

# **REPORT OF THE VISITING GROUP TO ROTHAMSTED RESEARCH**

**18-22 JULY 2005**

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## WHOLE INSTITUTE ASSESSMENT

### SUMMARY ASSESSMENT

1. The VG felt that there was a clear need to maintain Rothamsted Research (RRes) as a multi-disciplinary scientific centre for research, focusing on issues relevant to crop improvement and cropping ecosystems, and addressing the main needs of all key stakeholders. The VG agreed with the director's assessment that Rothamsted Research's primary focus was on the predictive understanding and management of sustainable food and non-food crop-based agriculture and that this differentiated it from other institutes.
2. The relocation of scientists from Long Ashton Research Station (LARS) combined with major changes to the main Harpenden site during the assessment period had been handled extremely well and the VG wished to commend the roles of the director and senior staff in this process. The VG applauded the strong sense of community clearly evident among staff and students within the organisation.
3. The VG commended the balance between end-user and fundamental research. RRes was providing a lead in the manipulation of cropping systems, providing a continuum between basic science and key end-users. The institute setting was clearly adding value; it provided important long-term holistic information on agronomy and arable ecosystems and addressed key questions relevant to environmental issues and end-user needs.

#### ***Recommendation 1***

*The VG endorsed the continued need for a multi-disciplinary research institute to sustain strategic research on crop improvement and cropping ecosystems, and to meet the needs of key user groups.*

4. Research quality varied across the institute's seven research divisions, with excellent areas often mixed with weaker ones amongst the fifteen programmes presented to the VG. Additionally in at least one programme there appeared to be an artificial grouping. This arose from the guidance to institutes from BBSRC in which Rothamsted was required to present no more than 15 programmes, but it had the effect of further diluting effort and output, resulting in lower assessment ratings.
5. The Biological Chemistry division contained elements of international and high international quality research. It was delivering flagship research on plant (host)-insect signalling, converting observations into excellent fundamental science and from there to potential products, exemplified by the work on human attractiveness to biting insects. The work was rated 'outstanding' in terms of meeting user requirements.
6. The programmes in the Plant Pathogen Interactions division were mostly delivering international quality science in rhizosphere biology, pathogen population biology and disease management, either meeting or exceeding user

needs, including the identification of new resistance genes in the barley virus work. Work on wheat pathogenesis had the potential to reach this standard. The VG was concerned, however, that resources for soil microbiology at RRes were insufficient and unbalanced when set against effort on plant and invertebrate ecology.

7. The VG highlighted in particular the work of the Sugar Beet Research division at the Broom's Barn site. The VG was impressed with the quality and end-user relevance of the work, which was driven by an enthusiastic group hungry for success; the programme was rated 'outstanding'. The research team had made very effective and strategic use of the limited CSG funding available to it. The VG felt that the sugar beet work should be more strongly integrated into the long-term vision of RRes.
8. Work in the Crop Performance and Improvement division varied in quality with elements of international and high national science, although the VG felt that most of the latter had the potential to reach an international standard. The VG highlighted work on wheat grain quality and on very long chain polyunsaturated fatty acids as being of international quality, with great potential to contribute to improved diet and health. Programmes were rated 'good' in meeting user requirements reflecting the strong links with industry, but the research teams were not driving the commercialisation process.
9. Science in the Plant and Invertebrate Ecology division ranged from high national to international standard and was generating answers to important questions about ecological interactions in arable ecosystems, including work on insect and plant population genetics, ecology and insect behaviour. A particular achievement was the leadership provided in the Farm Scale Evaluation (FSE) work examining the impact of herbicide management practices on biodiversity in relation to the use of GM crops. The unique and long-term insect datasets and the use of radar technology to provide new insights on insect dispersal and behaviour at the landscape level gave the institute a strategic advantage. Work on willow bio-energy crops was poised to make an impact at an international level, however the VG expressed concern about the weed research in the Plant Biodiversity and Population Genetics programme which needed to develop a new strategy and focus as a separate programme.
10. The institute's soils work in the Agriculture and Environment Division included important and focused international level research on developing soil remediation strategies. Biogeochemical cycling work was rated lower: although the quality of key individual scientists, including those producing excellent and relevant work on carbon and nutrient cycling, was recognised by the VG, there were genuine concerns about integration and forward vision. This was particularly evident in soil physics following the merger of activities with the Silsoe Research Institute (SRI), due to close in 2006, and how this might impact on the new Cross-Institute Programme (CIP) on Sustainable Soil Function (see paragraph 20).

11. The VG expressed concern at the apparent lack of strategic approach to the development of BBSRC and externally-funded portfolios, which did not always seem well integrated with each other. This was, in the view of the VG, frustrating a strategic approach to the research programme development. In addition, it sometimes meant that external funders did not automatically have the full benefit of all that RRes had to offer.

