salary increases to individuals who make significant contributions and out-perform their peer group over a sustained period.

3.12 We are reducing the number and proportion of researchers employed on fixed-term contracts (often funded externally, eg by Defra). This peaked at almost 1,300 in 2001–02, has decreased by 23% in two years, and is due to reduce further by over 60% by 2005–06.

4. Knowledge Transfer (KT)

4.1 We contribute to knowledge transfer through a variety of routes, one of the most significant being that one in four BBSRC PhD students move into industry or commerce upon completion of their studies. We also support a variety of public good research relevant to policy, and pre-competitive extension activities to the agri-food sectors, mainly through our institutes (4.10).

4.2 Our role is to support KT by BBSRC-funded scientists and complement the support to industry provided by DTI, and infrastructure support to universities from the Funding Councils and the Office of Science and Technology.

4.3 In line with The Baker Report on innovation in the public sector, we delegate management of Intellectual Property (IP) arising from our research to the university or institute where the research was conducted (see also 4.11, 4.12).

4.4 Our research is relevant to many sectors, eg pharmaceutical, healthcare, farming food, chemical, bio-processing, sensors and nanotechnology. We meet regularly with some of the leading organisations in these sectors, including the BioIndustry Association, Food and Drink Federation and Association of the British Pharmaceutical Industry, and with DTI's Bioscience Unit. We participate in Government-industry initiatives, such as the Bioscience Innovation and Growth Team, to optimise KT in key sectors.

Entrepreneurship and commercialisation

4.5 We encourage commercialisation of results from research at universities and institutes, through licensing, spinout companies, and partnerships. We assist researchers to identify and protect IP as part of a portfolio of activities promoting commercial awareness. We monitor and evaluate performance (Annex 9).

4.6 We pioneered the Bioscience Business Plan Competition, which has helped over 30 new ventures and led to the new cross-Council Competition. Ten companies from the first two rounds have attracted £2.3 million of investment. The third round is being taken forward as a cross-Council activity within RCUK.

4.7 We invest over £3 million per annum in LINK programmes that support collaborative research between academic and industry researchers. Our Industrial Partnership scheme supports grant applications with a financial commitment of at least 15% from industry.

4.8 We fund two Faraday Partnerships to foster networking between researchers and companies: on livestock genetics and genomics with Roslin Institute as the core partner; and on medical devices eg drug delivery systems, with EPSRC.

4.9 We have invested £2.8 million in awards to a total of 14 companies under the Small Business Research Initiative. Two of the companies Orla Protein Technologies and Hybrid Systems Ltd, now with external funding, came through the Bioscience Business Plan Competition. Another, Biotica Technology, is a spinout from BBSRC research at Cambridge University.

Role of BBSRC-sponsored institutes

4.10 Our institutes link with their user communities in a variety of ways, for example through membership bodies that enable two-way interactions between researchers and people working in the agri-food sectors (eg Arable Research Institute Association of Rothamsted Research, and the Institute of Food Research's Food and Health Network) and through in-house platforms for commercial services, eg those at the Institute of Grassland and Environmental Research on agricultural extension.

4.11 The institutes have commercial offices—some delivered through IP management companies. As appropriate, knowledge is transferred through bioincubators, spinouts, consortia (2.25) and user networks. Spinouts include: Novacta Biosystems Ltd (JIC), VSNi Ltd (RR) and Molecular Nature Ltd (IGER). The Babraham bioincubator houses 17 companies; and substantial additional facilities are planned. We are exploring a portfolio management approach across institutes.

4.12 Commercialisation of research at the BBSRC-sponsored institutes has been scrutinised by the Public Accounts Committee (Feb 2002; Feb 2003).

KT Training

4.13 An important dimension to KT is the role of researchers with industrial and commercial skills. We support training at different career stages through:

- increasing IP awareness through support for "local" IP workshops;
- Industrial CASE and CASE Partnership awards (total 91 per annum);
- Modular training courses at Masters level for bioscience graduates working in industry;
- the Industry Fellowship Scheme (with the Royal Society) that links scientists in academic centres and industry; and
- Biotechnology Young Entrepreneurs Scheme—where students and postdocs produce hypothetical business plans.

5. Public Awareness

5.1 We spend over £0.5 million pa on centrally managed activities. We also require institutes and grant holders to engage with the public, and estimate total spend at around £1 million pa. We work within RCUK and with others (eg Royal Institution, BA, Coalition for Medical Progress) to avoid duplication, share best practice, develop methods for evaluation, and deliver joint activities.

5.2 We promote awareness of the objectives and potential applications and implications of current research. We pay particular attention to researchers-public interactions. We complement presentation of scientific knowledge (eg Science Centres and Museums) and school and adult education (DfES, ASE, etc).

5.3 Data to date show that, of over 1,000 BBSRC grant holders, 68% (66% in 2000) have undertaken significant activities: over a third have engaged with the media, over half have participated in public events, and around a third have worked with schools.

Public access and accountability

5.4 We disseminate information through:

- web publication of: grants, BBSRC procedures, reports of Council meetings;
- media briefings/releases;
- touring public exhibitions—eg "InGENEious", a display on GM (1998–2002) and "DNA in the garden" a display on plant science and its applications, with RBG Kew (2003); and web exhibition site (www.bbsrc.ac.uk/life);
- publications eg "Science and Animal Welfare" (winner of 2003 UFAW Tesco award for promoting public understanding of animal welfare science); and
- school-scientist links: support for curriculum science and citizenship areas (eg "Genetic Futures" debates, with DfES and others).

5.5 We support researchers by providing media and communications training; and by a small grants scheme (awards of £2K–5K, totalling £60K pa) for public engagement work, including partnerships with other Councils.

Public dialogue

5.6 We sponsor public meetings at which members of the public can question scientists and engage in debate around a range of viewpoints, eg the nanotechnology meeting at the Royal Institution (March 2003); a meeting on the future of the countryside, with NERC (Cheltenham Science Festival, May 2002).

5.7 We publish position statements and discussion documents, eg on the use of animals in research, stem cells, transgenic plants, including "Ethics, Morality and Biotechnology" booklets.

Public consultation

5.8 We aim to understand public attitudes, and identify needs or concerns amenable to research, so that these can be considered by our Boards and Research Committees in deciding policy and funding, by:

- web consultations (eg gene flow, crop science);
- focus groups (eg bioremediation, animal health);
- input from the Advisory Group on BBSRC Response to Public Concerns; and
- dialogue with special interest groups (we are seeking ways of working directly with organisations such as Genewatch and Compassion in World Farming).

GM

5.9 BBSRC's remit covers science relevant to several areas of public concern including the application of GM technology. On GM, we have consistently supported public debate beginning with our sponsorship of the Consensus Conference in 1994. We encourage the researchers we fund to participate in public debate and contribute their personal knowledge and expertise, eg on gene flow. We seek to provide balanced information (eg "GM agriculture in the UK?" 1999, and InGENEious exhibition) and to publicise research on GM and non-GM approaches in agri-food eg in quantitative genetics and transgenic approaches to protecting potatoes from attack by nematodes. Several awards support school and wider public discussions on GM and related issues (5.5).

6. Recent Priority Investments

6.1 In SR2000, we received an additional £33 million for genomics research. This has enabled us to build on the outcomes of earlier strategic programmes in genomics through a new initiative, "Exploiting Genomics" that specifically addresses real problems in the agri-food, healthcare/pharmaceuticals, and manufacturing and post-genome technology sectors.

6.2 For example, through this initiative we are funding investigation of gene function in *Streptomyces* bacteria, which are the source of over half the world's antibiotic medicines. The project uses data about the *Streptomyces* genome sequence that was published in 2002 following a £2 million research project jointly funded in 1997 by BBSRC and the Wellcome Trust. Already data are being accumulated about the role of key genes in antibiotic synthesis, that should aid the design and development of novel antibiotics that might be used to combat pathogens that have become resistant to conventional ones.

6.3 Another example from Exploiting Genomics, is work to identify and understand important genetic determinants of virulence in the food poisoning bacterium *Campylobacter jejuni*. This builds on previous BBSRC-funded research that revealed that the bacteria have capsular coats and carbohydrate attachments to some proteins. These unexpected findings aid understanding how the bacteria evade immune defences, and could provide targets for novel controls and vaccines.

6.4 In SR2000, we were awarded an additional £8 million for e-science to develop the use of high-speed networks, software and computational models to relieve bottlenecks in data handling by our community.

6.5 We funded four pilot projects that apply GRID and related processes: assigning structures to proteins; high-throughput crystallography; molecules in motion; and biodiversity informatics. We also funded studies on ageing and neuroinformatics, with MRC; a GRID support centre at CCLRC, and 16 projects in enabling technologies for bioinformatics.

6.6 The £1.2 million biodiversity project is supporting development of a virtual laboratory for researchers worldwide, providing them with desktop access to tools for verifying, collating and analysing dataset sources from around the world. Data are expected to inform strategies for conservation worldwide, and predictions of the impact of climate change on biodiversity.

7. SR2002 and Beyond

7.1 Our projected spend on initiatives and responsive mode is presented in Annex 10. We also plan to build on our investments in stem cells and animal health research.

7.2 Our new £10 million programme on viral diseases of livestock focuses on understanding: disease persistence; resistance and susceptibility of animals; and disease progression and transmission. We have earmarked half the funding for collaborative research with the Institute for Animal Health, to re-enforce its strategic role as a centre of excellence: the other half will be awarded for basic research. Defra and SEERAD have contributed additional funding. We have used small focus groups to explore stakeholder attitudes to livestock health research.

7.3 We will invest £6 million in an initiative (Integrated Epigenetics) on how patterns of gene activity, rather than the genes themselves, effect development in animals and microbes.

7.4 The focus of our bid for SR2004 is to foster "systems biology", by providing further support to enable researchers to work across disciplines and institutions, to generate the seamless information about molecules, cells, tissues, organisms and populations needed to understand phenomena such as complex metabolic networks, stem cell development, immune defences, and brain function and behaviour.

8. Other Challenges

8.1 In addition to the challenges we have already identified, we recognise several which can be addressed only through RCUK or partnerships with other bodies.

Career development

8.2 We are working within RCUK and with the Funding Councils to implement recommendations of the Roberts Review. An example is identification of an integrated framework for training and early career development.

8.3 The fast pace of change in the ways bioscience research is conducted means that we need to enhance researchers' mobility, for example between universities and institutes, by providing the appropriate support.

Diversity issues

8.4 BBSRC's commitment to equal opportunities was recognised in a gold standard and silver awards in the 1999 Benchmarking Index of Opportunity 2000. We received a Gold Award in 2000–01 from Business in the Community's "Opportunity Now" benchmarking, for promotion of gender equality. We report data on application and success rates by gender in our Annual Report. This year we launched meetings with senior women scientists and research managers to identify solutions to career development problems that particularly affect women.

8.5 We have produced a race equality scheme and action plan. We contributed to the Ethnic Minorities in SET Forum, which will report to Government soon. We are also partners in the Disability Working Forum.

Changes to university funding

8.6 We welcome the appointment of a Director General for Higher Education and the opportunity to contribute, within RCUK, to consultations on the future shape of funding for university research. We support moves to achieve longer-term sustainability for funding for research in universities but are concerned to maintain a vibrant bioscience sector. In particular, the impact of reduced Funding Council support for biology, because of a lower weighting for teaching costs, and changes in the research funding formula for charity overheads could have serious knock-on effects and decrease the volume of bioscience.

National and international partnerships

8.7 Biosciences have become "big science" and are increasingly dependent on access to very costly facilities, such as DIAMOND, High Performance Computing and neutron scattering, that require investment of tens of millions of pounds per annum. Even provision of more routine and widely used technological resources needed in any world-class department typically costs millions of pounds per annum. Although we are currently managing the inevitable impact of this change on our application success rates, we recognise that a step change in funding will be required to prevent a serious decline in research volume in future.

8.8 BBSRC participates actively in European science (see submission to previous Committee enquiry). BBSRC is the managing partner of the UK Research Office in Brussels, on behalf of Research Council sponsors.

8.9 We work to develop strategic alliances with researchers in other countries, where there is mutual benefit to research and added value by joint working. Examples include the ERA-NET activity in plant genomics (within EU Framework Programme 6), and genome sequencing of pig and cattle (with USA and other international partners). We focus on North America, China and Japan. We have established two Partnering Award schemes that enable UK researchers to initiate long-term relationships with scientists in Japan and China, in areas of strategic importance to BBSRC, such as structural enzymology and bio-nanotechnology. We contribute to the Human Frontier Science Program.

Plant science and plant breeding in the UK

8.10 The UK is a world leader in plant science research and major centres such as Rothamsted Research and the John Innes Centre attract high calibre overseas scientists and participate in major international networks. The research underpins a wide range of potential applications and we are consulting widely on future directions that are particularly relevant to development of crop plants.

8.11 An example is plant science research relevant to developing countries eg biological pest control (Rothamsted Research) drought and salt tolerance (John Innes Centre) and GM control of nematodes in tropical crops (University of Leeds). This situation would appear to come under the remit of DfID.

8.12 In contrast to plant science, plant breeding is problematic. Problems arising from the lack of publicly-funded plant improvement programmes, including traditional approaches, in the UK have been exacerbated by the movement of private sector R&D offshore. The result is a hiatus in the development and commercialisation of outputs from basic research.

Stakeholder engagement

8.13 BBSRC has a pivotal role in fostering research that meets the various needs of the scientific community, the public, industry and Government. We recognise the need for better approaches to engaging with these stakeholders and the challenges arising from their different priorities and perspectives. We are working within RCUK to achieve the integrated and constructive engagement needed for the UK to obtain maximum benefit from its world-class science.

November 2003

Annex 1a

The BBSRC-sponsored institutes

Our mixed economy of universities and institutes enables us to support quick turn-around, short-term, curiosity-driven research and longer-term strategic research respectively. Institutes are characterised by: strategic research missions; multidisciplinarity; specialist facilities; and strong links to user communities. The BBSRC-sponsored institutes are:

- Babraham Institute (BI)—research supporting biomedical, biotechnological and pharmaceutical sectors (www.bi.bbsrc.ac.uk)
- Institute for Animal Health (IAH)—working to improve the health and welfare of farm animals and to safeguard the human food chain (www.iah.bbsrc.ac.uk)
- Institute of Food Research (IFR)—investigating food safety, diet and health, food materials and ingredients (www.ifr.bbsrc.ac.uk)
- Institute of Grassland and Environmental Research (IGER)—research on sustainable grassland systems and the wider managed environment (www.iger.bbsrc.ac.uk)
- John Innes Centre (JIC)—plant and microbial research with strategic relevance for food, health, sustainable agriculture and industrial innovation (www.jic.bbsrc.ac.uk)
- Roslin Institute (RI)—livestock genetics, breeding, welfare and biotechnology (www.roslin.ac.uk)
- Rothamsted Research (RR)—research on sustainable plant-based agriculture and the environment (www.rothamsted.bbsrc.ac.uk)

— Silsoe Research Institute (SRI)—bio-systems engineering research to benefit the agricultural, food, environmental and biomedical sectors (www.sri.bbsrc.ac.uk)

Annex 1b

BBSRC-supported virtual centres and consortia

Investigating Gene Function consortia (1999–2000)

— *Arabidopsis:* coordinated at University of York (£5 million)
— Brassicas: coordinated at HRI (£1.6 million)
— Cereals: coordinated at JIC and SCRI (£2 million)
— *Drosophila:* coordinated at University of Cambridge (£3.5 million)
— Farms and veterinary animals: coordinated at RI (£3 million)
— *Streptomyces:* coordinated at JIC (£1.1 million)
— Yeasts and fungal pathogens: coordinated at University of Manchester (£3 million)
— Mouse microarrays, Hinxton (from 2001)
— Third generation proteomics, UMIST (from 2001)

BBSRC Structural Biology Centres (1999)

— Bloomsbury (Birkbeck College and University College London)
— Cambridge and East Anglia (Universities of Cambridge, East Anglia, BI and JIC)
— Centre for Protein and Membrane Structure and Dynamics (Daresbury Laboratory)
— Imperial College London
— North of England (Universities of Leeds, Manchester, Sheffield and UMIST)
— York

Annex 2

Examples of the type and context of research funded by BBSRC

Basic and strategic research

This is science at the limit of human understanding that generates new knowledge about basic biological phenomena. It is funded mainly by responsive mode grants and initiatives. An example is the discovery of an unknown eye protein, melanopsin, which plays a critical role in regulating pupil size. It probably helps indicate daylight to the brain, keeping us alert and regulating our body clock.

Genomics: Our spend on genomics research includes a £19 million investment in seven virtual centres that focus on model and strategic species and on targeted applications, including healthcare and animal science.

Outputs include identification of genes in plants that influence height, resistance to disease, flowering in response to cold; genes in the fruit fly that have important human counterparts and are involved in regulating cell size, and renal function; and genes in E. *coli* 0157:H7 that are essential for gut colonisation and infection.

Stem Cells: BBSRC played a key role in building up the world-leading UK research community in stem cell work. We, and our forerunners, have been principal funders of the Institute of Stem Cell Research since its formation in 1989 (as the Centre for Genome Research). We are contributing funds to MRC to establish research lines of cells in the UK stem cell bank. We fund research on "transdifferentiation" of adult cells—a possible alternative to some uses of embryonic stem cells. To date our portfolio of stem cell research is £30 million. We support over 70 principal researchers.

Outputs include: identification of key factors that determine "decision making" in mouse embryonic stem cells including one that is essential in maintaining the cells' ability to multiply without limit.

Spinouts from BBSRC basic and strategic research include RegenTec and ReInnervate (stem cells); Solexa (genomics technology) and Inpharmatica (protein structure).

Longer-term and strategic research

Much of this research helps inform policy development in areas such as agriculture and land use; healthier old age; diet and health; food safety; animal health and welfare. We are the sole UK Government funder of public sector basic plant science research that underpins both conventional and organic crop science, as well as wider issues of land use.