### ***Recommendation 2***

*The VG had a number of concerns relating to aspects of key science areas at the institute, and recommended that the director and senior staff:*

- *direct more resources to soil microbiology as a priority;*
  - *work to ensure the integration of sugar beet work at Broom's Barn into the long-term vision for RRes;*
  - *review the current focus and strategy of the weed research at RRes and consider developing this as a separate programme;*
  - *ensure, as a priority, that the soil physics research moving from Silsoe Research Institute and the soils work already at RRes are fully integrated and;*
  - *take a strategic approach to resourcing and developing research programmes that arise from BBSRC and external funding that foster synergies in research outputs for individual teams and team members.*
12. The VG considered bioinformatics, biometrics and biomathematics to be central to all institute activities, particularly the delivery of a predictive systems biology approach and effective translation from models to crops. The VG had concerns about the bioinformatics user-interfaces, about succession planning in biometrics, and about the balance of skills across biometrics and biomathematics. Consequently this programme was rated at national standard. VG accepted that this problem was not confined to RRes, and felt that these areas should be reviewed in the context of all BBSRC-sponsored institutes.

### ***Recommendation 3***

*As bioinformatics, biometrics and biomathematics were central to all activities at RRes, the VG recommended that the director and senior staff:*

- *take appropriate action to improve the bioinformatics' user-interfaces, extending reach and integration with scientific programmes;*
  - *review succession and recruitment planning across biometrics and biomathematics, to meet future demand and obtain the appropriate balance of skills;*
  - *review ways in which problems associated with recruitment of key skills in this area might be addressed by building on existing relationships and developing new collaborative alliances with other BBSRC-sponsored research institutes that have similar needs and face similar problems in these areas.*
13. Although there were examples where good use had been made of the long-term datasets in collaboration with others (eg population studies of pathogenic fungi from the Broadbalk site) the VG encouraged the institute to consider allowing wider access to maximise their utility for public good research. Managed sensibly this should result in effective collaborations, with RRes

playing a leading role and raising the profile of the institute. The VG recommended that RRes ensure it was in the authorship of any collaborative papers coming from these datasets.

**Recommendation 4**

*The VG recommended that the institute allow wider access to its unique long-term datasets to maximise their utility and availability for public research and raise the profile of the institute. The institute should seek formal agreement for authorship in any collaborative papers that arise.*

14. The VG recognised the effective work of the institute's central facilities in bio-imaging and metabolomics which were contributing to research programmes across RRes. Bio-imaging had been closely integrated following the recent restructuring of the main RRes site, but the VG had concerns about the extent of integration of the metabolomics platform across RRes.

**Recommendation 5**

*The VG recommended that the director and senior staff work to achieve greater integration of the metabolomics platform across research at RRes.*

15. The VG recognised potential conflicts between different drivers for research (eg industry; policy makers; and wider society). However the VG was concerned by the lack of strong leadership and strategic focus in some programmes and the apparent disengagement of some principal investigators (PIs) from the overall strategic mission of the institute.
16. The VG was not convinced that mechanisms for the generation of science strategy and its dissemination to staff were fully effective. Development of the science strategy required high quality internal and external inputs and advice across the range of RRes science.
17. Most importantly RRes needed an influx of new blood, with strategic vision and the ability to set high expectations for individual productivity. In too many programmes publication outputs did not meet the VG's expectations: the institute as a whole needed to aim for publishing more of its papers in higher quality journals. Although some good appointments had been made recently the VG was concerned by the lack of assertiveness, ambition and drive of many of the researchers. In some cases this was limiting the potential of the research, for example in influencing policy-makers and setting the science agenda at a national level. It was the VG's view that the quality of new appointments must increase.

**Recommendation 6**

*The director had led the institute successfully through a very challenging period, including the closure of LARS and the redevelopment of the Harpenden site. The VG recommended that he now focus on revitalising the scientific strategy and focus of the institute, recognising that the life-blood of any research organisation is the quality of the people. The director should:*

- *quickly develop a strategy to address the core competencies and capabilities of the research programmes, involving staff in the process to ensure their ownership;*
- *strengthen the level of independent advice provided from outside the institute;*
- *increase the pace of change in terms of staff profile;*
- *set higher expectations for staff in terms of research productivity.*

## **COLLABORATION**

18. There were numerous, effective and appropriate links with universities and the VG did not identify any major weaknesses in this respect. There was a productive formal link with the University of Nottingham, creating synergies and added value for areas in biological, agricultural and environmental science. The VG noted that a significant proportion of the postgraduate students studying at RRes were registered at Nottingham but also that students were registered at a large number of different universities reflecting the diversity of science carried out at the institute.
19. There were examples of effective and productive collaborative research links with other BBSRC institutes in a number of areas (eg with the Institute of Food Research (IFR) on healthy foods; with the John Innes Centre (JIC) on plant pathology). In addition the VG endorsed the collaborative approach with JIC to public engagement. The VG noted that most links were supported through external funding streams although the new Cross-Institute Programme (CIP) model was based on pooling of CSG funded work. The VG identified a clear opportunity for an additional strategic alliance between institutes in relation to bioinformatics, biometrics and biomathematics (see also Recommendation 3).
20. In principle, soil science research at RRes was going to benefit from pooling of resources (expertise; facilities; databases and other information) in the new CIP on Sustainable Soil Function (with the Institute of Grassland and Environmental Research (IGER)). The VG felt that success would be critically dependent on a number of factors, including a solid, fully-costed business plan with clearly defined milestones and demonstrable support from the institutes and directors. Based on the documentation supplied, the VG concluded that a more explicit analysis of the threats to soil sustainability was needed with a clear assessment of how these should be addressed. The new CIP leader would need the confidence and support of both institute directors and the freedom of action to develop the science, with any bid for BBSRC support based on these assumptions. Concerns remained over elements of the existing soil science research at RRes. The CIP would need to address any deficiencies in capability and skills balance in soil microbiology and soil physics, otherwise the programme was unlikely to be competitive. Development of this CIP should serve as a model for other proposed CIPs (eg the ‘Monogram’ crop genomics CIP with IGER, JIC and the Scottish Crop Research Institute [SCRI]) for which plans were less well advanced.

21. Finally, in terms of collaboration, the VG felt that the institute should do more to promote a greater awareness of its valuable research resources, including the long-term insect trap samples and Broadbalk records and samples to promote further collaborative developments (see Recommendation 4).

## **STRATEGIC RELEVANCE**

22. The VG agreed that most research at RRes was relevant to the objectives in the BBSRC's Strategic Plan 2003-2008, in particular the key priorities of Sustainable Agriculture and Integrative Biology, which were reflected in the institute's focus on: sustainable management of crop-based agriculture; whole organism biology with a multi-disciplinary approach; the predictive understanding of complex systems from metabolism to populations; and the strategic end-user focus.
23. There were many examples of research relevant to, and meeting the needs of, key user groups (eg Defra, industry) much of which exceeded user requirements and was rated "outstanding". Much of the research output of the institute was aligned with Defra policies on: reducing waste and carbon emissions; increased use of crops for bio-energy; and conservation of soils, biodiversity and valued landscapes.
24. Sugar beet research was closely aligned with industry requirements and was making effective strategic use of limited CSG funding. RRes was leading, and participating effectively in the Defra-sponsored Genetic Improvement Networks (GINs) which were leading to productive synergies between other researchers and key stakeholders involved in wheat, oil-seed rape and willow improvement.
25. RRes was contributing to a number of international research programmes, including important work with and in developing countries, for example the institute's involvement in an international consortium for the sequencing of the *Brassica* genome and in the international steering group on the development of metabolomics protocols. The VG also wished to commend RRes for its commitment and role in training of scientists from overseas, including fellowships managed through Rothamsted International (a non-profit organisation working for sustainable agricultural development in developing countries). However, the VG gained the impression that overall the institute's effort in international collaboration was patchy and that, in most cases, RRes was participating in rather than leading research.

### ***Recommendation 7***

*The VG commended the institute for its contribution to international research programmes and training with much of its work relevant to developing countries. However the VG felt that RRes scientists should be more assertive and confident and provide more international scientific leadership across the RRes remit.*

26. The VG concluded that the Rothamsted Research Association was providing an effective mechanism to promote interaction and dialogue between RRes researchers and end-users with members mostly drawn from the agricultural industry. There was a growing realisation, endorsed by the VG, that socio-economic issues need to be central to the development of the institute's research strategy from the outset, in line with the institute mission statement to elevate societal confidence in science for agriculture. A good example was the recent Research Council Rural Economy and Land Use (RELU)-funded project on the combined use of managed field margins and semiochemicals in cereal fields to enhance aphid bio-control, which had addressed socio-economic aspects through collaborations with Imperial College and the Game Conservancy Trust.
27. The VG felt that, although the institute was consistently providing high quality information, it was not always sufficiently proactive in promoting its research to inform UK land use/agricultural policy. The VG gained the impression that researchers were not always clear about the wider strategic relevance of the work in which they were involved. This related directly to the VG's concerns regarding the wider engagement of staff in the strategic mission of the institute (see Recommendation 6).

## **SCIENCE AND SOCIETY**

28. The institute contributed to a substantial amount of science and society activity considering the resource constraints. The VG highlighted the work with schools, the impressive media coverage of scientific achievements and the dialogue activities with local groups – all achieved by a very small team, which was clearly engaged with developments in and issues around the science and society agenda, and was working to address the relatively recent call for 'upstream' public engagement, whilst retaining more established activities to inform and discuss outputs of research with stakeholder groups. The audiences the institute particularly wished to communicate with had been determined and events and activities developed accordingly. Limited resources inevitably resulted in low prioritisation of some areas; the science and society pages of the website were an example. These pages were not of the same high standard as some of the areas of the institute's work and an enhanced resource allocation could improve their impact substantially.
29. The institute's commitment to science and society activity was clear from the wording of the institute mission statement. In addition, a number of senior staff set excellent examples by actively engaging with various stakeholders and acted as role models for younger colleagues. It appeared that there was suitable access to training and opportunities for those who wished to get involved, although this was an area which should be monitored closely. It was particularly noteworthy that scientists' science and society activities were recorded and championed in their annual reviews. This demonstrated a clear commitment from RRes senior management that this area of work was taken seriously. It was therefore surprising that this commitment was not reflected in the divisional targets. Ensuring that all strategic documents reflected the

mission statement would both encourage the science and society team and embed this agenda more firmly within the institute's core business. The institute might consider the professional benefits of involvement with stakeholders, some of which were related during the presentation. This should provide substantive evidence for a business case for science and society activities to be part of the expected normal professional duties of scientists and help ensure they are not seen as an add-on in 'spare time'.