Outputs: BBSRC scientists contributed to the Farm Scale Evaluations, and conducted research on gene flow and stability that is informing decision making on the commercial growing of GM crops in the UK. Scientists at the Institute for Animal Health (IAH) helped establish the link between BSE and vCJD. With Roslin Institute, IAH scientists have patented a protein for potential use as a diagnostic for BSE-type

disease. IAH scientists were at the forefront of diagnosis and monitoring of the 2001 Foot and Mouth epidemic. BBSRC research has underpinned: new crop varieties (eg Aberdart grass, ryegrass with high digestibility and high dry matter yield); animal vaccines (eg Paracox, vaccine against serious protozoan parasites in chickens); diagnostics (Light leaf spot disease in plants, food peanut testing kit); and welfare-friendly animal transport (Concept 2000).

Enabling research

Much of our basic research generates knowledge about the evolution, function, and interactions of living things, and of their component parts, that can contribute to diverse and novel applications.

For example, studies on the structural components of natural protein "motors", on chemical signalling between cells and components of cellular architecture are informing the design of novel biomaterials, sensors and drug delivery systems (with EPSRC) and cell and tissue therapies (with MRC and EPSRC). Genomics, structural biology and whole organism physiology provide novel targets for safer drugs and pesticides. Genomics, whole organism biology and systems modelling are providing new options for optimising land use (with NERC and ESRC), for example, by matching the genetic make-up of crops to environmental conditions and farming and conservation targets.

Annex 3

BBSRC Strategic Objectives 2003–08

1. *Excellent science:* to prioritise and deliver world-class science in the non-clinical biosciences*.

2. *Tools and technologies:* to develop the basic tools, resources and new technologies to further understanding of the biosciences.

3. *People:* to invest in people to provide a motivated scientific community trained in relevant skills to meet national needs.

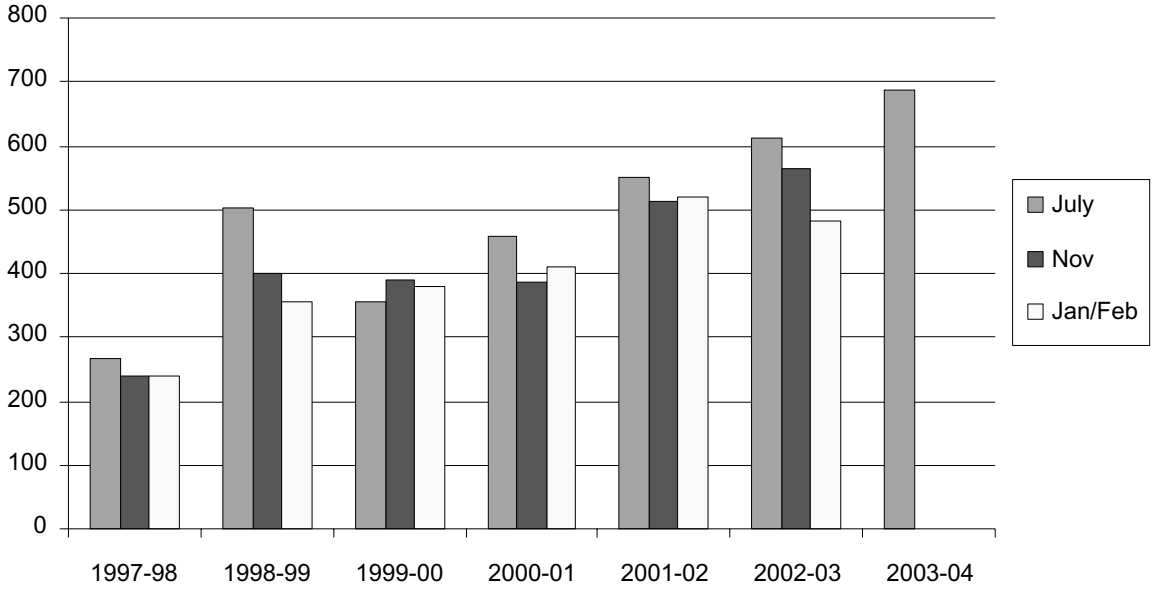
4. *Knowledge Transfer (KT):* to promote innovation and KT from BBSRC-funded science and training for the economic and social benefit of the UK.

5. *Partnerships:* to seek new and stronger partnerships with a range of other funders and stakeholders, national and international, where there is benefit to the science base. Engage the public in awareness and dialogue about BBSRC science.

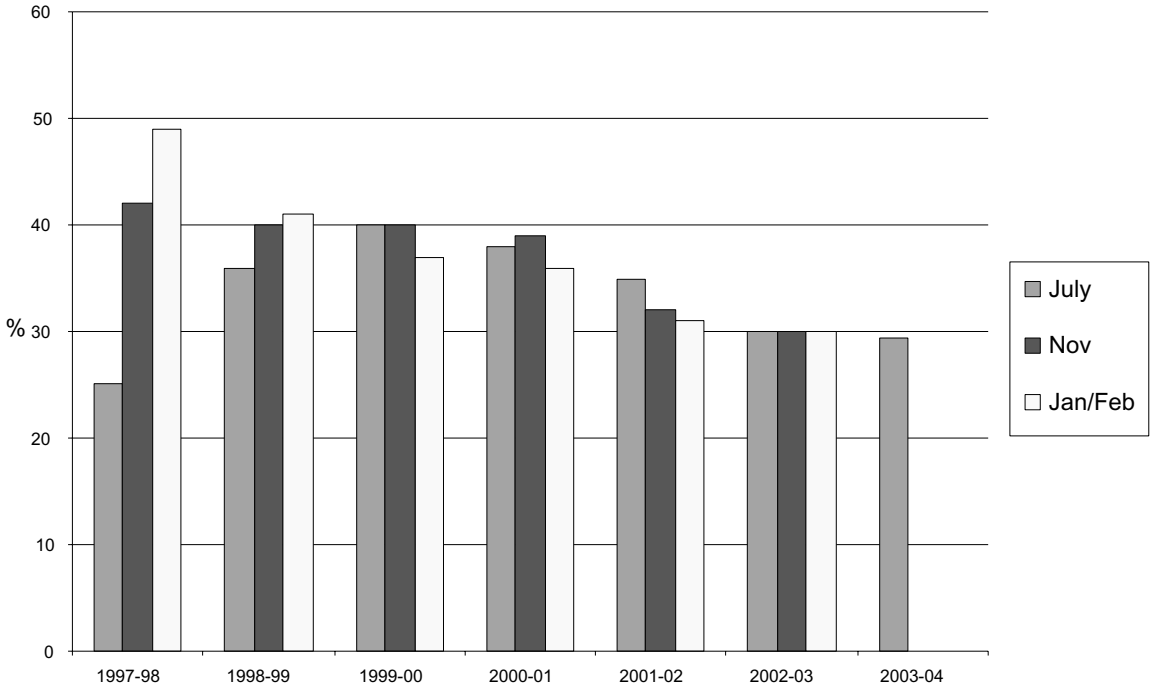
6. *Effective Organisation:* to utilise resources effectively and responsibly to maximise funding for science.

* Extensive consultation identified four priorities: a core of Integrative Biology supporting three interacting areas of Sustainable Agriculture; The Healthy Organism and Bioscience for Industry.

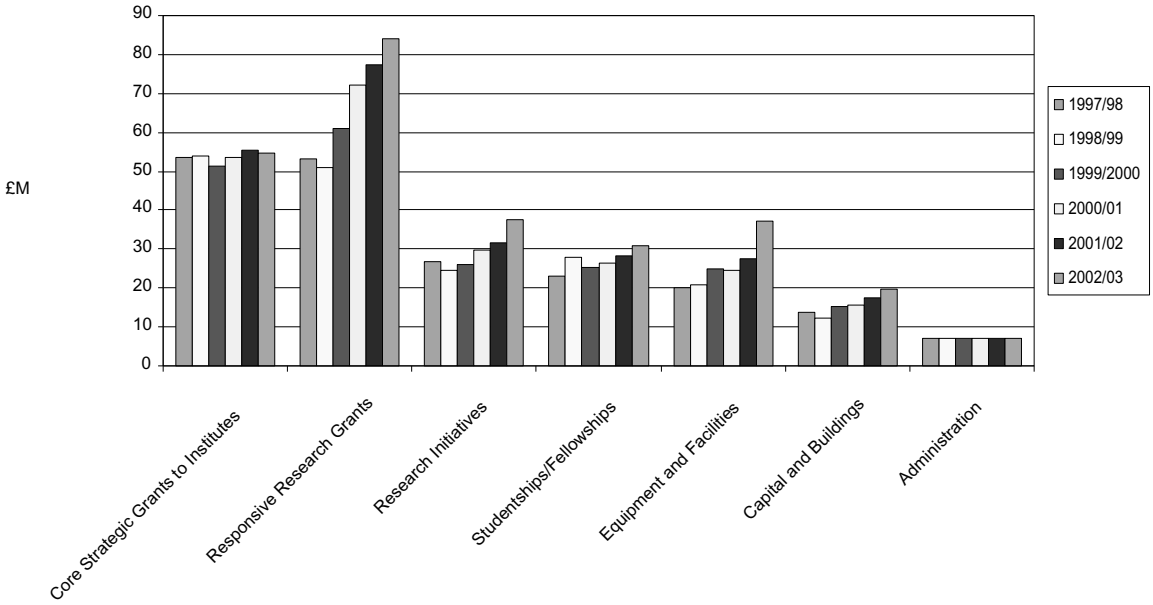
Annex 4a: Responsive mode applications, 1997-2003, by Committee round and financial year

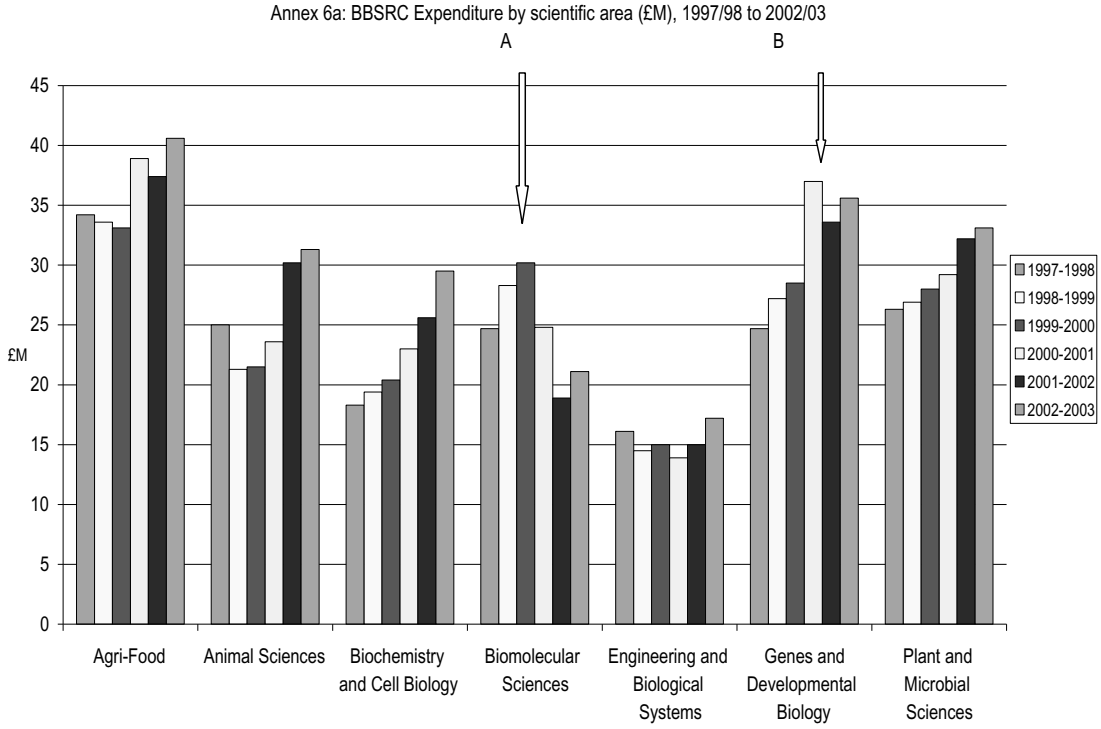


Annex 4b: Responsive mode success rates, 1997-2003, by Committee round and financial year



Annex 5: BBSRC gross expenditure by activity, 1997/98 to 2002/03





A: Peak reflects funding for Structural Biology Centres and European Synchrotron Radiation Facility (ESRF) beamline
B: Peak reflects funding for Investigating Gene Function (IGF) consortia

Annex 6b

Total value of new grants (£M) by science area (analysis based on the grant start date), and financial year

£M

	1997–98	*1998–99*	*1999–2000*	*2000–01*	*2001–02*	*2002–03*
AgriFood	12.2	14.5	18.2	15.6	21.5	14.9
Animal Sciences	8.2	11.3	13.6	23.5	16.6	19.6
Biochemistry and Cell Biology	10.9	12.0	14.1	16.0	26.5	26.8
Biomolecular Sciences	19.7	22.2	19.1	20.4	25.2	23.6
Engineering and Biological Systems	11.1	11.3	12.6	20.0	15.3	18.1
Genes and Developmental Biology	12.2	20.4	25.2	31.4	28.5	40.2
Plant and Microbial Sciences	13.4	14.9	20.9	19.3	19.3	20.6
Total	**87.7**	**106.6**	**123.7**	**146.2**	**152.9**	**163.8**

Annex 6c

Total value of new grants (£M) to BBSRC-sponsored institutes (analysis based on the grant start date), by financial year

£M

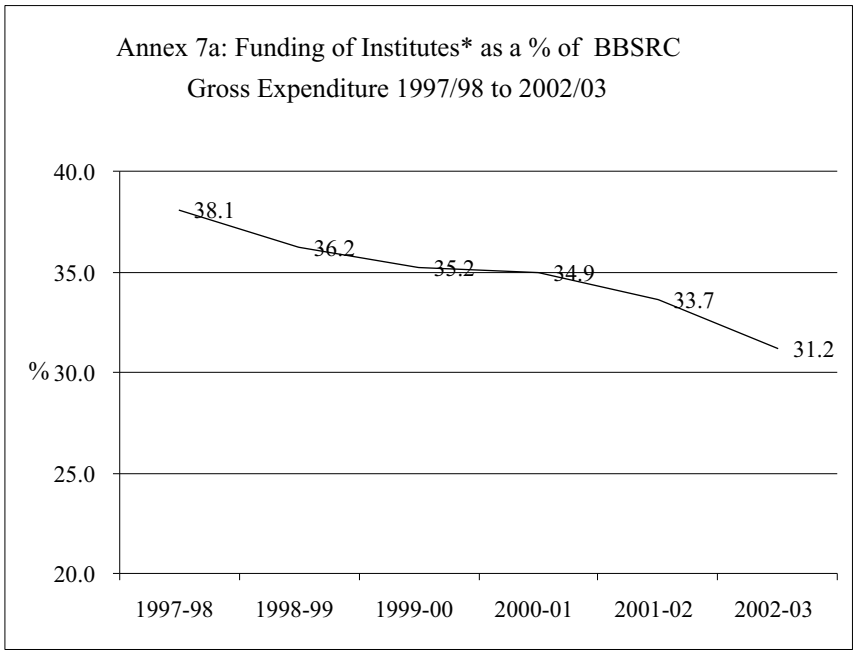
Institute	*1997–98*	*1998–99*	*1999–2000*	*2000–01*	*2001–02*	*2002–03*
Babraham Institute	0.5	0.8	1.0	2.5	1.4	1.3
Institute for Animal Health	2.2	1.9	2.5	0.4	2.6	2.1
Institute of Food Research	0.4	0.7	0.7	0.6	0	0.8
Institute of Grassland and Environmental Research	1.0	0.4	0.3	0.8	0.6	0.4
John Innes Centre	2.0	2.3	4.5	4.0	3.4	5.6
Roslin Institute	1.0	1.0	1.7	4.3	0.9	2.0
Rothamsted Research	1.4	1.1	1.9	1.0	3.0	2.0
Silsoe Research Institute	0.4	0.4	0.4	0.3	0.5	0.7
Total	**9.8**	**8.7**	**13.6**	**14.9**	**12.8**	**15.6**

Annex 6d

BBSRC estimated spend (£M) by RAE score, 1997–98 to 2002–03

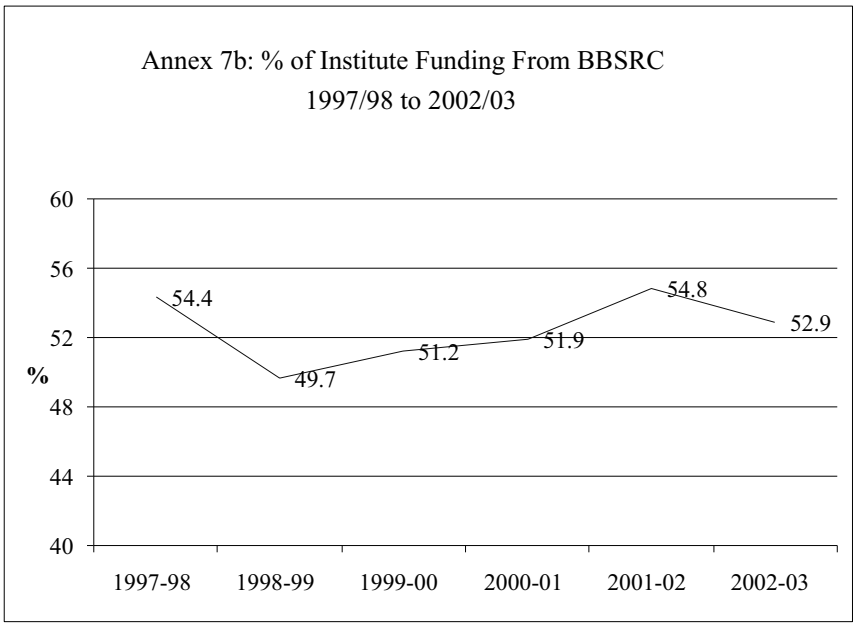
RAE score	*1997–98 (£M)*	*%*	*1998–99 (£M)*	*%*	*1999–2000 (£M)*	*%*	*2000–01 (£M)*	*%*	*2001–02 (£M)*	*%*	*2002–03 (£M)*	*%*
5*	18.9	38.1	18.7	34.4	20.1	31.7	25.0	30.3	28.1	28.2	31.5	27.1
5	26.6	53.6	31.2	57.4	37.7	59.5	49.7	60.2	60.6	60.8	71.8	61.7
4	3.1	6.3	3.4	6.3	4.1	6.5	5.5	6.7	7.0	7.0	9.1	7.8
3a	1.0	2.0	1.1	2.0	1.5	2.4	2.4	2.9	3.8	3.8	3.9	3.4
% portfolio assessed	69		71		75		77		80		80	

The grades are those awarded in the 2001 Research Assessment Exercise, which assessed research from the previous five years. Data analysed were for BBSRC's 26 highest funded HEIs as at April 2003.

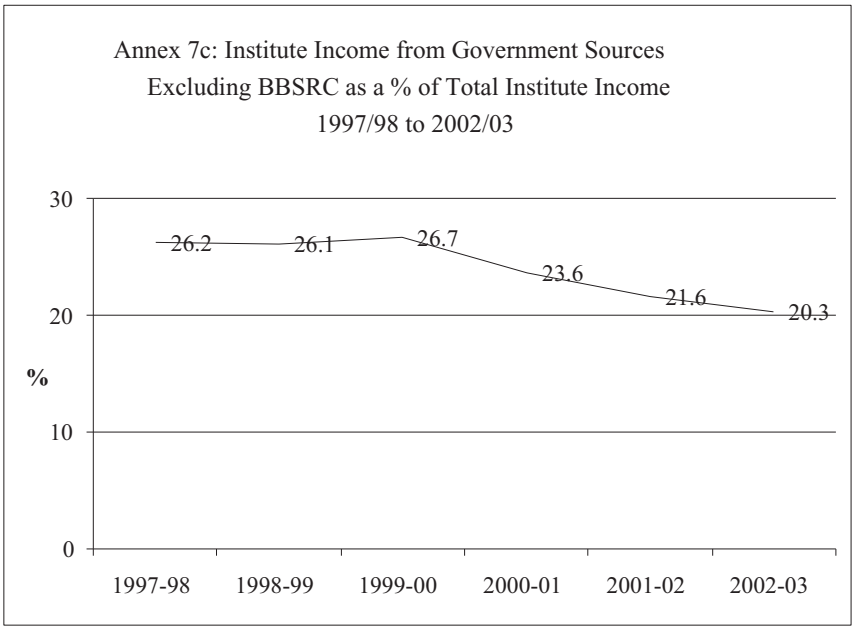


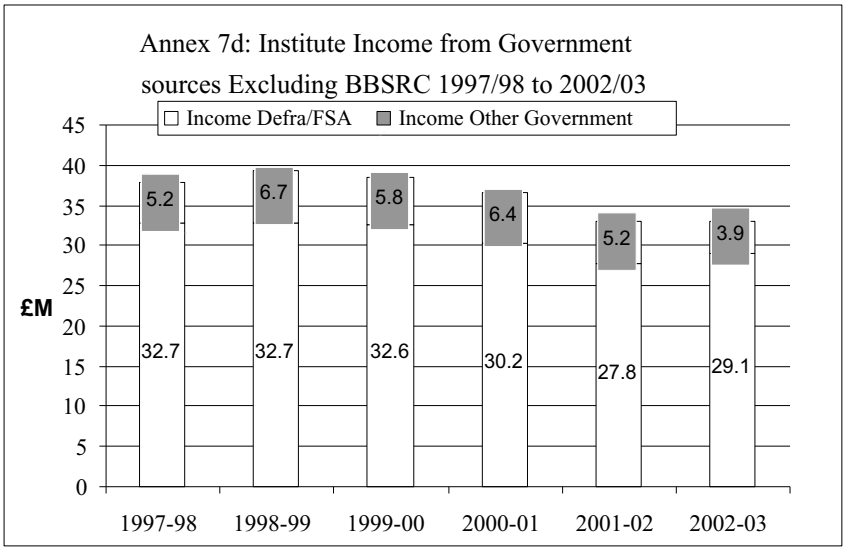
* Includes Core Strategic Grant, Competitive Grants and Capital Funding.

1999/2000 Superannuation Rate reduced from 15.6% to 10.1% with a consequent reduction in BBSRC funding.



7a and 7b indicate that BBSRC has continued to provide slightly over half the total funding to the institutes, while reducing the percentage of the Council s overall expenditure invested in this way.





7c and 7d: Defra and the FSA are key public sector partners in funding the BBSRC institutes; other Government funders include the other Research Councils and the Department of Health.

Annex 8

Studentships data

8a: Masters

Year	*MSc*	*MRes*
1997–98	55	45
1998–99	55	48
1999–2000	47	64
2000–01	46	67
2001–02	44	67
2002–03	39	65

8b: PhDs

Year	*Total PhDs (CASE)*	*New PhDs*
1997–98	1914 (653)	678
1998–99	1817 (650)	673
1999–2000	1935 (663)	691
2000–01	1920 (640)	707
2001–02	1910 (648)	672
2002–03	1879 (602)	655

The slight reduction in total numbers of PhD students reflects the start of BBSRC's pilot Doctoral Training Accounts, through which some students can be funded for longer than the standard three years, thereby reducing the total number of students registering.

Annex 9

Exploitation metrics from BBSRC-sponsored institutes

Numbers of patents and Plant Breeders Rights (PBR):	*1997–98*	*1998–99*	*1999–2000*	*2000–01*	*2001–02*	*2002–03*
Currently held	200	208	220	211	202	212
New this year	34	21	22	25	26	19
Assigned to collaborators	49	50	51	66	69	32
Assigned this year	10	2	3	5	3	1
Number of commercial licensing agreements:						
	1997–98	*1998–99*	*1999–2000*	*2000–01*	*2001–02*	*2002–03*
Total	**62**	**81**	**97**	**98**	**94**	**77**
New this year	15	19	15	10	14	0
Income from patents and PBR (£K):						
	1997–98	*1998–99*	*1999–2000*	*2000–01*	*2001–02*	*2002–03*
	998	1,167	1,509	1,351	1,116	1,273

In addition £1.14 million raised from sale of equity from 2000–01 to 2002–03.

Annex 10

New initiatives from the 2002 Spending Review

Stem Cells (Allocation to BBSRC 10.6 million)

This new initiative focuses on those aspects of the basic biology of stem cells that will be essential for their future development and deployment in healthcare, such as regulation of self-renewal and differentiation in stem cells, stem cell identity and propagation, and the normal processes of stem cell development and reprogramming.

We are investing £0.65 million to support research lines of cells in the National Stem Cell Bank, in collaboration with MRC.

Rural Economy and Land Use (Allocation to BBSRC £7.5 million)

We have launched this £20 million programme in partnership with ESRC and NERC. There are four interdisciplinary themes:

— integrated solutions for land and water resource use and management;
— the environmental basis of rural economies and regeneration;
— successful and sustainable food products and food chains; and
— economic and social interactions with the rural environment.

Brain Science (Allocation to BBSRC £4 million)

This cross-council activity in Brain Science with MRC, EPSRC and CCLRC is aimed at increasing understanding of normal brain function from genes to cells to the function and behaviour of whole organisms. BBSRC is committing an additional £3 million to the programme.

Infectious diseases of animals (Allocation to BBSRC £10 million)

This BBSRC initiative will address viral diseases of livestock and focus on: disease persistence; resistance and susceptibility of animals; and disease progression and transmission.

Post-genomics and proteomics (Allocation to BBSRC £49 million)

We have launched a £12 million initiative on Proteomics and Cell Function to apply proteomics across our research portfolio. We have allocated £4 million to our Bioinformatics and e-science programme to deliver generic tools for proteomics. We have launched a £14 million investment in Structural Proteomics of Rational Targets. We are investing £10 million to take forward functional genomics work funded from earlier spending reviews, and are investing £4 million in metabolomics. We are contributing £5 million to a cross-Council initiative on developing technology for proteomics.

E-science (Allocation to BBSRC £10 million)

We are investing in a range of activities to support the development and dissemination of new software tools, algorithms and analytical methods, movement towards GRID-compatible ways of sharing data, networking and training. We will build on the base established through our 2001 programme in Bioinformatics and e-science.

ACRONYMS

ASE	Association for Science Education
BA	British Association for the Advancement of Science
BBSRC	Biotechnology and Biological Sciences Research Council
BI	Babraham Institute
BSE	Bovine Spongiform Encephalopathy
CASE	Cooperative Awards in Science and Engineering
CCLRC	Council of the Central Laboratory for the Research Councils
Defra	Department for Environment, Food and Rural Affairs
DfES	Department for Education and Skills
DfID	Department for International Development
DTI	Department of Trade and Industry
EPSRC	Engineering and Physical Sciences Research Council
ERA-NET	European Research Area Network
ESRC	Economic and Social Research Council
FSA	Food Standards Agency
GM	Genetic Modification
HRI	Horticulture Research International
IAH	Institute for Animal Health
IAE	Institute Assessment Exercise
IGER	Institute of Grassland and Environmental Research
IP	Intellectual Property
JIC	John Innes Centre
KT	Knowledge Transfer
MRC	Medical Research Council
NERC	Natural Environment Research Council
RAB	Resource Account Budgeting
RBG	Royal Botanic Gardens
RI	Roslin Institute
RCUK	Research Councils UK
RR	Rothamsted Research
SCRI	Scottish Crops Research Institute
SEERAD	Scottish Executive Environment and Rural Affairs Department
SET	Science Engineering and Technology
SR	Spending Review
UFAW	Universities Federation for Animal Welfare
UMIST	University of Manchester Institute of Science and Technology
vCJD	variant Creutzfeldt-Jakob disease

APPENDIX 2

Memorandum from GlaxoSmithKline

INTRODUCTION

1. GlaxoSmithKline's mission is to discover, develop and commercialise effective treatments and medicines for human diseases. We cannot do this without a strong science base in the countries in which our R&D organisation operates both as a source of well-trained staff and as high-calibre partners in basic & applied research. Around 45% of our worldwide R&D staff are based in the UK, with a similar proportion of our R&D facilities being in this country. GSK R&D works closely with the BBSRC, as we do with the MRC and EPSRC, and we are a major "user" of the research it supports and the people that it educates and trains. The BBSRC is a valuable partner to GSK in our work, especially because of its strategic support for the biosciences and its strong and direct focus on a number of key subject areas. These include functional genomics (proteomics, transcriptomics etc), the neurosciences and brain science in general, integrative biology, systems biology and complex biological systems. The Council's support for research into stem cell biology is also recognised by GSK as important for medical progress in the longer term.

2. As the Science & Technology Committee will be aware from our previous comments on the matter, GlaxoSmithKline's continued success is based on our commitment to innovation and our sustained investment in R&D. In this regard we do depend upon excellence in university research and on the

availability of well-trained researchers, scientists, engineers and technologists. These are an essential prerequisite for the discovery and development of innovative medicines and vaccines. We acknowledge that the BBSRC plays a major role in this area, through its support for basic and strategic research in the non-clinical biosciences, and through its effective training programmes.

3. We regard the Council as one of our major partners in many of our UK-based research activities. We do believe that the BBSRC, as is the case with the other main Research Council, with the limited funding that it has access to, is currently doing a good job for its user communities in the UK. We support the long-term vision of the Council as it seeks to identify (and give appropriate support to) those priority areas of the biosciences that can offer the best opportunities for advancing knowledge, providing for the public good and increasing economic prosperity.

Issues under Consideration by the Science and Technology Committee

4. We note that the Committee will be considering *inter alia* BBSRC's administration of its grant awards, its public awareness and technology transfer activities and its pursuit of the strategic objectives contained in its five-year plan. In our further comments below, we raise a number of issues on some of these matters.

Interaction with Industry

5. GSK is pleased that, in seeking to ensure that it had appropriate input from its user communities, as it drew up its submissions for funding allocations through the Science Budget (Spending Review 2004), the BBSRC proactively sought senior level input from the industry, via the ABPI. GSK encourages all of the Research Councils to maintain an open dialogue with the company to discuss our needs and the direction in which our new research is going, in order that both sides can map our research objectives onto our respective agendas.

6. In this context, the Committee should note that despite having increasing demands on their time, many senior GSK staff work closely with the Council on a wide range of issues. They clearly consider that their personal involvement in the work of the Council is both important and valuable, and that it benefits both sides. In this context GSK is currently represented on the Strategy Board of the BBSRC, its Committee on Studentships and Fellowships, and other groups including those addressing Knowledge Transfer, Modular Training programmes for Industry, Biotechnology & Exploitation Platforms, BioInformatics & E-science and a number of other scientific committees and strategy groups.

7. GSK looks to the BBSRC (and other Research Councils) to minimise bureaucracy associated with the management of their part of the science base and to be responsive and entrepreneurial when considering leveraging funding and access to technologies from multiple partners. For the most part, we consider that the BBSRC fulfils the above objectives.

The Council's Strategic Objectives: Research Funding Allocation

8. GSK considers the areas of science supported by the Council, either alone, or in collaborative Cross-Council Programmes are highly relevant to our current and future needs. We particularly welcome the Council's focus on predictive biology outlined in its Ten-Year Vision. The Council's support for brain research and systems biology, which recognises the continued need for the use of animals in understanding complex biological mechanisms, is welcomed by GSK. Much of today's research is both multi- and inter-disciplinary and industry would look to the Research Councils to be flexible in the interpretation of their remits to help ensure that key areas of research do not "fall between the cracks". It may have been the case that in the past, for example, some applications for research involving human subjects were rejected by the BBSRC, without due process of review. This being on the possible basis that other Research Councils should fund them. GSK would hope therefore that the Science & Technology Committee was able to obtain reassurance from the Council that it had moved away from what may have been a "rule-book mentality" in how some of its staff interpreted the remit of the BBSRC.

9. At the same time, despite the efforts that have already been made in this area, it appears that matters concerning the chemistry/biology interface have yet to be resolved fully. Since the change of funding of the Biomolecular Sciences Committee (BMS) and the formation of the Life Sciences area within the EPSRC there still seems to be some confusion as to the boundaries of funding, and again, some grants may have fallen through the cracks. Greater clarity and cooperation between the Councils to ensure these 'interface' grants are appropriately targeted would be in everyone's interest and would promote the interdisciplinary and integrative science we all wish to encourage.

Case Scheme

10. GSK is a strong supporter of the CASE scheme and views the scheme as one that enables the company to develop real partnerships with Universities and the Research Councils. GSK currently holds 27% of BBSRC's Partnership Industrial CASE awards and furthermore, 39% of the GSK studentship portfolio starting in October 2003 are co-funded through BBSRC awards. We believe this reflects BBSRC's

recognition of the quality of research and training environment that GSK can provide to its CASE students. With 6,000 R&D staff in the UK, GSK have the critical mass of scientists in the company to supervise and accommodate large cohorts of students.

11. We would encourage the BBSRC to do more to promote the scheme to SMEs as a significant route to exploit skills and technology developed in the university base.

Business Plan Competition

12. In the spectrum of industry/academic links GSK considers that the formation of university-led spin-out companies does play a vital part in innovation and knowledge transfer and the development of a knowledge economy. We do consider, however, that other forms of technology transfer may be more effective in other situations. Spin-out companies, if successful, can eventually provide innovative expertise and technical service support to large pharmaceutical companies. In this context, following the successful Young Entrepreneurs Scheme for young scientists working in the Biotechnology or Biological Sciences arena, where the BBSRC provided training to budding entrepreneurs, the Council introduced a Business Plan competition for potential spin-out companies. GSK supported the original aims of the competition and was pleased to be able to contribute more than £50,000 towards prizes and the management of the scheme. In GSK's view, the key benefits of those entering the competition was the access to critical business mentoring on areas such as finance, law and intellectual property. As a result of the competition a number of businesses were established and GSK has subsequently commissioned work from some of them, for example in the field of CNS-related contract research.

13. As indicated above, GSK considers that the formation of spin -outs is only one part of the technology transfer process, and it would be concerned if the focus of the Council's business-support activities moved too far further in this direction.

Small Business Research Initiative (SBRI)

14. The SRBI is considered a good mechanism for providing funds to this sector. Large pharmaceutical companies are keen to access technologies, which are sometimes best developed in rapidly moving biotechnology companies. GSK is supportive of the Exploitation Guide produced by BBSRC as a useful tool for highlighting the issues around commercialisation.

The Development and Protection of Intellectual Property

15. BBSRC's role in increasing awareness amongst its researchers of intellectual property provision is welcomed. The workshops BBSRC has organised in the area are an especially effective way of familiarising researchers with the issues and processes.

16. Additionally, whilst recognising that the activities of the Institutes supported by the Council do raise a number of difficulties, GSK views BBSRC's stance on the ownership of Intellectual Property (IP) that may arise from the collaborative research it co-funds as very positive. GSK firmly believes that in the great majority of cases a company will be in a much better position to protect such IP effectively, for the longer-term benefit of both the company and the university. We support the Council's pragmatic position and that it does not seek to be prescriptive about the ownership of any intellectual property generated during collaborative research projects. GSK considers that the unwillingness of the BBSRC to insist that the university has to own any IP arising from a collaboration but that it does ensure that the reassurance is sought that the IP is being managed effectively remains the most appropriate way forward.

Modular Training for Industry Programme

17. Many of the skills required by the pharmaceutical industry, within the biosciences, are subject to rapid changes with the technology constantly moving forwards at a rapid rate. This makes it difficult for the development of training programmes. Many of the industry's skills needs can be addressed through short modular-based training programmes developed at centres of excellence and expertise in the various fields. GSK believes that the BBSRC has risen to this challenge well, and has responded in a timely manner to the needs of industry for training in these specialist areas. It has helped to fund the establishment of programmes in integrative biology, pre-clinical psychopharmacology, the use of stem cells, microscopy and imaging; molecular genetics, bioinformatics and microarray technology, as well as other industry-relevant courses in engineering for biotechnology. We suggest that the Committee takes note not just of the Council's activities in identifying those areas that do need supporting through such modular training programmes, but its ability in getting funding in a timely manner to those seeking to develop such courses.