30. It was clear from the report and presentation that the science and society staff were aware of developments in science and society and also that these were discussed at senior management meetings. The dedicated staff were suitably networked into the wider science and society community, and were working to address recent developments including the call for more 'upstream' engagement. This seemed to be appropriately tensioned with the continuing requirement to provide information and discuss research outputs in a more conventionally 'downstream' manner. Although it was clear that the institute was moving away from straight information provision towards dialogue approaches the VG felt there may be benefit in ensuring that the strategy is as positive as possible – not always looking to address concerns but also to discuss stakeholders' aspirations and interests.
31. There was a tension between responding to opportunities and working to a strategy that was outcome-led. While recognising this, the VG felt that the institute could nevertheless benefit from spending more time deciding exactly what it wished to achieve with its science and society activities. This might help inform choice and targeting of activities which is particularly vital when working with very limited resources. It was acknowledged that meaningful evaluation of science and society activities was complex and resource-intensive. However, moving towards a more outcome-led strategy would help with developing measures of success, which would allow the institute to move further away from simply evaluating the process and component parts of its science and society programme, and make evaluation more meaningful compared with the overall strategy.
32. The institute already worked with a good range of partners, and had been successful in securing funding from several organisations. Partnerships were a useful way of increasing reach and impact of activities and the institute might benefit from seeking new partnerships, for example from within the farming community or among educational bodies. In addition, close working with other BBSRC-sponsored institutes had already been beneficial and increasing these activities should help share best practice and benchmark existing activities. The VG felt that this was an area which BBSRC could coordinate and perhaps resource centrally.

### ***Recommendation 8***

*The VG recommended that the wording of the divisional mission statements and divisional five year ambitions support and encourage the science and society team and ensure that scientists articulated their medium term plans to engage in this area. Recognising that "impact assessment" was a challenge for the whole field, the VG also recommended that a little more attention to developing the science and society*

*outcomes the institute wished to achieve would better inform its choice of activities and success measures. The VG recommended further that the institute build on existing partnerships and seek to develop new ones to help increase the impact and reach with new and existing stakeholder groups.*

### **KNOWLEDGE TRANSFER (KT)**

33. The VG agreed with the main findings of the KT report in particular the generally effective links between basic science and key end-users. The VG agreed that RRes provided a generally good input to Defra but felt that, overall, this varied between programmes and that researchers should be more confident and assertive when engaging with key policy makers, with greater influence and impact on policy development (see Recommendation 6).
34. The VG also felt that unique long-term datasets did not always appear to be effectively managed for public good. Unless there was clear evidence of Intellectual Property (IP) value the VG recommended that the institute should encourage more access by other groups to these unique datasets (see Recommendation 4).

### **STUDENTSHIPS AND FELLOWSHIPS TRAINING (SFT)**

35. The VG agreed with the main conclusions in the SFT report and felt that the high ratings given for research-based and generic training and the research environment were an accurate reflection of postgraduate training at the institute. The full report is at Annex 2.
36. The VG was impressed by the quality of the students, who it considered to be articulate and well-motivated and clearly well supported by the institute. The VG agreed with the SFT panel that the training provided at RRes represented a model of good practice.

### **BUSINESS PLANNING AND ORGANISATION**

37. The VG considered that RRes had very clear and effective lines of management (in relation to operational activities) which were understood by staff, with the director operating a very “hands-on” approach to management. This had for the most part proved very effective in managing the institute through the structural changes of the last few years. It was clear to the VG that staff valued being in the institute and it provided a “hub” of exchange, information, support and collaboration.
38. The terms of reference of key management committees involved in development of high-level scientific strategy (the Director’s Advisory Team [DAT] and the Institute Executive Committee [IEC]) were not entirely clear to the VG, supporting previous concerns about the engagement of staff in the development of the strategic mission of the institute (see Recommendation 6). It was also unclear to the VG how major decisions were made. Strategic

planning was felt to lack clarity in key areas. CSG funding did not always appear to be divided between programmes in a clear strategic way in relation to external income.

39. Although there was felt generally to be a good level of interaction between programmes, more attention needed to be paid to the rationale for building multi-disciplinary teams at RRes. Some groupings were not a good fit and appeared to be artificial contrivances.
40. The VG was disappointed that the institute had been unable to attract any independent research fellows based at RRes and felt that it should be more ambitious in this respect: the institute should work to encourage an influx of senior independent fellows as a means of re-invigorating the life-blood of the institute.