Public Dialogue on Scientific Developments

18. The BBSRC supports a number of areas of science that do raise ethical issues, including the use of animals in research, stem cells, cloning, and genetic modification. GSK acknowledges the Council's efforts in producing relevant material for supporting sciences in schools and to bring debate on these key issues to a wider audience. Recognising the importance of continued public support for these new technologies; GSK welcomes the Council's activities in seeking to continue to develop mechanisms for *effective* public dialogue. Within the limitations of its budgetary provisions for such activities, we hope that the Council will be able to increase its activities in this field, working with colleagues in other Research Councils to share best practice and make full use of limited resources.

Collaborative Research Grants

19. The BBSRC introduced a scheme whereby standard grant applications with a direct cash contribution of 15% direct from industry are viewed favourably when academics submit quality research proposals for peer review. GSK welcomed this 15% industrial funding criteria and believe that it could (and should) be used to stimulate the overall amount of industrial collaboration. We do fear, however, that awareness of this scheme is low amongst individual researchers, companies (especially SME's) and we would suggest that the Council should promote it more widely.

BBSRC Staff Experience of Technology Transfer

20. We believe that BBSRC is working hard to enhance the profile of technology transfer among its research community. An additional benefit would be if BBSRC's staff could have first hand experience of the area ideally through secondments.

BBSRC Institutes

21. GSK has only limited interaction with those Institutes supported by the Council. We do consider though that the Babraham Institute has a critical mass of world class scientists working in areas of strategic importance to the company such as signalling, neurobiology, developmental genetics and molecular immunology.

22. GSK is very keen to support young scientists at a stage in their career where they are building up their research groups and we look for a number of ways of doing this, including supporting David Philips Fellowships. GSK is supporting two David Philips fellows, several PhD studentships and post-doctoral researchers at Babraham Institute in areas of mutual scientific interest. GSK has a history of collaborative research with the Babraham Institute that is likely to continue.

Payment of PhD Stipends

23. GSK welcomed the recommendations on PhD stipends made by Sir Gareth Roberts in his review. We note that the BBSRC has sought the additional funding required to meet its commitments arising from the Roberts Review to enhance the PhD stipend. We welcome its efforts in trying to use the increased stipend to try to encourage the wider training of postgraduate/postdoctoral scientists.

Conclusion

24. GSK appreciates the hard work that Professor Julia Goodfellow and her staff carry out in the discharge of their duties, and in their efforts in seeking to understand more about the future research and the skills needs of their User Communities, including the pharmaceutical industry. They clearly recognise that an effective interface with industry is essential if the BBSRC is to achieve its vision of fostering a world-class biological research community in the UK.

November 2003

APPENDIX 3

Memorandum from the Association of the British Pharmaceutical Industry

The Association of the British Pharmaceutical Industry represents the majority of companies in Britain that research, develop, manufacture and supply prescription medicines. It also has other members drawn from organisations with an interest in the pharmaceutical industry operating in the UK

Our interaction with the BBSRC is wide ranging. In the last year we have commented on their Ten Year Vision and Strategic Plan (2003–08), we have met with BBSRC staff to discuss a number of issues within the general areas of knowledge transfer and postgraduate training, and we have provided input into the Research Councils (BBSRC, MRC and EPSRC) discussions on the 2004 Spending Review. In addition we work with BBSRC public affairs department to promote bioscience to school students.

We are encouraged by the changes being implemented by Professor Julia Goodfellow as Chief Executive. We are happy with the lead role BBSRC is taking in promoting dialogue between ABPI and the Research Councils and we support their clear strategic view, arrived at following consultation with stakeholders.

We strongly support the BBSRC initiatives to promote integrative biology. We see this as the major bioscience challenge for the 21st century, with studies assigning functional significance to the genome being very relevant to the industry's current and future needs. We are therefore pleased that this has been suggested as a cross-council theme by the scientific Research Councils for SR2004. Other Research Council priorities in their proposals for SR2004, such as modelling of complex systems and use of stem cells in regenerative medicine, are also seen as being highly relevant to the future of medicines research and, as such, we strongly support them. We hope that the partnership between the BBSRC, MRC and EPSRC through RCUK will continue to develop to ensure that grant applications which do not fall fully within the remit of a single council, are still considered for funding.

The ABPI works closely with the BBSRC, as it does with the MRC and EPSRC, and is supportive of the work they do in providing education and training for young researchers. We strongly support the BBSRC in their aim of improving the quality of postgraduate training and quality of trained people, including enhanced training of PhD supervisors.

The pharmaceutical industry partners with BBSRC in supporting research and training through CASE awards and sees this as a means of developing a close partnership with universities and the Research Council.

The Science and Technology Department at ABPI also works directly with BBSRC staff in providing support for science teachers and school/college students to learn about new biotechnology techniques and issues associated with their use.

We believe that the BBSRC works hard to ensure that it understands the knowledge and skills needs of the pharmaceutical industry and that it recognises the importance of dialogue and working in partnership to ensure that those needs are met, to maintain and develop world class bioscience research in the UK.

November 2003

APPENDIX 4

Memorandum from Professor Roger Corder, William Harvey Research Institute

1. Introduction

This submission concerns a specific grant application to the Biochemistry and Cell Biology Committee of the BBSRC and its subsequent rejection (Grant Application No: BBS/B/07942; Title: Proteomic Characterisation of Endothelial Cell Regulation; Principal Applicant: Prof R Corder; Co-applicant: Prof D Perrett). As a specific case, this application highlights deficiencies in the management of grant applications by the BBSRC. Because it was rejected on specious grounds, it appears that discriminatory practices are being used to unjustly exclude some applications from full consideration. There is also evidence of a complete lack of joined up thinking, most notably by having a priority area of "Diet and Vascular Health" while attempting to dissociate this from the only outcome of any real significance—namely, atherosclerosis and heart disease. The BBSRC and MRC do not seem to be working together in a co-ordinated manner. Based on these observations it is questionable whether the current practices of the BBSRC operate in the best interests of British science or ensure the competitiveness of the British pharmaceutical industry.

The submission covers the following points in the paragraphs indicated below:

2. *Summary of the application*
3. *Strategic relevance of the work*
4. *How the application met relevant calls and priority areas of the BBSRC*
5. *Basis for withdrawal of the application by the BBSRC*
6. *Key issues identified that need to be addressed:*
   - 6.1 *Anti-competitive practices*
   - 6.2 *Overlap between BBSRC and MRC in vascular health and disease.*
   - 6.3 *Ensuring BBSRC supports research that could be beneficial to the UK pharmaceutical industry.*

2. Summary of the Application

The project described a proteomic strategy to characterise the regulation of endothelial cells. These are the cells lining every blood vessel, which play a key role in regulating vascular function in health and disease. Previous work by the applicant has shown that red wine polyphenols induce changes in these cells, which mimic the healthy state in vivo. This insight provided a key opportunity to advance understanding in this area as it could allow proteomic studies to be undertaken on a larger scale than that achievable by conventional methods of investigating endothelial regulation. The project envisaged a proteomic

characterisation of the key mechanisms controlling healthy vascular function. This research could have provided insights into the factors that create a state of vascular health, and may have led to the identification of new targets for drug development for preventing cardiovascular disease.

3. Strategic Relevance of the Work

Endothelial cell function is of major importance in health and disease. Many drug discovery programmes in the pharmaceutical industry are focused on the search for agents that modify endothelial function to inhibit tumour growth in cancer or prevent heart disease. Such research takes place in the absence of a clear road map of endothelial cell signalling. Hence, this project could have informed the work of many by discovering key mechanisms controlling healthy endothelial function. Equalling important is the understanding this project could have provided into how a component of diet (red wine polyphenols) can help maintain vascular health.

The anticipated results were likely to be of considerable scientific and commercial value, and therefore highly consistent with BBSRC's strategic goals for high quality research that leads to new understanding that can be exploited pharmaceutically or to improve quality of life.

Studying the actions of red wine polyphenols is of considerable public interest. High quality research on this area is well suited to BBSRC engaging the public in understanding how investment in scientific research contributes to increased knowledge and can be translated into improved well-being. Unless research is appropriately targeted to priority projects it is unlikely that BBSRC can satisfy its strategic goals. It is hard to believe the timeliness and insights of this proposal could be more appropriate.

4. How the Application met Relevant Calls and Priority Areas of the BBSRC

The application was submitted in response to BBSRC's "Proteomic and Cell Function Initiative". Quoting from the BBSRC web pages:

"The initiative will support the application of proteomics across the whole BBSRC remit."

The expressed goals of the proteomics call included:

". . .increase our understanding of cell function in the normal state, or that underpin the development of new drugs. . .".

or, Biochemistry and Cell Biology Committee specific goals:

"Proteomics can be used to catalogue the total protein content of individual cell or tissue types whilst differential proteomics can be applied to study changes in the levels of proteins as a result of disease or following drug treatment".

Our proposal seemed ideal for meeting these aspirations. So it was submitted to the Biochemistry and Cell Biology Committee.

The Biochemistry and Cell Biology Committee "*recognises that its remit covers scientific areas that are of considerable interest to the pharmaceutical, biotechnology and agricultural industries and is happy to consider applications with clear strategic relevance, although the study of specific human diseases is excluded*".

The goal of the project was to understand how the normal healthy function of endothelial cells was maintained. Nevertheless, this is highly consistent with aims of studying intracellular signalling in endothelial cells and cataloguing changes "*following drug treatment*". Our insight provided an opportunity to study the regulation of endothelial function in a manner that could ensure we were in the forefront of this field and maintained the competitiveness of British science.

Because the proteomics initiative was a cross committee call, we expected the wider implications of the application to be taken into account. So it is important to note that it matches closely BBSRC objectives for "Diet and Vascular Health", which is a priority area for the Agri-Food Committee. Indeed, "*It is anticipated that research in this area will include consideration of the effects of dietary components on gene expression in cells of the vasculature, and cell signalling*".

5. Basis for Withdrawal of the Application by the BBSRC

Dr Alice Jennings (Programme Manager, Biochemistry and Cell Biology) informed me that the application was being withdrawn from consideration because it fell within the MRC's remit. This was confirmed by Dr Colin Miles (Head of Branch for Molecular and Cell Biology). I was also informed that by the terms of BBSRC charter it was not allowed to support studies that fall within the remit of the MRC.

I discussed this at length with Dr Fiona Russell at the MRC (Programme Manager for Immunology), who had reviewed the application on behalf of the MRC. Dr Russell freely admits she is not a specialist in vascular research. Her view was that the application fell within the MRC's remit, but was clearly within the BBSRC's *as well*. She was unable to give an opinion why the BBSRC were unwilling to give the application proper consideration when it matched so closely their calls and priorities.

Hence, it appears the justification for withdrawal of the application was on tenuous grounds. To show the arbitrary nature of this decision, this submission of evidence includes an APPENDIX that lists more than 30 cardiovascular research grants currently funded by the BBSRC, which could be considered to have an underlying medical objective. Moreover, it is particularly unclear how the BBSRC can have a rational approach to handling applications in response to their priority call for projects on Diet and Vascular Health.

The justification for refusing to give the application proper consideration was based simply on the opinion that it ALSO fell in the MRC's remit. The fact that this decision could be made without using the informed opinion of specialist referees requires an explanation.

It should be determined whether the motivation for finding reasons to exclude an application from full consideration is driven by the desire to maintain a specific award rate, which would not be possible if all applications had to proceed to committee stage and were only awarded on their merits and ability to achieve the relevant BBSRC objectives.

It also needs to be examined whether classification of applications as 'MRC remit' is in widespread use to avoid funding basic research conducted in medical schools.

6. Key Issues Identified that need to be Addressed

6.1 *Anti-competitive practices*—Submission of a grant application is effectively a tender to conduct a piece of research. Any discriminatory practice that excludes an application from full, fair and proper consideration if it meets the current calls from the BBSRC (irrespective of whether it is also covered by the MRC's remit) would appear to breach competition law. This issue needs to be evaluated by a competent legal expert. If current procedures are deemed to be anti-competitive, then measures should be taken to eliminate such practices.

6.2 *Overlap between BBSRC and MRC in vascular health and disease*—The overlap between BBSRC and MRC calls and priorities has created a situation where almost arbitrary criteria are applied to define whether an application falls within the BBSRC remit. It has to be accepted that the vascular health focus of the BBSRC is largely to prevent atherosclerosis, even if this is not acknowledged as the goal of this research. Whether this research has a health or disease focus is completely interchangeable. It is therefore untenable to maintain the current system for deciding whether applications are within the MRC or BBSRC remit. It seems likely that the only effective solution is to make vascular health and disease a joint call between the MRC and BBSRC as part of an overall research strategy for the prevention of atherosclerosis.

Similarly, obesity and insulin resistance (the precursor of type 2 diabetes) is another area covered by the BBSRC Agri-food priority "Diet and Vascular Health". The idea that this is not medical research is hard to swallow. Therefore, this area should also form a joint priority area with the MRC because health and medical aspects of these areas are completely intertwined.

Surprisingly, less than 5% of MRC Co-operative Group grants are focused on atherosclerosis and diabetes despite the very large burden of ill-health and disease caused by these conditions. Therefore, MRC and BBSRC should give a very high priority to a co-ordinated approach to funding these areas.

6.3 *Ensuring BBSRC supports research that could be beneficial to the UK pharmaceutical industry*—It is difficult to believe that wealth creation and research to support the UK pharmaceutical industry can be disconnected from health/medical research. BBSRC and MRC need to work together more effectively on issues relating to basic research with a medical impact. Basic research to discover new protein targets for drug discovery should be a much higher priority for BBSRC because of the need to develop and protect intellectual property for UK industry. There should be no restriction on BBSRC funding the discovery of target proteins simply because the mechanisms under investigation have a medical application or a disease focus. Use of specific models of disease should be acceptable within the BBSRC remit otherwise the full potential for techniques such as proteomics is restricted.

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APPENDIX

List of BBSRC grants with an emphasis on cardiovascular function with a likely medical relevance

Studentship number: 02/A1/C/08934
Institution: King's College London
Supervisor: Mann G E
Title: Involvement of transcription factor Nrf2 in the induction of antioxidant genes in vascular cells

Grant Reference: EFH16042
Institution: University College London, Unilever Research
Leader: Steptoe A, Rycroft J, Wardle J, Gibson E L, Martin A, Erusalimsky J D
Title: The effects of chronic tea intake on stress reactivity, platelets and vascular function

Grant Reference: E16594
Institution: Imperial College, National Heart & Lung Institute (Imperial College)
Leader: Chester A, Johnson P, Yacoub M H
Title: Responsiveness of cells to mechanical force; implications for the choice of cells for tissue engineering heart valves

Grant Reference: S18959
Institution: King's College London
Leader: Brain S D
Title: Calcitonin gene related peptide, adrenomedullin and their receptor components in the peripheral microvasculature

Studentship number: 02/B1/G/08255
Institution: University of Manchester
Supervisor: Canfield A E
Title: Molecular regulation of the osteogenic differentiation of vascular pericytes

Grant Reference: E17190
Institution: University of Glasgow
Leader: Baker A H
Title: Targeted delivery of gene-based medicines to vascular endothelium

Studentship number: 01/A4/C/07715
Institution: University of Leeds
Supervisor: Peers C S, Haddock P S
Title: Hypoxic remodelling of human vascular smooth muscle excitability

Grant Reference: C15239
Institution: The Queen's University Belfast
Leader: Scholfield C N, Curtis T M
Title: Control of microvascular smooth muscle by perivascular astrocytes in microvessels of rat brain

Grant Reference: S13745
Institution: Guy's, King's and St Thomas' (GKT) King's College London, University of Newcastle upon Tyne
Leader: Gnudi L, Bilous R W, Viberti G
Title: Physiological role of vascular endothelial growth factor in the kidney glomeruli

Grant Reference: GTH12582
Institution: University of Glasgow, University of Manchester
Leader: Baker A H, Hawkins R, Dominiczak A F, Watkins S J, Jayson G
Title: Re-targeting adenoviruses to the vascular endothelium for safe and effective gene therapy of diverse pathologies

Studentship number: 99/A1/C/05354
Institution: University of Nottingham
Supervisor: Barrett D A
Title: The role of endogenous eicosanoids in brain and vascular tissue—application of capillary MS techniques

Grant Reference: FG11419
Institution: University of Cambridge
Leader: Charnock-Jones D S
Title: The role of specific growth factors, particularly a new vascular endothelial growth factor (VEGF) and its expression, localisation and function in the establishment of pregnancy

Studentship number: 98/A1/C/04338
Institution: University College London
Supervisor: Zachary I
Title: The role of integrin-mediated signalling pathways in controlling apoptosis in vascular cells

Grant Reference: 9708860
Institution: University of Manchester
Leader: Brenchley P E C
Title: The control of heparanase expression in blood leucocytes: implications for function of the vascular capillary wall

Grant Reference: C08510
Institution: University of Cambridge, University College London
Leader: Brown G C, Brand M D, Moncada S
Title: Regulation of cellular respiration by nitric oxide, endothelial agonists, and cytokines

Studentship number: 96/A3/C/02712
Institution: University of Kent at Canterbury
Supervisor: Proud C G, Huggins J
Title: The role of kinase cascades in hypertrophy of cardiomyocytes and activation of vascular endothelial cells

Studentship number: 96/A2/B/02077
Institution: University of Bristol
Supervisor: Brady R L, King D J
Title: Structure and function studies of the mucosal vascular addressin MAdCAM-1 and its integrin receptor

Studentship number: 94/B3/C/00909
Institution: University of Bristol
Supervisor: Newby A C, Greaves M
Title: Regulation of metalloproteinase and tissue inhibitor of metalloproteinase expression in vascular smooth muscle cells in response to growth factors, cytokines and injury

Project Reference: 4121032
Institute: Institute of Food Research (IFR)
Title: Folates: from food to functionality & Optimal health (FOLATEFUNCHEALTH)

Project Reference: 2307058
Institute: Institute of Food Research (IFR)
Title: Lipid nutrition and metabolism: implications for vascular function

Project Reference: 2300973
Institute: Institute of Food Research (IFR)
Title: Kinetic investigation of folate absorption using stable isotopes

Project Reference: 2300698
Institute: Institute of Food Research (IFR)
Title: Lipid nutrition & metabolism: implications for vascular function

Grant Reference: D17858
Institution: University of Southampton
Leader: Green L R, Hanson M A
Title: The impact of diet in pregnancy on the mechanisms linking cardiovascular control and growth in the fetus

Grant Reference: E17208
Institution: The University of Reading, Queen Mary, University of London
Leader: Weinberg P, Carrier M J
Title: Development of a non-invasive technique of measuring nitric oxide bioactivity in large arteries in vivo

Grant Reference: C13119
Institution: University of Strathclyde
Leader: Gurney A, Osipenko O N
Title: Molecular identification of potassium channels in pulmonary artery

Grant Reference: S10953
Institution: University of Birmingham, University of Leeds
Leader: Nash G B, David T, Walker P G
Title: Physical conditions under which blood cells can adhere to the wall of vessels at high flow rate

Grant Reference: ICS00657
Institution: University of Cambridge
Leader: Sage S O, Mahaut-Smith M P
Title: Calcium signalling and its modulation by other second messengers in platelets

Project Reference: 4131039
Institute: Institute of Food Research (IFR)
Title: Dietary modulation of human mononuclear cell functions

Project Reference: 2300855
Institute: Institute of Food Research (IFR)
Title: Influence of dietary fatty acids & carotenoids on the activation of the transcription factor NF-KB in human monocytes

Studentship number: 00/A1/C/06190
Institution: University of Leeds
Supervisor: Colyer J
Title: Biochemical events upon calcium store depletion in the heart

Studentship number: 99/A1/S/05903
Institution: University of Bath
Supervisor: Woodward B
Title: Effects of chronic hypoxia on the heart

APPENDIX 5

Memorandum from Prospect

Prospect is a TUC affiliated Union representing 105,000 scientists , engineers and other professional and specialist staff in the Civil Service, research councils and in the private sector. We have over 1,500 members in BBSRC and as such are the biggest Trade Union representing staff in the Institutes and headquarters of that organisation. Prospect negotiates with the BBSRC through the Joint Negotiating and Consultative Committee (JNCC) on training and development issues, and has recently conducted a survey of all staff (funded through the Union Learning Fund) to determine how career and personal development could be improved in the Council The data is currently being analysed and an action plan developed. Prospect has also financed a series of development programmes for its members under the generic title of "Opportunities for Change".

Therefore we are uniquely placed to comment on matters affecting scientific careers and development in this research council. We believe that a properly funded and administered system of career development is vital to the success and long term sustainability of the organisation and that urgent steps need to be taken if the BBSRC is to maintain its pre eminent position in UK Bioscience research.

Over the last 15 years, the career structure for scientists in the BBSRC institutes has changed dramatically. There was a time when one could enter the service from school or University and work one's way through the system on merit to the "career" grade (now Band 4). This held for all scientific positions.

Today most new group or project leaders enter at this Band or the one below and are classed as innovative. They can receive promotions on merit to Band 1. Those who are graded from the start as non-innovative, no longer have any career progression on any basis let alone scientific merit, excellence or skills. Research Assistants fall into this category. There was a point when such staff entered the service at a training grade and were then promoted once they had achieved the required levels of knowledge and skills (the so-called 'straight-through' grading system. Even this has now been removed. Instead there is a tendency to appoint research assistants with the highest qualifications and at the highest level. It is rare now to see youngsters entering the service and being trained and promoted since promotion is almost impossible on merit; the opportunity afforded by the "JEGS" (job evaluation grading support) system, whilst in principle valuable, is often not realisable in practice, since a criterion of "organisational need" is increasingly strictly applied. Thus there is no career for them unless they wish and are able to take the group leader route. This normally requires leaving the institute for further training.

The BBSRC grant system also has no built-in career progression system. Apart from personal fellowships for the very best scientists, the system is designed to "use and lose" people, normally over a period of three years. The latest Fixed Term Employee legislation has exacerbated the situation since some institutes are now reluctant to keep staff due to the cost implications of redundancy payments. Thus legislation that was designed to help Fixed Term contract staff is actually hindering their career development!

The reliance of many institutes on competitive and short term funding precludes the development of a satisfactory career pathway for all but a lucky few and the majority of staff are locked into a system which neither adequately rewards nor motivates its staff. Prospect believes that there needs to be greater stability of funding to nurture a real career structure for scientific staff , and that there also needs to be an increase in core funding to invest in BBSRC's greatest asset—its staff!

To conclude Prospect feels the BBSRC should overhaul its system of career development at its own institutes and to build into its grant structure, training and development opportunities with the appropriate funding.

November 2003

APPENDIX 6

Memorandum from Professor A Watts, University of Oxford

1. Delays in Establishing New Methodologies

Solid state NMR in biology is now a major growth area in structural genomics and when we started to pioneer the approach in 1986, only a handful of groups were developing the method—by 2003 some 150 groups (in academe and industry in Japan, the US, Germany, France, Canada) are now actively using and developing the method. The UK now has recently (belatedly since 2000) established groups interested in the area at UMIST and Leeds, with an expert in method development recently moved to Southampton- we were the only one in the UK until 2000, compared with about 30 in the US, five in Germany, for example. Waiting

times for instruments can be more than 18 months due to the delay in specialized (wide bore) magnet production (predominantly out of the UK, with concomitant profits for these companies). Drug companies are now investing heavily in the methods, and we are a centre for training.

The initial development of this methodology by us in Oxford was severely hampered by lack of the required equipment—it took 10 years to convince SERC/BBSRC to make any major equipment investment at the required level whilst others internationally were making advances leaving us behind. However, based on our advances and productivity using "borrowed" instruments (usually in Holland and the US), a 1/3rd shared instrument (in Chemistry, Oxford), and inadequately converted (solution state) instruments, coupled with the final awakening that this was a major growth area, we were eventually awarded sufficient funds under the new JREI schemes (in 1996 and 1997; 50% raised by me from industrial sources) to establish what is now one of the better equipped biological solid state NMR facilities world-wide. Lack of expert opinion, under funding and prejudices for new methods, probably contributed to this difficulty in securing support—it could certainly not have been as a result of lack of research output.

The methods are highly sophisticated, require two to three years for people to become competent, and are expensive to maintain. None of this seems to reduce the ever increasing enthusiasm and investment world-wide, since the information being gained is new and often inaccessible by other means, especially for membrane and drug receptors. I am inundated with requests for graduates, senior post-doctoral workers often on prestigious fellowships and senior sabbatical workers to come to the group to gain experience in the methods.

The UK activity in this area was therefore inhibited for many (10) years due to these funding delays in supporting equipment for new methodology and development with application in structural biology.

2. Facility Support

Major investments in equipment require infrastructure and development support. Without this, instruments are under-used, under-developed and do not reach their full potential. UK research councils are notorious for under-support of facilities and major equipment once in place, *even though these have often been established, at least in part, with money from these very research councils*. My personal knowledge of the US, Japanese, German, Dutch, Swedish and French solid state NMR facilities, all of which have fewer instruments than us but have (several) people to keep the facilities running smoothly, confirm this fact.

Our successes until now with the new instruments have been entirely due to the added support of the two JREI grants which did have facility support, but they have now expired (in 2002) with no further BBSRC commitment (despite having applied for it).

Due exclusively to the lack of effective mechanism at BBSRC for requesting facility support, my BBSRC/HEFCE funded facility has no BBSRC support for:

- infrastructure;
- workshops for specialized state-of-the-art hardware development;
- new method developments to stay at the fore-front of the area;
- instrumental running costs (these are not trivial);
- technical support; and
- long-term management and/or technical personnel for training.

Many other similar examples exist in the UK of such under-support. An application submitted specifically to maintain "state-of-the-art" developments (needing non-commercial, innovative equipment engineering and physics with applications in biology at its most sophisticated), was returned unfunded with indications that "BBSRC does not support facilities with infrastructure" and "support has to come through individual projects".

Thus, UK/EU graduate students and post-doctoral workers, who are in the group for a limited (3 year) time and need training for each (often highly specialized) activity, are now being less than productive with their main projects because they are having to use their (limited contract) research time to:

- repair complex faults (maintenance is a prohibitively expensive at £300/day from a company);
- update and test new instrument software;
- carry out essential maintenance;
- repair and build sophisticated NMR probes;
- train new users, rather than be trained much more quickly themselves by an expert with longer-term (more than three years) experience;
- fill magnets and manage cryogens; and
- manage the facility.

In addition, the "standard" consumable allocation from BBSRC is often insufficient for each grant, and certainly the RTSG is nowhere near enough for any graduate student in this area. We have 23 international collaborations, and I feel uncomfortable in asking for instrument support from these co-workers for NMR instrument running for (especially European) collaborative projects (in their own countries this kind of request would unheard of)—I am now refusing new collaborations for this reason.

Yet again, the UK activity in this area is falling severely behind that elsewhere, as a direct result of a policy not to fund facility support.

Recommendations

The CEO of BBSRC should consider policy changes to:

- fund highly innovative research at an early stage in preference to secure, low risk, less inspiring routine research;
- fund highly productive research groups with more "in principle" five year programme grants;
- support equipment investments for at least five or 10 years after their establishment—this could be at a fraction (about 1–2% of capital cost would be sufficient in our case) of the initial cost, but significantly enhance their productivity; and
- ensure that researchers with good resources and who are highly productive with research output (training, publications, etc), are maintained as successful, and not cut them back.

November 2003

APPENDIX 7

Memorandum from the British Biophysical Society

1. Peer Review

It is clear that *the current practice of having just two application deadlines a year is not working to anyone's advantage.* It obviously makes it slower to get research off the ground, and makes it more difficult to retain good post-docs (if one grant fails, it is a long time before the next opportunity, by which time the person has gone). From the point of view of BBSRC administration and committees, it is felt that having the workload concentrated into two intense periods hinders their performance and helps neither them, nor the community. This is clearly illustrated in the current grant round by the fact that one of BBSRC's grants committees is being expected to make decisions with an average of only 0.3 referee's comments per application.

There are also serious implications for newly tenured staff getting support. Generally a new academic on a two to three year probationary period would only get four to five attempts to get a grant (assuming that they are able to apply immediately on taking up their post). Any delay in being able to make an application (due to other pressing duties) and developing ideas for a submission, could restrict their chances significantly of gaining support within the probationary period.

2. Levels of Support

We would like to recommend strongly *that opportunities for longer-term (5 year) support become more routinely awarded.* This would be much more in line with practices in other research-active countries, and is a frequently voiced criticism of BBSRC. This would also have the added benefit of reducing administration and the time taken in the proposal writing and reviewing process (one 5 year grant with 2–5 PDRAs in a well established group would be far less work for all concerned than an equivalent 7 or 8 three year project grants, and most likely be much more productive for the PI).

With respect to the career development of talented staff (the next generation of tenured staff), the ability to retain a researcher over consecutive short term (three year) contracts is becoming very difficult under new employment laws (indeed impossible as far Universities are concerned). A five year contract which is permitted, will be very attractive to the best and will give them the time to develop their careers as they take on more responsibility within a project.

In addition, we are concerned that (although not officially stated as far as we know, but abundantly clear in feedback from colleagues on grants committees) asking for *two* post-doctoral researchers on a grant dramatically decreases the chances of success. (Indeed, the possibility of applying for a postdoctoral worker and a studentship at the same time does not even exist, and it would be a good and productive option.) This attitude should be done away with (the same comment made above about consolidating reviewing and committee time also applies).

These comments effectively address the practice of "spreading resources too thinly", something other research councils seem not to do as much as BBSRC. Allied to this are the observations that committee decisions not to fund an application *appear* to be made on comments such "this PI is doing well already, so

do not support", or "count up the hours per PI for current grants, and they are working too many hours for a new project"—if the PIs who can manage research effectively and successfully cannot be supported, then who can?

3. Studentships

The committee studentships are an excellent idea, and we hope these will be retained when/if BBSRC moves to a doctoral training account system for quota studentships, similar to the EPSRC scheme. We hope that the current suggestion—again apparently arising simply from considerations of restricting the numbers of applications—that Committee studentships will be restricted to holders of BBSRC grants, will not be put into practice. (It is important that students be placed in an active laboratory, but this can easily be judged from the information already required in the application.) Like many, we would like to see a 4 year or 1 + 3 year studentship scheme, which would allow for a broader training, as well as more realistic project support which is available in other similar schemes.

4. Facility Support

Biophysical research revolves around instrumentation and equipment, which can be expensive but which is essential if the research is to be internationally competitive. In the post-genomic era, we are seeing very major investments abroad in NMR (US$10 million in Japan, Germany, France, Canada and the US), protein production (to support structural studies), bionanotechnology ($100 billion in the US alone in the coming spending review), proteomics ($100 million in Korea in the next five years at KIST), etc. In the UK, some investments have been made in these areas by Wellcome and through initiatives such as JIF and SRIF, but BBSRC has not been a major player in this activity.

When BBSRC *has* invested (often as a capital investment, sharing the cost with HEFCE), there is no commitment to the correct level of personnel support for the equipment, or indeed to continuing support. The BBSRC BMS committee, in particular, is well aware of this shortcoming. *If funds are not made available to realize the potential of such capital investment, then the investment will be wasted,* and certainly the groups involved will have no opportunity to be competitive at the international level in the continually developing and increasingly sophisticated era of biophysical research.

5. "Safe Bet" Research

Funding committees do not admit to using the criteria of "guaranteed productivity per proposal" (£/publication) or the "expense per project", but such observations are widespread informally. Similarly, a notional sum for consumables per PDRA is commonly allocated on each grant, regardless of the requested or real cost. Innovative or developmental projects, which may have a lag time before producing results, have little chance of success, especially where equipment building and development are involved in areas like biophysics—*the current "high throughput everything" (ie calculating how many guaranteed papers will result from a guaranteed method with a guaranteed system) is stifling much innovation.*

6. Overhead Support

In reality, few HEIs can provide realistic infrastructure support comparable to that available in Institutes . This is not a problem restricted to the UK—for example in Germany MPIs attract the best students and post-docs, and are much better supported than the Universities. Universities are fast becoming the poor cousins of research, and this is almost exclusively as a result of poor infrastructure support—most academics can make the time for teaching and research, but when they waste time trying to do world-class research with inadequate resources, their energy runs out. This has been recognised, in part, by the allocation of additional government funds. However, the proposals to introduce a complex system of calculation of full economic costs on every grant will simply swallow up this additional resource in unnecessary bureaucracy. *Overheads should be increased to sensible levels and measures taken to track them through to the PI.*

7. New Methodologies

Biophysics applications to BBSRC (and elsewhere often) depend critically on the panel having at least one person who understands the nature of research which frequently has novel instrument/technology development as a major component. Equipment panels or initiatives frequently fund equipment and then responsive mode committee panels refuse to fund staff to work on the projects.

This is a hugely inefficient use of time and resource. In addition, some panels seem to require new techniques to be developed AND new research problems solved, all in a 3-year 1 post-doc grant (whereas the techniques usually need to be tested on simple problems first). Thus, the phrase "this research is technology driven" should be disallowed as a criticism for BBSRC applications. Strengthening the EPSRC/BBSRC border might help, but recent history proves this is not happening to a satisfactory level.

November 2003

APPENDIX 8

Memorandum from the Biosciences Federation

INTRODUCTION

1. The Biosciences Federation (BSF) was founded in December 2002 in order to create a single authority within the life sciences that decision-makers can consult for opinion and information to assist the formulation of public policy. It brings together the strengths of the Institute of Biology and societies that were formerly members of the UK Life Sciences Committee. Those societies that have already joined the Biosciences Federation (see www.bsf.ac.uk) represent a cumulative membership of 60,000 bioscientists and cover the whole spectrum from physiology and neuroscience, biochemistry and microbiology to ecology. Those represented are drawn largely from Universities and research institutes and many will interact with BBSRC, so the BSF is ideally placed to respond to the above consultation.

SUMMARY

2. This statement's principal points include:

(i) The Biotechnology and Biological Sciences Research Council (BBSRC) is a highly regarded organisation that should be congratulated for its work towards excellence in biological and biotechnological research in the UK (paragraph 3).

(ii) The BBSRC should continue to focus on providing project grants for fundamental research, rather than applied or policy driven research which traditionally falls within the remit of Government department and Industry science (paragraph 4).

(iii) Cuts in Defra's budget have had a negative impact on the BBSRC's core investment in fundamental research (paragraphs 5 and 6).

(iv) Investment in sustainable agriculture is being undermined by a lack of co-ordinated planning among the major funders (paragraph 7).

(v) Although not unique to BBSRC, there are still problems with supporting research at the interface between disciplines (paragraph 11).

(vi) There should be more opportunity to obtain extended grants for work that cannot be completed within three years (paragraph 13).

(vii) While broadly supporting BBSRC's future planning, the BSF urges that the focus on computer-modelling approaches must not be at the expense of fundamental "wet" biology research. The BSF would also like to learn BBSRC's view on how the drive towards "big science" will affect smaller research groups (paragraph 14).

(viii) The BBSRC is to be congratulated on its wide range of public awareness activities (paragraph 17).

RESEARCH FUNDING POLICY

3. The Biotechnology and Biological Sciences Research Council (BBSRC) is a highly regarded organisation that should be congratulated for its work towards excellence in biological and biotechnological research in the UK. Administration is handled efficiently and openly, and those who work with the BBSRC have few complaints.

4. In the past BBSRC has been particularly good at supporting project grants and the BSF continues to believe that most funding should be concentrated on ground-up (ie fundamental) research. The BSF urges caution in the way the BBSRC responds to the Government drive for commercialisation of its science, and for the research that it funds to be "relevant". The prediction of scientific advances is notoriously difficult and the best and most innovative science is usually achieved by funding good people with good ideas, not grand plans. Government departmental science is there to support surveillance and policy-driven applied research, and industry tends to support more near-market and specifically market-goaled research.

5. There is concern that the long-term year-on-year cuts in the research budget at the Department for Environment, Food and Rural Affairs (Defra; formerly MAFF) have had a negative impact on BBSRC's work. The BBSRC has had to compensate for budget cuts in Defra's more applied research, thus putting pressure on its core investment in fundamental research. The Commons Select Committee on Science and Technology and the UK science community have highlighted this several times in the past, so the continued budget cuts at Defra have been disappointing.