#### ***Recommendation 9***

*The VG recommended that the institute work to encourage independent fellows to work at RRes as a means to reinvigorate the life-blood and strategic vision of the institute.*

41. The VG agreed that Phase 1 of the redevelopment plan of the Harpenden site had been managed well. The new Centenary Building was providing world-leading accommodation and facilities for researchers and the VG wished to commend the director and senior staff for managing this process so effectively. The VG was, however, concerned by the delay to Phase 2 and how this might affect future plans. The relocation of soil physicists from SRI and their full integration into the soil programmes at RRes and the CIP with IGER on Sustainable Soil Function appeared to be at least partially dependent on a new building not scheduled to be ready until 2007.
42. It was not clear whether the institute had carried out a risk assessment of the main threats to its own sustainability. Some programmes were heavily dependent on key individuals who were approaching retirement; in some cases the age profile of the programme was not sufficiently balanced and succession plans not yet been developed.

#### ***Recommendation 10***

*The VG recommended that the director carry out a risk assessment of potential key threats to the sustainability of the institute. In particular this should address the VG's concerns that some programmes were heavily dependent on individuals who were approaching retirement, and how the delays to Phase 2 redevelopment at the Harpenden site were likely to impact on the progress of the soils programme.*

## RESEARCH FOOTPRINT

Research footprint assessment summary					
	Number of programmes in each assessment category				
BBSRC-funded	High international	Inter-national	High national	National	Unsatisfactory
			<b>2</b>		
Externally-funded	Outstanding	Good	Satisfactory	Unsatisfactory	
	<b>1</b>				
Mixed programmes	High international	Inter-national	High national	National	Unsatisfactory
		<b>6</b>	<b>5</b>	<b>1</b>	
	Outstanding	Good	Satisfactory	Unsatisfactory	
	<b>3</b>	<b>9</b>			

### Programme

### BBSRC

### External

#### Crop Performance & Improvement Division

501Crop development & Improvement (BBSRC)	High national	-
502Metabolic regulation (mixed)	High national	Good
503Lipid metabolism & signalling (mixed)	International	Good
504Terpenoid metabolism & signalling (BBSRC)	High national	-

#### Plant-Pathogen Interactions Division

505Wheat pathogenesis (mixed)	High national	Good
506Rhizosphere biology (mixed)	International	Good
507Pathogen population biology (mixed)	International	Outstanding

#### Plant and Invertebrate Ecology Division

508Plant biodiversity & population genetics(mixed)	High national	Good
509Insect behaviour (mixed)	High national	Good
510Insect population genetics/ecology (mixed)	International	Outstanding

#### Agriculture and Environment Division

511Biogeochemical cycling (mixed)	High national	Good
512Soil protection and remediation (mixed)	International	Good

**Biomathematics and Bioinformatics Division**

513Biomathematics and bioinformatics (mixed) National Good

**Biological Chemistry Division**

514Biological chemistry (mixed) International Outstanding

**Sugar Beet Research Division**

515Sugar beet productivity/improvement (external) - Outstanding

## **ANNEX 1: MEMBERSHIP AND ACKNOWLEDGEMENTS**

### **MEMBERSHIP**

- i. Rothamsted Research (RRes) was reviewed by a Visiting Group (VG) between 18 and 22 July 2005, The Group comprised:

Professor D T Delpy FRS (chair)	University College London
Professor M J Bailey	NERC CEH-Oxford
Professor S T Buckland	University of St Andrews
Dr J Clough	Syngenta, Jealott's Hill
Dr D Cole	Consultant
Professor M S Cresser	University of York
Ms C Drummond	Linking Environment And Farming (LEAF)
Dr A Greenland	Syngenta, Jealott's Hill
Professor J Hemmingway	Liverpool School of Tropical Medicine
Dr Y Kamiya	Plant Science Center, RIKEN, Japan
Professor M J Kearsey	University of Birmingham
Dr J Memmott	University of Bristol
Dr D Murphy-Bokern	Defra
Professor W Powell	National Institute for Agricultural Botany (NIAB)
Professor A R Slabas	University of Durham
Dr I Williams	Defra

- ii. The Group was joined by additional experts to review the institute's contributions to the Science and Society agenda:

Sir Roland Jackson	The British Association
Mr C H Johnson OBE	Independent

- iii. The following people attended from BBSRC Office: Professor Julia Goodfellow; Professor Nigel Brown; Dr Doug Yarrow; Dr Maggie Leggett; Dr Bill Eason; Mrs Fiona Goff; Dr Isobel Howe; Miss Caroline Dow

### **ACKNOWLEDGEMENTS**

- iv. The VG was most grateful for the welcome and hospitality extended by the director and staff of the institute, who had done much to contribute to the smooth-running of the visit. The VG also appreciated the considerable amount of background work that had been undertaken by the institute in preparation for the visit.