6. The BBSRC has coped well despite budget cuts at Defra, but some research institutes have suffered, such as Horticulture Research International, and it has become harder for the BBSRC to provide the science to underpin policy. Systematics is vital for a wide range of ecological activities but lack of funding support in this area has meant that the UK is at risk of losing alpha taxonomic skills. In addition, the Nutrition Society is concerned that investment into food-chain nutrition research has markedly declined over the past

15 years, particularly in the area of animal nutrition. Animal nutrition and related sciences synergistically complement and exploit advances made in other fields currently developed by BBSRC research, such as genetics and genomics, animal health and immunology.

7. A recent review commissioned by BBSRC concluded that investment in sustainable agriculture, one of the key goals in its 5-year plan, is being undermined by a lack of co-ordinated planning among the major funders, ie the BBSRC, Government departments and industry. For example, research funding is often redirected during crises such as the BSE outbreak, with consequent cut backs in longer-term strategic work. A report in 2002[3] by the Policy Commission on the Future of Farming and Food, Chaired by Sir Donald Curry, recommended that the Government should set up a "priorities board" to set the agenda for public research on farming and food matters. This does not seem to have materialised, unless Defra's new Science Advisory Council is to fulfill this function.

8. Government research institutes also undertake some fundamental research to underpin their applied research and should be allowed to apply to the BBSRC for funding. Cuts in Defra funding have meant that such institutes compete with each other for a reduced resource, and an additional source of competitive income would be beneficial.

9. The BBSRC must be careful to look after the interests of its research institutes across the whole of the UK. The devolved parliaments will have a particular interest in maintaining the institutes within their own countries, but English institutes may not receive the same attention.

10. The scientific community is largely sceptical about the value of EU funding programmes such as the Framework series, which have too many political strings attached, require a large amount of effort to apply, and have a poor success rate. Although this is not specific to the BBSRC, the UK Research Councils must address this in their dealings with the EU.

Administration of BBSRC Grants Awards

11. Although clearly not unique to BBSRC, there are still problems with supporting research at the interface between disciplines, and it is too early to tell if the creation of Research Councils UK will help to overcome these. A problem that has been previously highlighted is that if peer reviewers used by individual Research Councils are less familiar with cross-disciplinary work they tend to regard it as being "risky" and are more inclined to turn down such proposals.

12. There needs to be better co-ordination and planning of the support for research infrastructure between Research Councils, Universities, major medical charities, and Government. The sector has no policy for amortisation and replacement of key equipment and it is a lottery whether the money to maintain infrastructure can be won on grants. It may be more cost-effective and efficient to establish centrally funded core research facilities in Universities, for example, for imaging or gene array, that can be staffed by dedicated specialists.

13. There should be more opportunity to obtain extended grants for projects that cannot be completed within three years, for example, work involving the generation and use of genetically modified animals.

Pursuit of Strategic Objectives in the 5-year Plan

14. The BBSRC 10-year vision for biosciences research emphasises the three overlapping areas of integrative biology, data sets and tools. These areas will be crucial in contributing to the quantitative understanding of biological systems, however:

- Investment in this type of work should not be at the expense of fundamental "wet" biology research to understand systems better at a variety of levels, particularly in whole organism, ecological and environmental sciences;
- Success in predictive biology will require an enormous recruitment and training programme in bio-informatics and the BBSRC should work with other agencies to achieve this; and
- The pursuit of "big research" will drive the creation of large teams in fewer universities. Universities UK is arguing strongly against further research concentration. What does BBSRC consider will be the impact on smaller research groups, bearing in mind recent reports that found that size does not necessarily translate into greater efficiency?

15. The 5-year plan outlines improving the quality of post-graduate training, and developing training for Principal Investigators and potential research leaders, but says little about career development for "career post-docs" who may not want to become team leaders. These are often key people within research teams (eg involved in the running of core research facilities) yet the uncertainty of grant renewal makes their employment on short-term grants unpredictable. It is by no means sure that the new Fixed-term Contracts regulations will improve their career security. The Research Councils must work with Universities to continue improving career prospects and conditions for people working in science.

[3] Report of the Policy Commission on the Future of Farming and Food. *Farming and Food: A sustainable future.* Available at: http://www.cabinet-office.gov.uk/farming/pdf/PC%20Report2.pdf.

16. BBSRC already has sound policies for remaining in contact with women scientists during maternity leave and during career breaks. But the loss of women scientists for family reasons remains too high and BBSRC must continue to explore training programmes, fellowships, and part-time working to facilitate the return to work. Support mechanisms to help keep female researchers' work going during maternity leave would be valuable.

Public Awareness Work

17. The BBSRC is to be congratulated on its wide range of public awareness activities, for example, its events and resource packs for schools, public exhibitions and events, and grant schemes for communicating science.

Technology Transfer Activities

18. The BSF believes that technology transfer cannot necessarily be left to the scientists and commends the way in which the BBSRC has worked in partnership with learned societies in order to pass on key technology transfer messages to the practitioner. It applauds the way in which it has encouraged two-way dialogue and has listened to the concerns of those working within the sector.

Openness

19. The Biosciences Federation is pleased for this response to be publicly available and, with permission, will be shortly placing a version on www.bsf.ac.uk. Should the House of Commons Science and Technology Committee have any queries regarding this response then they should in the first instance address them to Catherine Joynson, Science Policy Advisor, Institute of Biology, 20 Queensberry Place, London, SW7 2DZ [email: c.joynson@iob.org].

November 2003

APPENDIX 9

Memorandum from Dr Donald Bruce, Director, Society, Religion and Technology Project of the Church of Scotland

1. Introduction

I am a member of the BBSRC's Advisory Committee on Issues of Public Concern (which needs a more manageable title), and also of the Scottish Science Advisory Committee. I am very pleased to offer the following comments BBSRC's work and strategy. My focus is not so much in the detailed scientific priorities, but wider insights from an ethical and social perspective as Director of the Society, Religion and Technology Project (SRT) of the Church of Scotland. This was set up in 1970 to examine ethical issues arising from current and future technology. It has a distinguished record in providing informed insights in many fields. In the past decade it has especially engaged with agricultural biotechnology, notably in an expert working group on GM crops and animals which I chair. This group produced the book Engineering Genesis in 1998, and we are currently preparing a second edition.

SRT was one of the first organisations to draw to the Government's attention the need to take more seriously the emerging concerns of the public over GM crops and food in the late 1990s. I have had considerable involvement in the subsequent moves to encourage public participation on issues in human and non-human biotechnology. This year I helped develop a card game called DEMOCS for the New Economics Foundation, which was designed to enable informal groups of people to discuss GM issues in the GM Nation debate. It was used in a number of tier 2 and 3 meetings, with the approval of the GM Nation Steering Committee. I was also the expert presenter for a small series of focus groups with low income families and students organised by the Scottish Civic Forum on behalf of the Food Standards Agency, in its consultation on GM food in Scotland in March 2003.

For your information, I originally trained as a chemist and worked for 15 years in research and risk assessment in nuclear energy before becoming Director of the SRT Project in 1992. I have doctorates in chemistry and in theology. I am also an honorary fellow of Scottish Agricultural College and a member of its Applied Biosciences Committee, and my wife Ann Bruce is the Scientific Administrator of the BBSRC Roslin Institute and is also a research fellow for the ESRC's Innogen centre for social and economic research in innovation in genomics. The views expressed in this submission represent an informed view from within the Church of Scotland, as Director of the SRT project, but they should not necessarily be taken to represent the formal view of the Church of Scotland, as this can only be expressed by its annual General Assembly.

2. Future Priorities Arising from the GM Nation Findings

The most significant factor in relation to BBSRC's work is the substantial public unease about high technology interventions in food crops, and also in non-food crops in so far as these might harm health or the environment. This has been shown in various studies, but especially in the outcome of the GM Nation debate. Here, BBSRC is presented with a unique set of data on public views about key aspects of crop biotechnology, which it must now take seriously. Clearly it would not be a good use of public funds to do research leading to products that would probably be rejected in the market place or to gain understandings that are unlikely to be applied. It is therefore of great important that BBSRC takes to heart the key lessons of the GM Nation debate.

(i) *Major Conclusions and BBSRC Opportunities*

From my own direct observations and from the data presented in the official report, I share the opinion of a number of observers that the open debate showed a sampling anomaly. The unrealistically short timescale of six weeks inevitably meant that those who took part in the open debate were those who happened to have been alerted to it. There was not enough time for it to have penetrated far into the wider population. The comparison between the open debate responses and those from the "narrow-but-deep" focus groups suggests that the former were more likely to be opposed to GM crops than a random sample of the general population would have been.

Nonetheless, several factors are very clear from both parts of the debate.

- There is a deep scepticism about the current generation of GM crops, and there is no public mandate for allowing their commercialisation at present;
- While focus group participants recognised that some future applications of GM crops might bring consumer and other benefits, this is tempered by scepticism whether these would actually be delivered, especially if in the hands of GM companies;
- There is a near universal belief that we do not so far have enough data to be reassured about possible health and environmental risks; and
- Para 199 of the GM Nation report gives a clear message about the need for more reliable sources of data and information.

"In both groups people consistently expressed a very strong wish—almost a longing—for more information about GM from sources they could trust. They wanted such information partly to resolve the contradictions and disputes, claims and counter-claims, in the existing body of information, science and research on GM issues. They wanted information which serves as a corpus of agreed 'facts' accepted by all organisations and interests, and independent of any special influence."

BBSRC has a unique opportunity to respond positively to the clear public desire for more research and information in some of these disputed and incomplete areas. I think it is fair to say that the public would now expect that BBSRC should play a significant role, as an independent sponsor of research. It also suggests that BBSRC has an important opportunity here to regain some measure of public trust by demonstrating its responsiveness to public concerns. On the other hand if it does not do so, BBSRC could be seen as out of touch, and considerable damage might be caused to its standing. A public funding body has a primary duty to respond to public views about policy. I suggest that "business as usual" is not now an option. BBSRC should now set a high priority to respond to these views and concerns, if it is to fulfill its role as the leading agency for publicly funded research in UK biotechnology, and it should now make appropriate reorientations in its priorities.

(ii) *Health and Environmental Risk*

The universally perceived inadequacy of current information on GM environmental and health risks implies a major criticism of past research priorities. In effect, as far as the general public is concerned, the Government has failed to stimulate the kind of research on GM that the public would have wanted to see. Various parties are of course involved in this criticism, including DEFRA, ACRE and DTI, but some of it must fall on BBSRC as the lead body in promoting publicly funded GM research over recent years.

(a) GM and Health

It is both ironic and significant that the greatest concern is over health risks. This demonstrates unequivocally that, whatever its scientific merits may or may not be, substantial equivalence has no public confidence whatsoever as a regulatory concept for GM food, and must be abandoned. The absence of direct testing seems to prove a significant barrier to public trust. It was a source of important criticism from the health committee of the Scottish Parliament earlier this year. BBSRC should consider as a priority promoting research, in collaboration with FSA and MRC, which is geared to developing new criteria and methods for biotechnology food health safety, and which might carry a degree of public confidence where present methods have so clearly failed.

(b) GM and the Environment

In the environmental sphere, the farm scale trials revealed how comparatively little is known about some quite basic characteristics of the natural biological environment. I have a concern that the undoubted scientific fascination with emerging areas such as genomics, genetic engineering and bioinformatics has led to an underfunding of some less glamorous traditional areas of biological research which yield their results more slowly. I claim no expertise here, but it seems obvious to me that it would not be not "sound science" if the biological and ecological systems into which novel forms of biotechnology are to be applied are not sufficiently understood to be able to predict unintended consequences of the new applications.

In some cases these are also the basic capacities that would underlie risk assessment for potential future crises in agriculture or food. Looking back over the last 10 years, the Government showed itself unprepared with the basic scientific tools in areas such as TSE-related research, foot and mouth and vaccination, and in aspects of soil science, biodiversity and ecology relevant to GM crops. BBSRC should consider if the effect of its priorities is that the industry is vulnerable in ways that could be avoided.

(c) GM and Animals

While the GM Nation debate did not touch on genetically modified animals, the backwash of public scepticism means that the application of genetic modification to farm animals seems likely to remain restricted to non-food novel uses, such as medical applications. While GM applications to help prevent animal disease might be welcomed from an ethical point of view, if they were food animals I suspect that the risk element would still remain a barrier to many people.

3. What is BBSRC's Research Primarily For?

(i) *Balancing Reductionist and Systems Approaches*

A related question to the above comments is to state a need for a reasonable balance of research into reductionist and systems approaches to biology.

First, how good is the reductionist understanding of organisms which emerges from genomics, proteomics and related fields of study? Given the current understanding that gene function is now seen as a more complex affair than was thought a few years ago, BBSRC should perhaps be careful not to assume we know as much about the various genomes as we think we do. Pressure to file patents and commercialise based on single gene effects should be tempered by the need to explore interactions and side-effects.

Secondly I have one concern about the research sub-culture of BBSRC. I sometimes pick up impressions of an underlying antipathy, at least in some parts of BBSRC, to organic agriculture. It seems as though research related to organic systems is somehow not proper science, perhaps because it is not so readily expressed in reductionist concepts? While some parts of the organic movement are arguably at fault for being antipathetic towards conventional science, this is not true of all of it. Given the increased public demand for organic food but its relatively high price to the consumer, it would seem obvious for BBSRC to devote more attention to basic research aimed at improving the effectiveness and cost-effectiveness of organic agriculture. This should also include studies relevant to various "integrated" agricultural systems. These latter are important because they offer increased ecological sensitivity in ways that may be pragmatically more approachable for many farmers than organic agriculture.

(ii) *Are the Aims of BBSRC too much influenced by Wealth Creation?*

I am concerned that the goals of BBSRC crop research in the past may have reflected too much a DTI philosophy that wealth creation is the primary goal of biotechnology research. BBSRC should reflect on giving more emphasis to the goals of improving health, quality of life, welfare and stimulating environmental benefits. These precede the goal of wealth creation logically, philosophically and morally. Similar observations may be made regarding the expressed priorities of the science strategy of the Scottish Executive and the biotechnology strategy document of the European Commission. One can only create wealth with a product that someone wants. GM crop applications developed for agronomic benefits provide a disturbing example of a product promoted largely for wealth creation, that people in Britain (and much of Europe) have turned out not to want.

In the priorities it considers today, BBSRC should therefore reflect on how to avoid mistakes of the kind that was made by Monsanto some years ago in prioritising what now appear as the wrong applications of GM. In concentrating GM research on agronomic applications which had no tangible consumer benefit (and which might be so broadly applied that environmental risks were unavoidable), they effectively undermined the UK and European market for a generation. The experience of the earlier UK GM tomato paste is that a series of carefully planned applications which primarily gave food or nutritional improvements to consumer (and which were well labelled) might have created a climate of approval into which agronomic applications could later have been added. To learn the lessons from others' past mistakes, BBSRC should ask itself what are the equivalent decisions for its own research priorities today.

In the current climate of public scepticism, biotech research that is seen to be motivated by commerce is disbelieved almost in principle. For the time being, meeting public needs should be the primary goal for biotechnology, more than wealth creation as such. The location of the research councils and OST with DTI as their paymaster may now be somewhat problematical in this respect. The priority should be to rebuild long term trust. BBSRC's emphasis should therefore move more towards research which the public would see a point to doing. This implies a much earlier engagement with the public in research priorities, and more openness on the part of the scientific community to public scrutiny of what is being funded. I appreciate that this is not a simple issue, but that is no reason for not grasping the nettle.

(iii) *Insufficient support for spin-outs?—the case of PPL*

Where there good examples do exist, which both meet a public need and provide opportunities for wealth creation, serious questions must be asked whether the right infrastructure exists to safeguard some of the excellent biotechnology developments which come from BBSRC institute research. The recent demise of PPL Therapeutics raises the question of whether DTI puts in place sufficient long-term provisions to give substance to its current stated commercial purpose for BBSRC research. I was for several years the external member of PPL's ethics committee under the Animals (Scientific Procedures) Act, and I observed at close hand the misfortunes of the company. It was a sad case of an extremely good scientific idea for an ethically acceptable medical application of biotechnology in animals, which eventually fell foul of a badly done phase II clinical trial and then the changed policies of a foreign multi-national company on whom PPL depended. While some have criticised PPL for having too broad a research interest for the size of company, these various innovations in nuclear transfer and stem cell research were the sorts of science that BBSRC encourages. This suggests whether too much of a gap exists in medium term financial support from DTI for biotechnology companies, which have good prospects but a long lead time. This must throw into question whether the stated commercial purpose of BBSRC research is sustainable without substantial more mid-term support for companies at this vulnerable stage.

4. Independence of Funding

The GM Nation report confirms the findings of other studies of a serious scepticism about the validity of risk, safety and regulatory processes where commercial data are involved. The trend of the last 30 years away from publicly funded research to more commercially oriented work has had an unintended consequence in a corresponding loss of public trust in the research. Whether or not the perception of data being tainted by commercial motivations is valid is not the point. If these are the real attitudes that people have, they must be respected. Experience suggests that they are not addressed by scientists or regulators shouting louder about the virtues of their data.

It suggests that there is a need for an independent source of funding for this sort of risk-oriented research. This might be done with teams made up of researchers from across the various institutes and research groups, who are "ring fenced" to do only this sort of work. They would need to avoid involvements in other areas that could seen by the public (and especially the media) to taint their independence of judgement. There may be useful parallels with the field of toxicology, or research promoted by the Health and Safety Executive. If it is not seen as BBSRC's role because of its terms of reference or by precedence, then I suggest its terms of reference need to be changed to reflect a changed public mood. The perception would be that BBSRC would expect to be among those promoting this sort of research—as if to say "if it is anyone's job, it's surely yours." If it is not seen as BBSRC's role, because BBSRC is seen as promoting biotechnology, then BBSRC should identify a body which should be fulfilling this need.

5. Research Pressures and Value for Money

I would sound a cautionary note on the degree of competitiveness demanded in bidding for funding. I recognise that historically there was a need to require better accountability and value for money that can be aided by competitive bidding. There comes a point, however, when competitiveness turns back on itself and fails to deliver value for money, because so much of the time is being spent on funding bids that researchers have little time left to do research. This has two results. One is that the researchers have to work even longer hours and eventually suffer from stress-related illness and loss of effectiveness. This results in a net loss of value for public money. As a church which often picks up the pieces of stress in the workplace, we would point out the need for the research councils to consider their human responsibility in this area, which is not always handled well. Secondly there is a concern that public money is being wasted by turning Principal Investigators too much into fund raisers—which the public would not expect—instead of enabling them to do what the electorate would expect them to be doing—namely, to be leaders, managers and energisers of high quality research.

6. Public Awareness and Ethics

I am pleased with the work of the public awareness section of BBSRC, but considerably more effort should be devoted to it.

(i) *Training of Researchers in Public Engagement and Ethics*

There is an acute need for bioscientists to listen to, understand and respect the concerns of the public, and to understand basic ethical issues related to their work. This applies equally to in service training of established scientists as to PhD students and new post-docs. The training of crop scientists in public awareness and communication needs to continue to encourage more reflexive and two-way processes of engagement with the public. The single, often rather token, day of time allotted for researchers to public aspects is simply inadequate in the present climate. My experience is that while some scientists are indeed alert to the realities of public dialogue, the failed "deficit model" of "educating the public" into accepting an innovation sadly still persists among many in the research community. Serious effort needs to be put into training of scientists to include these dimensions and BBSRC has a lead role to play here.

(ii) *Additional Emphasis on Assessing Ethical Implications*

The ethical oversight of research funded by BBSRC needs to be re-examined. The respective roles of university or institute ethics committees, on the one hand, and the public advisory group on the other, needs to be clarified. Research ethics committees may in some cases be too spasmodic to provide a reliable route, and things may be falling through cracks. It is also not clear that research that is funded out of core grants receives the same degree of ethical scrutiny by BBSRC as research that goes through the competitive review process. There seems to be no mechanism to assess this work and this represents an unacceptable anomaly. The public advisory committee should therefore probably have stronger role in ethical assessment of any research proposals that have the requisite scientific merit but which could be controversial.

November 2003

APPENDIX 10

Memorandum from the Royal Society of Chemistry

The Society welcomes the support provided for the chemical sciences by the BBSRC

The core science of chemistry continues to enable major advances to be made in the broader chemical sciences. The particular expertises that chemical scientists have are invaluable in advancing many areas of the biological sciences and these skills will become more important into the future. For example, the technology required to sequence the human genome was chemistry since DNA is one of the basic "molecules of life". Information provided by the sequencing on the human genome can be translated into better health care, new medicines and improved disease control as indicated in the recent Government White Paper *Our Inheritance, Our Future*.

The RSC also welcomes recent increases in the funds provided to the BBSRC as a result of the latest Comprehensive Spending Review. The increased financial support for science builds upon the Government's commitment to, and policy for, the UK to develop a high value added economy that focuses on utilising science and technology married to a highly skilled workforce. Increased support for science and engineering will help towards achieving this aim but only further sustained increases in investment in the Science Base will enable the full benefits of advances in science to feed through into the health, wealth and total well being of the population.

In particular the RSC welcomes the BBSRC's continued support for the Biomolecular Sciences (BMS) and recognises that chemical scientists remain successful in receiving funds from this programme. *The RSC does note however, that the recent transfer of funds from the EPSRC to the BBSRC resulted in a cut in the total BMS budget*.

The RSC is also encouraged by recent moves by the BBSRC to engage further with the chemical sciences community and welcomes efforts by the BBSRC to work with bodies such as the RSC in identifying funding opportunities for chemists within BBSRC programmes.

The Society would like to suggest that the Select Committee might want to inquire into what more the BBSRC might do to build on these positive developments.

November 2003

APPENDIX 11

Memorandum from the University of Warwick

We are among the 20 universities which receive most funding from the BBSRC (commitment of £6.8 million to projects at University of Warwick at January 2003, including £5.8 million to our Department of Biological Sciences) and we are about to acquire Horticulture Research International which receives core support from BBSRC of the order of £2.5 million per annum.

We are strongly supportive of the way in which BBSRC has discharged its responsibilities, since its establishment nine years ago, and we would highlight the following positive features of its record:

(a) the Council has directed increasing proportions of its resources through competitive funding routes, and to Universities, while sustaining its Institutes as centres of excellence;

(b) it has retained the confidence of the academic community in the impartiality of its peer review process, through a period of considerable financial stringency when success rates for responsive-mode funding have occasionally dropped below 30%;

(c) it has maintained a good balance between strategy-driven initiatives and responsive-mode funding;

(d) it has supported interdisciplinary work, notably at the interfaces with Chemistry and Mathematics (members of our Chemistry and Mathematics Departments serve on BBSRC funding committees);

(e) it has devoted substantial resources to training and has driven forward the widening of the training expected during a PhD;

(f) it has introduced imaginative Fellowship schemes to support the career development of university researchers; and

(g) it has demonstrated managerial firmness in actively driving the rationalisation of the large number of widely-dispersed Institutes it inherited from the AFRC.

Of these aspects of BBSRC performance, items (a)–(c) are probably the most important in establishing the climate for biological research in universities. One of our young Professors, recently recruited back from the USA comments as follows: "BBSRC has a grant review system for responsive mode that commands widespread respect among researchers for its fairness and for supporting new investigators. Charges of cronyism are rare. Young researchers with international experience do not take these benefits for granted, so this is a major competitive advantage for the UK in the market for talented young researchers. The fairness of research funding complements the academic freedom offered by the UK university system, even if the amount of funding is not always world-leading."

Our negative comments relate to administrative procedures which are mainly being addressed since the Quinquennial Review of Research Councils and the establishment of ROUK. The diversity of administrative practice between Research Councils is a considerable inconvenience and burden to universities (and individual researchers) who deal with several of the Councils. The pressure towards greater conformity of practice is something we greatly welcome.

November 2003

APPENDIX 12

Supplementary evidence from the Biotechnology and Biological Sciences Research Council

Grant Administration

1. *How many grant applications have you rejected on remit grounds over the past five years?*

BBSRC's policy, in common with the other grant-awarding Research Councils, is that all responsive mode applications from eligible individuals must find a "home" Council. Proposals on the edges of the BBSRC remit are discussed with the most appropriate Council and, if necessary, referred to that Council. We do not have systematic records of applications which have been transferred (if transferred there is no reason for BBSRC to keep a record in our database) but, in the most recent grants round (November 2003 meetings) 24 applications were transferred to the MRC, three were transferred to NERC, and three to EPSRC. Typically, in previous rounds, we estimate than an average of four or five applications per Committee per round would be transferred: that is, about 100 applications per year (from total numbers of applications of between 1,200 and 1,800).

2. *Do you ever reject grant applications before they have been peer reviewed? If so, are they included in the figures that you have provided? Can you supply separate data on the number of applications rejected without peer review over the past five years?*

Very occasionally, when an application is quite obviously outside the BBSRC remit, it will be returned to the applicant, with advice to apply to another Council; also if insufficient information to start the reviewing process is submitted, the applications may be returned to the applicant. In the November 2003 round two applications were returned with the advice that they should be submitted elsewhere, and two were returned because the applications were incomplete.

3. *Can you describe all the measures you have taken to keep application rates at a manageable level (apart from writing to departments asking them to restrict their grant applications to only those most likely to meet with success: Q13)?*

As we indicated in the oral session, the rise in the number of applications to BBSRC reflects the growing number of bioscientists within the UK research community, and increasing strength of UK bioscience. Clearly this presents us with a problem, as there is a limit to which we can increase the amounts of money available for responsive mode grants. We are therefore pursuing ways of managing the level of demand and we have opened discussions with universities through:

- meetings with senior staff around the country to discuss the BBSRC Vision and implementation of the Strategic Plan;
- our annual meeting with the Heads of the 30 highest funded bioscience departments;
- a recent letter to all UK Vice Chancellors;
- a joint policy meeting, involving all our Research Committees, in September 2003;
- on-going discussions with the chairs of the Research Committees;
- bilateral discussions with individual institutions; and
- discussion at Strategy Board and Council.

Currently we provide individual institutions with their own success rate data, to assist their management of the application process. We are considering publishing this information for all institutions, and are consulting other Research Councils and the universities with a view to doing this.

4. *What consideration have you given to replacing your Committee system of peer review with a peer review college?*

The BBSRC's peer review system is based on committee decisions informed by referees, which we regard as our peer review college. We maintain these on a database to help identify the most appropriate individuals to contribute to each peer review assessment. Additional Committee members are co-opted for specific meetings to ensure the range of expertise is adequate.

Our system has the support of the vast majority of the bioscience community and delivers a very high standard of research. We are not complacent about the system and keep track of developments in the peer review systems of other major funders, including other "college" systems, and adjust our processes if required; but we are not convinced of the case to move to a significantly different system at the present time.

Under the joint Council Electronic Research Administration programme, a business analyst has been employed to look at all the Research Councils' grant awarding processes and this will provide us with a good opportunity to consider whether any changes/harmonisation would be of benefit.

5. *Lord Sainsbury told us that increased research concentration was due in part to choices made by Research Councils. Can you identify any decisions made by BBSRC in the past which may have contributed to this phenomenon? Are you happy with the current level of concentration? What role, if any, do you think you should play in redressing the balance?*

As indicated at the oral session, BBSRC funding is based on the money following the best science: we welcome good proposals from any eligible individual/institution, and do not take account of RAE rating in the peer review process. In our submissions to the Funding Councils' research assessment consultations we (via RCUK) stressed the need to protect good individuals in less research intensive institutions. We are concerned that the UK maintains a diverse bioscience research base, and we currently fund researchers in more than a hundred HEIs and academic analogues (in all regions of the UK and including many new universities), in addition to our sponsored institutes.

6. *Why is it necessary for you to consult other Research Councils before publishing the grant application success rates for individual HEIs (Q37 and Q39)?*

As set out above (Q3), and indicated in our responses at the oral session, we see clear advantages in publishing relative success rates. This is, however, an issue which is relevant to all the grant-awarding Research Councils and, in the interests of harmonisation of procedures, we are keen to work together in taking this forward.

7. *You cap the number of grant applications that your institutes can make and use this to explain their high success rates. Have you considered capping the number of applications that individual universities can make?*

We have considered various means of "capping" or rationing access to responsive mode funding. However, we have found it difficult to identify a system that would work for all eligible institutions. The sponsored institutes constitute a small group about which we have considerable knowledge and with whom we can have manageable and constructive dialogue. This is not the case for the 100+ universities and academic analogues we currently fund, or for any other institutions we are currently not supporting but which are eligible to apply.

8. *What measures are you taking to ensure that BBSRC grants are not being spent on fund-raising activities by Principal Investigators?*

BBSRC, in common with all other Research Councils, expects its grants to be managed in accordance with its terms and conditions. The grant is awarded to the Administrative authority of the University (usually the Finance Office) which is held responsible for the propriety of expenditure.

Universities sign an Annual Statement confirming an effective process is in place. Furthermore, the Councils undertake Dipstick Testing visits to Universities in receipt of significant sums, where checks are carried out. These checks are designed to be able to offer assurance to our Accounting Officer that expenditure incurred on RC grants is in accordance with our terms and conditions. The process satisfies National Audit Office requirements in this area. Comparable desk-based reviews are carried out on Universities in receipt of smaller amounts of funding.

9. *Do you turn down any grant applications on the basis of their presentational quality? What guidelines about presentation do you have in place?*

Our web site contains detailed instructions on completing the application form. We do not turn down applications on the quality of presentation. However, we do return applications to applicants where necessary details are omitted from the forms or where the length of the case for support is excessive.

10. *Can you clarify whether or not Sense About Science is directly funded by BBSRC (Q57)? If you would not support an organisation such as this, can you explain why it is acceptable for an institution to spend BBSRC funds in this way (Q59)?*

Sense about Science is not directly funded by BBSRC, although we have once sponsored (jointly with the Natural History Museum) one of their events: an evening discussion meeting on the topic "Public-good plant breeding". We sponsor a number of activities of this kind as part of our commitment to encourage informed public debate. For example we have recently sponsored the publication by the National Council of Women of a booklet on "Food in the 21st Century? Deserving of answers".

With respect to the Institutes, they have authority to work with other organisations if this is in the interests of enhancing the impact of the Institute's scientific work.

11. *Can you supply data on the number of your committee members that belong to organizations that are funded by, or have an interest in, BBSRC?*

Number of members from:	*HEIs*			*Institutes*			*Industry*			*Government*			*Others*		
	2000–01	2001–02	2002–03	2000–01	2001–02	2002–03	2000–01	2001–02	2002–03	2000–01	2001–02	2002–03	2000–01	2001–02	2002–03
Council	7	7	7				4	5	3	3	3	3	1		2
Strategy Board	9	9	9	2	2	2	4	3	3			1		1	1
Committee on Studentships and Fellowships	8	8	9	1	1	1	3	4	4				1		
Seven Research committees	47	51	65	6	8	13	28	26	23			1			1

INTERDISCIPLINARITY

12. *Can you describe the process you use to determine whether or not a grant application falls within your remit?*

Applicants are required to identify the BBSRC Research Committee they think is most suitable to assess the application, and are encouraged to contact the Office to discuss this in advance if they are unsure. On receipt of the application, scientifically qualified staff within BBSRC Office will judge whether the application is within the remit of the particular Committee and/or the BBSRC's overall remit, consulting scientific peers (usually Committee members) if necessary. For applications which are considered to fall outside BBSRC's remit, but within the remit of another Research Council, an appropriate person in the other Research Council is contacted for their view. If they confirm that the application is within their remit, the applicant is informed and directed to the other Research Council. As set out in question 1, all complete applications are found a home either within the BBSRC or with another Council.

13. *Can you supply data on the number of grant applications you have referred to other Research Councils over the past five years? Do you ever reject grant applications on remit grounds without sending them on to the relevant Research Council? If so, how many applications does this apply to?*

See Q's 1 and 12.

14. *Can you describe the process by which you refer grants to other Research Councils (Q3)?*

See Q1.

15. *Can you provide a list of all the formal meetings held with other Research Councils to discuss remit issues in the past 12 months (Q1)?*

- Chief Executive level bilateral meeting with EPSRC (June 2003)
- Chief Executive level bilateral meeting with MRC (November 2003)
- Chief Executive level meetings with NERC (January, June and December 2003)
- Director of Science level meeting with MRC (December 2003)

During 2003 the Engineering and Biological Systems Committee revised its remit, this involved:

- a BBSRC/EPSRC meeting on opportunities for joint working at the interface of the life sciences and physical sciences and engineering;
- discussion by EBS Committee in January, June, Sept and November 2003;
- a series of working groups over the summer; and
- EPSRC attended all EBS meetings and several working groups.

Animal Sciences (AS) Branch met NERC (September 2002) to identify areas close to the edges of the AS and NERC remit; this led to NERC co-funding some applications that bridged the remits. All sections of the Science and Technology Group (which manages the peer review process) have held informal discussions with MRC, NERC, ESRC and EPSRC about specific proposals or potential applications.

16. *Can you supply data on individual applications that are jointly funded by BBSRC and another Research Council outside cross-council programmes?*

For the January and June 2003 rounds 12 applications were jointly funded by BBSRC and another Research Council: four with MRC, seven with EPSRC and one with both MRC/EPSRC.

Since 1999 EPSRC has contributed up to £750K per annum to grants in three areas of the Engineering and Biological Systems remit—biological aspects of nanotechnology, biological mathematics, biochemical engineering; in addition EPSRC supports individual high quality applications from across the EBS portfolio where the application contains a significant physical sciences element.

All BMS grants (since 1994) that started before October 2002, and all grants funded under the Bioinformatics initiatives (1995–2001) are supported 2:1 with EPSRC.

17. *Can you describe the processes and mechanisms that you have put in place to train biomathematicians to work in the biosciences?*

BBSRC funds training for mathematicians at Masters and doctoral levels. We also use a variety of mechanisms to encourage mathematicians to work in the biosciences.

Masters and doctoral level training

At Masters level, support relevant to biomathematics is currently provided in courses on Bioinformatics (27 places out of a total of 114) and Biometry (four places). Allocations for support of training at Masters level run for three years. In the recent call for applications, BBSRC emphasised the need for applicants to show how the courses contributed to the achievement of BBSRC's scientific objectives as formulated in its Strategic Plan 2003–08 and its Ten-year Vision, both of which highlight the importance of quantitative approaches. The Strategic Plan identifies encouraging the development and use of mathematical models in the biosciences as a key goal.

At doctoral level, BBSRC supports training for biomathematicians primarily through the Committee studentships scheme. Research Committees set their training priorities annually, and these have included biomathematics on several occasions (eg Theoretical Biology in 2001 and 2002; Bioinformatics, e-Science and related Theoretical Biology in 2003). Once priorities have been set, applications are open to all researchers at HEIs, BBSRC-sponsored research institutes and Horticulture Research International.

BBSRC is using funding provided in the Science Budget 2003–04 to 2005–06 to provide targeted increases in PhD stipends for students whose projects lie in the interface between the biological sciences and the physical, mathematical and engineering sciences; this will include students training in biomathematics. The stipend enhancement of £2,000 applicable from October 2004 should prove a valuable incentive to attract suitably qualified students into this area.

Mechanisms to encourage mathematics in the biosciences

BBSRC has built up the level of mathematical research on biological systems through:

- BBSRC/EPSRC responsive research initiative in Mathematical Modelling Simulation and Prediction (1996); BBSRC responsive research initiative in Mathematics and Modelling of Agricultural Food Systems (1999); call for proposals in theoretical biology (1999) and the current cross committee priority area in theoretical biology; and
- Joint Research Council workshops in Theoretical Biology in 1999 and 2001. Another is planned for Summer 2004.

Discipline Hopping: since 2002 BBSRC has been a partner in this scheme, which allows scientists to develop the language and techniques of new disciplines thereby enabling them to conduct interdisciplinary research.

Staffing Issues

18. *Can you supply data on the number of BBSRC-funded contract researchers who are unable to apply for grants on their own behalf (Q26)?*

At any one time we fund about 2000 RAs. Of those currently funded, 328 have "recognised researcher" status, indicating that they have made significant contributions to the original proposal. For other grants the original application may not have included a recognised researcher, or even a named researcher, because the PI would intend to recruit if the application were successful.

Any RA can achieve recognised researcher status if they contribute to subsequent applications.