## **ANNEX 2: REPORT ON STUDENTSHIPS AND FELLOWSHIPS TRAINING ASSESSMENT**

### **BIOTECHNOLOGY AND BIOLOGICAL SCIENCES RESEARCH COUNCIL**

#### **2005 INSTITUTE ASSESSMENT EXERCISE**

#### **STUDENTSHIPS AND FELLOWSHIPS TRAINING (SFT) ASSESSMENT**

#### **VISIT TO ROTHAMSTED RESEARCH: 14 OCTOBER 2004**

### **INTRODUCTION**

1. Rothamsted Research (RRes) was visited by a Studentships and Fellowships Training (SFT) assessment panel on 14 October 2004. The SFT assessment forms part of the Institute Assessment Exercise (IAE). The SFT panel comprised two members of the Committee on Studentships and Fellowships (CSF): Dr Mark Edwards (Heptagen Limited; chair) and Dr Helen Sang (Roslin Institute). The panel was accompanied by staff from BBSRC Swindon Office: Dr Ian Lyne (Head of Postgraduate Training and Fellowships) and Dr Bill Eason (Evaluation and Policy Unit).
2. The visit was informed by a background paper prepared by the Institute, which provided the basis for a meeting with senior Institute staff with designated responsibilities for postgraduate and postdoctoral training. The panel subsequently met with a group of postgraduate students from RRes for an informal, free-ranging and confidential discussion about their experiences and expectations of the training provided by the Institute. In addition, the panel viewed examples of laboratory and office accommodation used by students at RRes, together with some of the site's specialised facilities. At the time of the visit there were no recipients of BBSRC David Phillips postdoctoral fellowships (or equivalent early career fellowships) at RRes.
3. In assessing its provision of postgraduate training, the panel had regard to RRes' effectiveness in meeting the requirements of the Joint Statement of the Research Councils Skills Training Requirements for Research Students ([http://www.bbsrc.ac.uk/funding/training/skill\\_train\\_req.html](http://www.bbsrc.ac.uk/funding/training/skill_train_req.html)) including:
  - Research skills and techniques
  - Research environment
  - Research management
  - Personal effectiveness
  - Communication skills
  - Networking and team working
  - Career management

In making its assessment the panel considered a range of factors which contribute to the delivery of the requirements set out above, including the

environment and facilities; links with universities; supervisory practice; generic training and pastoral care and the student community.

4. The panel provided an overall assessment in three key areas:
  - Provision of research-based training
  - Provision of generic non research-based training
  - The quality of the training environment
5. Each aspect was assigned to one of three broad categories
  - (i) good
  - (ii) adequate
  - (iii) unsatisfactory

## **PROVISION OF RESEARCH-BASED TRAINING**

### **Overall rating: Good**

6. The panel agreed that Rothamsted Research (RRes) was a leading centre for research into the sustainable management of crop-based agriculture, spanning work from basic plant science to large-scale field studies and pest control. It confirmed that RRes provided a distinct environment for postgraduate student research with a broad range of facilities and expertise. Students reported the dual benefit of access to university and institute expertise and facilities.
7. Students were based within one of seven Research Divisions at RRes. At the time of the visit all 64 students were based at the main Harpenden site (students were occasionally also based at the Broom's Barn Research Station, a Division of RRes located an hour from Harpenden by car). Unlike most BBSRC institutes, RRes was not located close to a university. Consequently students were registered at a range of different universities, at the time of the visit totalling over 20. However, within this number RRes had developed closer links with two key partner universities where a significant proportion of students were registered. 37 students were registered at the Universities of Nottingham or Reading. Development of links with these key partner universities had contributed to a reduction in the total number of RRes partner universities over the last four years. RRes had a designated University Liaison Officer, who was responsible for the development and management of links with universities. Where larger populations of students were registered at a single university more favourable terms in relation to allocation of student fees had been negotiated. There appeared to be a clear rationale for the selection of university supervisors, based on both the intellectual and the practical support they could bring to the student's project, rather than the administrative convenience of selecting from a smaller pool of universities. This policy, combined where possible with the development of stronger formal links with a smaller number of key partners, was endorsed by the panel.
8. At the time of the visit, over half the students were funded by BBSRC. Eleven students were funded by the Lawes Trust and around 20 students were funded

through a variety of different individual sponsors (e.g. overseas governments; EU; DFID; Defra). Projects were assessed for their suitability for a PhD by the Postgraduate Education Committee (PGEC) (see section 9). Candidates invited for interview met 2-3 PGEC committee members. The Director made it clear that the focus of the selection process was on the quality of the student. Selected students were then matched to suitable projects. Recruitment was reported to be more difficult for some projects, for example where there was more external competition (e.g. more general plant science projects) or CASE studentships where it was sometimes difficult to find the right combination of student, project and industrial partner (see also section 17).