19. *What processes or mechanisms are you using to convince or encourage universities to employ researchers on a longer-term basis than research contracts?*

BBSRC has striven to take account of the Research Careers Concordat in devising and operating its procedures for supporting research. Our vision for research career development is for multiple career tracks (including but not dominated by that leading to a position as a principal investigator) to be available to postdoctoral researchers, along with access to training and development opportunities and guidance that effectively support their professional development and career progression.

BBSRC's David Phillips Fellowships scheme is targeted at researchers with up to $5\frac{1}{2}$ years postdoctoral experience who have not yet achieved appointment to a permanent post. The Terms of Fellowship Agreement commits institutions hosting them to:

- provide Fellows with appropriate formal and informal career guidance to maximise his/her chances of establishing him/herself in an independent scientific career; and
- accord Fellows equivalent status in scientific matters to their established academic staff.

The draft BBSRC Postgraduate Training and Research Career Development Strategy (currently open to public consultation, see http://www.bbsrc.ac.uk/funding/consult/trainingstrat/Welcome.html) sets out BBSRC's vision for postdoctoral researchers.

The consultation document on the strategy specifically asks for comments on how BBSRC can best contribute to the career development of postdoctoral researchers employed under BBSRC funding at universities and other research organisations.

20. *Have you considered a funding stream for new academic appointments?*

As new academic appointments clearly will not have track records that match those of more established scientists, and may be disadvantaged in direct competition, we encourage new researchers to apply as New Investigators. When they do so, the Committee assessing their application will make particular allowance for an applicant's lack of experience, and will focus on their potential. Apart from that, the peer review is as usual.

To encourage universities to support these researchers, we make New Investigator grants only where there is evidence that the university will contribute to setting up a laboratory for the applicant. Our awards are for research, not just for equipment.

Although the quality of the proposed research must meet our rigorous standards, we see the awards as giving a boost to the early stages of a scientist's career. For this reason, successful applicants cannot re-apply, and each New Investigator can only hold a single such award.

We expect the Academic Fellowships Scheme, which is being set up following the Roberts Review, to have a significant impact on the supply of new academics within the biosciences and are working with the other Research Councils and OST to maximise their effect.

21. *Can you explain why your administrative costs are so low, given your current under-resourcing problem (Q80)?*

BBSRC attaches a high priority to efficient and effective use of resources for administration which represent about 2.5% of the budget and compare favourably with international comparators. During much of the period since 1994 BBSRC pursued an efficiency drive and reduced costs substantially. In real terms 2002–03 costs were around 30% below the levels when the Council was established. With the significant growth in funding, increased application numbers and an increase in collaborative work we have recognised the need to increase staffing. An additional 10 staff have been recruited at all levels over the past year and we are in the process of recruiting a further 10.

22. *What are the career prospects for the lowest-grade research assistants in BBSRC institutes?*

All BBSRC vacancies are "trawled" throughout our own institutes and those supported by the Scottish Executive, normally prior to external advertisement. Internal applications are encouraged and transfer terms are available for those who are successful. There are no specified qualifications, length of service or grade-based limits applied to this process.

Career development is an integral part of the annual appraisal process and training and development are actively encouraged. Level transfers are permitted, if an individual feels that this would be in their career interests.

In addition, all BBSRC employees have the right to have their job reviewed if they feel that their duties and responsibilities have increased to the extent that they are working at a higher grade.

Special redeployment arrangements are in place to maximise the job opportunities for employees whose project comes to an end.

23. *What steps have you taken to facilitate the return to work of women who have been on maternity leave?*

BBSRC has for several years contributed funds to the Daphne Jackson Trust and David Phillips Fellowships—aimed at candidates wishing to re-establish themselves after a break from active research—can be part-time. This was renewed in 2002.

Employees due to take Maternity Leave, who all retain their right to return, are asked if they wish to be kept in touch with activities at work, via their Local Personnel Officer and their line manager with such information as vacancy details, social events, major workplace changes, etc. This reduces the feeling of isolation and alienation from the workplace.

Appropriate training is offered to any employee returning to the workplace where technological change had occurred in their absence.

BBSRC contributes £1,000 to AWiSE (Association for Women in Science and Engineering), whose newsletter and website our employees have said they find very useful, and who encourage Women Returners.

BBSRC is an active member of Opportunity Now—Business in the Community's gender equality arm—and participates in its annual benchmarking exercise, which includes measures taken and monitoring of effectiveness.

BBSRC now reimburses employees for the cost of agreed membership of one professional institute, so employees can keep abreast of developments in their professional field. As memberships can be over £100 pa, this can be of great help to those incurring other additional expenses.

We have collated the "best ideas" from around the organisation, and are integrating the best of these into our mainstream policies:

— Offer career development advice to key scientists and get training needs clearly identified;

— Information on AWiSE circulated to all appropriate females and networking encouraged;

— Have "Diversity" (of which gender equality is part) as standing item on agendas, so that it is considered in all business decisions;

— Equality Champion at each Institute to alert Institute Director of specific cases where data indicates that career progression has been overlooked; and

— Implement a Work/Life Balance Policy on official meetings/seminars, ie between 10 am—1 pm and 2 pm–4 pm.

BBSRC has a wide range of work/life balance policies which underpin the desire to employ those who have other responsibilities (often women) outside of work. These include:

— Flexible Working;

— Part-time Working;

— Job Sharing;

— Home Working;

— Term-time Working;

— Compressed Weeks;

— Career Breaks;

— Enhanced Maternity Leave;

— Costs incurred by carers;

— Special Leave; and

— Dependency Care Leave (384 days leave were granted across the BBSRC as a whole for childcare reasons in 2002–03).

Our Best Practice Guidance Note on "Achieving Work/Life Balance" now includes:

— the default stance that "all Managers are expected to consider all positions as suitable for flexible working. Requests for flexible working can only be refused if there are legitimate business reasons to do so"; and

— the process for employees' Right to Request Flexible Working, in line with legislation.

The Guidance Note was issued to all BBSRC employees and is on our website.

We have issued a Best Practice Guidance Note for managers on avoiding indirect discrimination in the Science Merit Promotion Procedure, ie that opportunities of demonstrating leadership ability outside the work environment such as within playgroup committees, school governing bodies, etc can be equally valid and should be explored for those who have lost time on the career path due to maternity leave.

We have issued a Best Practice Guidance Note for managers on avoiding indirect discrimination in the Recruitment Process, ie explaining the Burden of Proof emphasis and how to ensure fairness to all candidates.

We have just launched a BBSRC Childcare Voucher Scheme whereby employees can save National Insurance contributions on salary taken as Vouchers.

We have subsidised Workplace Nurseries at several of our Institutes, and a number run Holiday Clubs.

Science and Society

24. *How does the amount of money you spend on public awareness projects compare with the other Research Councils (Q79)?*

We spend around £1 million pa on specific science and society activities (this excludes the cost of BBSRC Office staff who manage the activities) and, in addition, require the researchers we fund to devote a small proportion of their time to similar activities. We believe this proportion of the budget to be very similar to those of the other Councils (particularly MRC and NERC), but it is not clear precisely how different organisations calculate the resources devoted to the science and society agenda.

25. *To what extent are BBSRC research initiatives responsive to government policies (eg how would you change your strategy in the instance of a long-term ban on GM?)?*

Some BBSRC research initiatives are targeted in areas of national need: for example the initiatives run throughout the 1990s on the biology of spongiform encephalopathies. We also invite other funders, including government departments, to contribute to initiatives in which they have policy interests: the Scottish Executive Environmental and Rural Affairs Department (SEERAD) is a regular partner.

With respect to setting our research strategy we consult a wide range of stakeholders including key government departments: the process we went through during the second half of 2002, in developing our Ten-Year Vision and Strategic Plan 2003–08 involved targeting stakeholders to seek their views in particular as well as a general, web-based consultation, open to all. On GM, we would not expect to alter our strategy for basic plant science research, as the results from the basic biology are equally applicable to non-GM systems, for example intelligent, traditional, marker-assisted breeding.

26. *How do public opinion and market forces feed back into BBSRC strategy?*

In developing the Vision and Strategic Plan, once the consultation was complete, all views were considered by the Office and distilled into draft documents, which were then considered by the Research Committees, Strategy Board and Council, who formally agreed the final version. The Vision and Strategic Plan set the framework for our strategic planning for the medium term.

Similarly during 2003 BBSRC, in common with the other Research Councils, ran consultation exercises to inform the development of our input to the SR2004 bid. We consulted major stakeholders, including the research community, government departments and agencies, and key industrial users. Their input was a crucial element in BBSRC's internal discussions of SR2004 and informed our choices as the bid process developed through RCUK discussions over the summer and autumn of 2003.

At a more detailed level, the input we receive from web-based consultations on proposed new research initiatives is provided to the expert panel which decides the final terms and remit of the initiative.

Public concern about the 3Rs (reduction, replacement and refinement) has been a major driver in the development of the Animal Sciences Committee priority on animal welfare and the cross committee priority on alternatives to animals in research.

Knowledge Transfer

27. *How can you make CASE awards more suitable for, and attractive to, SMEs?*

Many SMEs, particularly newly created companies typical of the biotechnology sector, are not in a position to commit funding for the duration of a three-year PhD studentship. They rely on the venture capital they are able to raise, and this is seldom for long periods. Nevertheless we are aware of the constraints under which these companies operate and we are keen to discuss with them ways in which we can help them to participate.

The consultation document on the draft BBSRC Postgraduate Training and Research Career Development Strategy (currently open for comment, see http://www.bbsrc.ac.uk/funding/consult/trainingstrat/Welcome.html) specifically asks for comments on the best way to enable industrial involvement in postgraduate training and research career development.

Institutes

28. Can you supply data on the number of papers per pound produced by your institutes, compared to the number produced by BBSRC-funded HEI research groups?

We monitor numbers of refereed publications (that is publications included in the ISI databases) per research leader in our institutes. These are:

	1998	*1999*	*2000*	*2001*	*2002*
Refereed publications	1,497	1,467	1,445	1,267	1,238
Refereed publications per scientist	3.44	3.64	3.54	3.79	3.92

We do not have equivalent data for the universities, as publications recorded on final report forms represent only a fraction of the eventual outputs. We are not confident that data of this kind used in isolation is particularly helpful.

29. *Why did the industrial contract income earned by your institutes fall from 2000 to 2003? What are you doing to ensure this doesn't happen again?*

Information on external income from industry at institutes is divided into contract and collaborative categories. The balance between these two categories may change from year to year while not affecting the overall amount of industrial income being received by the Institutes. BBSRC therefore considers it more appropriate to focus on the total industrial income received. For the period 1999 to 2002 this was:

2000–01 million	*2001–02 million*	*2002–03 million*	*2003–04* million*
£14.5	£15.7	£15.3	£15.5

* estimate

Overall this shows an encouraging trend as the Institutes are maintaining the level of industrial research income, despite it being a very difficult time for the biotech industry and agriculture in particular.

BBSRC has a number of mechanisms in place to encourage Institute/industry interactions, these include collaborative funding for research (LINK, Faraday Partnerships) and KTP (formerly TCS).

Institute performance is also monitored and assessed though regular business planning meetings and the four yearly Knowledge Transfer assessment exercise.

Equipment and Infrastructure

30. *What training and support does BBSRC provide for equipment purchased as a component of its research grants?*

Support for equipment is provided as requested on grant applications: the request will be scrutinised in the normal way through peer review as part of the application as a whole. At a more aggregate level, the Investigating Gene Function initiative provided major support for post-genomics: 23 awards, totalling over £19 million have been awarded.

The training element is funded via the indirect costs paid on all grants.

For large equipment the main route for support is the Research Equipment Initiative where BBSRC pays a contribution towards the capital costs of equipment based on the peer judgements of a high quality scientific case. The institution must provide the running costs, which can be applied for via research grants. Also the Joint Infrastructure Fund (JIF) and Science Research Infrastructure Fund (SRIF) have provided considerable equipment and running costs for fixed periods which institutions will eventually have to maintain when the period of support runs out.

Currently BBSRC supports few grants where equipment is of sufficient size to warrant specific support in the form of dedicated personnel eg high field NMR. Where this is the case, the applicants usually request and have granted technical support posts for the efficient operation of the equipment. As part of the deal with manufacturers for purchasing the equipment, training is often provided for many months following installation. Such arrangements are the responsibility of the institution concerned and should be considered as part of "procurement best practice". Maintaining equipment is the responsibility of the institution: under the dual support transfer rules BBSRC pays for the fraction used to support our research projects.

31. *How do you ensure that your Equipment Panel and Responsive Mode Committee co-ordinate to ensure that they fund the same projects?*

Following JIF, major capital awards are made direct to universities through SRIF and not through the research Councils' peer review processes. It is then for the university to administer the allocation of funds for specific pieces of large equipment.

For smaller equipment, applications to BBSRC are judged by the same criteria as responsive mode applications.

The Research Equipment Initiative (REI) 2003 funds research equipment costing between £25,000 and £200,000. Applications are peer reviewed by a BBSRC panel, and coordination between this panel and Research Committee funding of responsive mode projects is the responsibility of BBSRC Office.

Postgraduates

32. *What proportion of BBSRC students have taken the opportunity to attend UK GRAD graduate school? What are you doing to promote and evaluate this opportunity?*

During calendar year 2002, the number of BBSRC PhD students who attended a UK GRAD graduate school was 243 (37% of the student cohort). Unlike previous years, when BBSRC students were placed on a waiting list, not all of the 285 places for which BBSRC provided funding in 2002 were taken up (take-up rate 85%).

BBSRC has taken the decision to use a proportion of the funding provided in the Science Budget 2003–04 to 2005–06 for additional training in transferable skills for PhD students to provide places on UK GRAD graduate schools (or equivalent) for all its PhD students from academic year 2004–05 onwards. The additional opportunities will be widely publicised to ensure that all BBSRC PhD students and their supervisors are aware of them and to ensure maximum take-up.

Annex A

Further Comments From BBSRC

BBSRC'S role is to support and foster the highly successful UK bioscience community both in universities and in institutes. Multidisciplinarity is central to modern biology and BBSRC has a strong record in this area. Due to the success of this community, we are funding responsive mode research proposals at c30%. The fall from 40% is due to the very large increase in numbers of such proposals, especially in the biomedical area. We are minded to change policy to publish university success rates as it is success rates, rather than volume alone that should be the drivers for a sustainable university base.

BBSRC contributes to the science and society agenda, focusing on areas that impact on our community. Understandably, public debate often focuses on technological applications, many of which evoke strong and often polarised views within wider agendas such as globalisation, technology treadmills and the "industrialisation" of life forms. BBSRC's role, and that of its scientists, is to engage in debate to identify issues amenable to fundamental research and to contribute the appropriate scientific evidence that contributes to decision-making. For example in the GM debate we have done this since 1994.

BBSRC has strongly endorsed the need for partnership in several areas but especially with DEFRA in the areas of animal health, including the rebuild of the nationally important Pirbright Laboratory of the Institute for Animal Health, and in the area of sustainable agriculture.

We look forward to working with the House of Commons Science and Technology Committee to maintain and increase the science vote in the next spending review.

Annex B

Supplementary Questions

Academic Analogues

These are non-university research organisations eligible to apply for BBSRC research grants, frequently in collaboration with universities or institutes.
Animal Health Trust
Centre for Applied Microbiology Research
Council for the Central Laboratory of the Research Councils
European Bioinformatics Institute, Cambridge
Marine Biological Association
Natural History Museum
Scottish Agricultural College
National Institute of Agricultural Botany
Royal Botanic Gardens, Edinburgh
Royal Botanic Gardens, Kew
Wellcome Trust Sanger Institute
Veterinary Laboratories Agency (under consideration)
Central Science Laboratory (under consideration)

Research-Related Activities Funded by BBSRC

The following list comprises currently funded research-related projects supported by the BBSRC to underpin the bioscience research base or its administration.

International

European Science Foundation [£66K pa]
UK Research Office, Brussels [£24K pa]
Human Frontiers Science Program [£150K pa]

Infrastructure

National Collections of Industrial and Marine Bacteria [£200K pa]
European Collection of Cell Cultures [£96K over three years]
Mouse microarrays, Hinxton [£65K over 18 months]
Stem Cell Bank [£650K over three years]
Chicken genome annotation—international consortium [£530K 2003–04]
Bovine genome annotation—international consortium [£660K 2003–04]
Networking of SEQNET [£45K 2003–04]
National Centre for Biological Text Mining, JISC [£40K 2003–04]
Research Outputs Database, City University, London [£16.5K pa]

Networking activties

National Cancer Research Institute [£25K pa]
Interdepartmental Group on Health Risks from Chemicals [£6K in 2002–03]
Global Biodiversity Informatics Forum [£60K over 3 years]
Neuroinformatics network [£20K 2003–04]
TSE Funders Forum Website and Workshop [£39K 2003–04]

Public engagement/concerns

Centre for Best Practice in Animal Research [£100K over three years]
Researchers in Residence Scheme [£25K 2003–04]
British Association CREST Scheme [£10K 2003–04]

Responsive Mode Grants, by Frascati Code

The following is a break-down into basic and applied research as defined by the OECD's Frascati Codes (see below), of the data shown as "responsive research grants" in Annex 5 of the BBSRC's written submission.

Year	*Basic research*		*Strategic/applied research*		*Total expenditure*	
	£ million	*%*	*£ million*	*%*	*£ million*	*%*
1997–98	32.5	61	20.7	39	53.2	100
1998–99	31.1	61	20.0	39	51.1	100
1999–2000	38.1	63	22.8	37	60.9	100
2000–01	47.6	66	24.5	34	72.1	100
2001–02	53.1	69	24.2	31	77.3	100
2002–03	58.0	69	26.2	31	84.2	100

Basic research: original investigation carried out to gain new knowledge.

Strategic/applied research: research where the work has practical aims, but no specific use has been worked out for it yet.

Risky/Adventurous Research

We do not ring-fence money for "risky/adventurous" research: when we attempted such a scheme in the past we found little difference between the riskiness of applications for that scheme and our normal responsive mode.

Our experience is that applications which are sound but unadventurous simply do not get funded through our responsive mode system because they are not competitive.

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