9. The Institute's Postgraduate Education Committee (PGEC), which was formed in the year prior to the visit, was responsible for overseeing the development of student training policy at the Institute. Two sub-committees, the Postgraduate Student Supervision Committee (PGSSC) and the Postgraduate Training Committee (PGTC), reported to the PGEC. The long-standing PGTC was responsible for developing the formal postgraduate training programme at RRes. The PGSSC was formed in the two years prior to the visit and was responsible for ensuring RRes supervisors met required standards.
10. The panel had a strong impression that most students were receiving excellent levels of support and contact from their RRes and university supervisors. Although in most cases the principal contact was with the RRes supervisors, it was also clear that most university supervisors were also contributing significantly to the development of the students' studies. There was some evidence of isolated problems with poor supervision in the past (cited mainly by final year students), but RRes had clearly taken steps to address these with the establishment of the PGSSC. The role of the PGSSC was to make sure supervisors were fit for the job, meeting a comprehensive set of eligibility criteria, including:
  - previous satisfactory supervision experience (with at least two students co-supervised successfully to completion);
  - high-quality of scientific output;
  - a track record of project management.
11. The PGSSC reported to the PGEC, with the final decision on the award of supervisor status requiring Directorial approval. Further to this there was a mandatory half-day training course taken by all supervisors regardless of their experience. The course was updated annually and staff were expected to attend the course every two years. The panel, although concerned by reports of earlier poor supervision, was satisfied that the new arrangements in place for ensuring high supervision standards should significantly reduce the likelihood of future problems. It recommended that the Institute ensures that the mandatory training requirements are met.
12. Students were represented on the PGTC. Although not elected by students, the three representatives appeared to have the support and trust of their fellow students. Issues that had been raised by students (with, in their view,

successful outcomes) included changes to the timing of certain training courses, resolution of budget issues and granting of extensions. Students had also lobbied successfully for the introduction of more formal statistics training at RRes.

13. In addition to the main and co-supervisor at RRes each student had a mentor, from a different research group, assigned to them. The mentor system had only recently been introduced but the initial feedback from the students was generally positive, citing mentors as useful additional sources of guidance for their studies, and also as independent arbitrators should any conflict arise with their main supervisor.
14. The panel noted with approval that students were well supported by other members of staff at RRes, including science and technical support staff. This was exemplified in the recently established bio-imaging facility where senior scientific staff were on hand to advise and guide students in the use and development of bio-imaging techniques for their studies. The panel identified this as a model of best practice in a student research training environment.
15. The PGTC had developed a formal training programme setting out clearly what is expected of students in each year of their studies. For example in their first year all students were required to attend the RRes Student Symposium as a poster presenter, and to present a Divisional seminar. This, together with specific skills training, formed part of a Personal Training Programme for which the students themselves (in consultation with their supervisory team) were responsible. Although the training programme had only been developed recently, it appeared to be working well. Significantly, many third year students reported the new training programme to be a great improvement on their own early experience. Most students were clearly well motivated and had easily exceeded the minimum requirements. The use of a Personal Training Programme was endorsed by the panel and potentially represented a model for best practice in training management.
16. All students were required to submit reports along clearly defined timelines. After 9 months students submitted a 15-20 page progress report intentionally similar in style to a refereed paper. The report included a literature review, a report on research progress and plans for future work. The report was submitted to the Head of Division and was the focus for an oral examination by two senior members of staff not directly involved in the project. Approval to continue with studies had to be agreed by both the Head of Division and the Director. The timing of the reporting process gave time to address any major problems and the opportunity where necessary to terminate the project before 12 months. At 24 months the students were required to prepare a 20-30 page report including further checks on progress and plans. Assessment included interviews and Directorial approval. Students were able to see their reports and could exercise a right of reply. All training and assessment records were maintained in Personal Progress Files (PPF). The panel saw sample copies of these; they appeared to provide a good record of student training and progress. The panel was impressed by the personal commitment of the RRes Director in overseeing student progress. The panel was satisfied that the current

arrangements were suitable as the Director was providing an overview of the student's performance, independent of Divisional interests. More importantly, the arrangements were working effectively.

17. RRes plans for the operation of Doctoral Training Accounts were not finalised at the time of the visit. The Institute had offered a four-year project to all eligible BBSRC students for the 2004 intake and all had accepted. However, RRes was concerned about the inequalities between these and other students. At the time of the visit BBSRC Industrial CASE students for example could only be offered three-year projects and there were concerns that it would become increasingly difficult to maintain such a position. It was reported that CASE projects at RRes were already under pressure given the decline of the UK plant biotech and agrochemicals sectors, which might also be affecting recruitment, with one CASE project held over for a year. The panel felt that the flexibility offered by DTAs was well suited to much of the research done at RRes (e.g. field based studies), but it shared the concerns of the Institute about creating inequalities between students and about the possible impact on Industrial CASE recruitment.

## **PROVISION OF GENERIC NON RESEARCH-BASED TRAINING**

### **Overall Rating: Good**

18. The Institute's generic skills training programme, which had been developed in the two years prior to the visit, was clearly defined and all students understood what was expected of them. In their first year all students undertook 10 days of mandatory generic training, 5 days of which all students attended (covering e.g. technical writing, presentational skills) and 5 days of which was selected by the student from a range of courses run in-house or managed by external suppliers. This, together with research skills training, formed part of the student's Personal Training Programme (see section 15). In the final year all students were required to attend courses on CV writing, interview skills and PhD preparation as well as an additional 7 days generic training selected by the student. In intervening year(s) there were a further 10 days per year of mandatory generic training for each student. Overall the panel was impressed by this pragmatic approach to generic skills training, particularly the clear emphasis on student choice and self-motivation in a significant part of the training. The panel felt the balance between training that applied to all students and the amount that was self-selected was about right, a view endorsed by the students themselves, particularly those in their final year who had had experience of the current and previous training programmes. The panel recommended, however, that the new statistics course (see section 20) should also form part of the mandatory training requirements (except for students in biomathematics who had formal undergraduate qualifications). Although the new RRes generic skills training programme had only been in place for a relatively short period, it potentially represented a good model for skills delivery.

19. Of the students seen by the panel, at least one third reported attendance at a UK GRAD School. There was a wide level of awareness amongst all students of the programme. All reported positively of their experience and recommended it to fellow students. It was clear that positive experiences had influenced others to take the same opportunity.
20. Statistical support for all students was provided by on-site experts and most reported that the levels of support were much better than in their partner university. After student lobbying through the PGTC a formal statistics course had been developed. Although there was some frustration expressed by how long this had taken, this was set against the significant upheaval following the recent major restructuring of the Institute.
21. Careers advice did not appear to form part of the formal training programme at RRes. This was available at partner universities but for many students registered at distant universities this was not a practical proposition. The panel felt that more should be done to raise awareness amongst students of the potential career options open to them, including those not related directly to science. The panel recommended that the Institute should organise a careers symposium in which ex-students were invited back to the Institute to explain how they developed their chosen career paths.

## **THE QUALITY OF THE TRAINING ENVIRONMENT**

### **Overall Rating: Good**

22. RRes had undergone a major investment programme over the last few years. The most striking and obvious result of this was the new Centenary Building, which housed three of the seven Research Divisions and where many students were located. The panel was very impressed with how laboratory and office space had been arranged. The building housed new NMR and Mass Spectrometry facilities. Elsewhere on site the panel was able to see the new bio-imaging facility (see also section 14) which housed fluorescent, con-focal and electron microscope facilities. Students also had access to extensive controlled environment and field facilities and an insectary. The panel was impressed by the range and quality of facilities and the technical support at RRes and students appeared to have full access to them.
23. All students at RRes had access to designated laboratory and office space and their own, networked computer. The examples of work environment seen by the panel in the Centenary Building were of a very high standard. Additionally students were well served by a well-resourced and recently refurbished library. Students requiring access to more specialised journals accessed these via inter-library loans. In addition there were more than ten quiet work spaces (three with a networked PC) in the library.
24. Students at RRes obtained a rounded experience during their time at the Institute. In addition to the good research and generic skills training other opportunities were available to them. This was evidenced by exposure to

industrial experience through participation in the BBSRC Biotechnology YES programme. In addition, some students had taken part in schools activities.

25. The panel got the impression of a good social community amongst RRes students, for example, working together to lobby RRes staff through the PGTC (see section 12). Additionally, most students were members of the RRes Sports and Social Club with many making use of the on-site sports and social facilities.
26. Many students at RRes made use of the on-site accommodation on their arrival. This provided full board accommodation in single or shared rooms. However, this accommodation was, for most students, only suitable for a few months. It was no less expensive than that available on the open market, and most students preferred to move to self-catering accommodation where some costs (e.g. food and heating) were in their control. Many students chose to live away from Harpenden, for example in Luton, where rents were considerably lower. RRes provided loans for rail travel cards for these students, but living costs remained a major issue for students at RRes. The panel felt more should be done to help improve student financial arrangements, where this would be a low cost to the Institute. This might include loans to help with deposits on rented accommodation, cited by a number of students as a problem. The panel also felt that RRes should assess whether some of the on-site self-catering accommodation reserved for Institute staff could be made available to students. The introduction of DTAs also provided an opportunity to increase stipends, and this should also be considered.

## **GENERAL COMMENTS**

27. Students at RRes had access to a wide range of expertise and extensive facilities not available to most UK students. They were well supported by the Institute and the partner universities. Students received good levels of support from their supervisory team and from the wider community at the Institute.
28. The panel was impressed by the new training structures. The implementation of a Personal Training Programme was identified by the panel as a model for student training practice.
29. Based on the students nearing the completion of their studies, the end products of training at RRes were well-rounded individuals. The panel felt that students had a positive outlook and were generally well prepared and well motivated for the next stage in their careers. Although difficult to measure, the panel felt that this was as important as the formal training structures that were in place.
30. The panel felt that students would benefit from improved careers advice, particularly those students who might be considering alternative careers to science.
31. Accommodation and travel costs were the main concerns cited by the students. There were signs that this was already affecting recruitment and the panel felt

that the Institute could be more proactive in considering ways in which it could assist the students. The Institute should consider an increase in stipend levels with the introduction of DTAs.

## **SUMMARY OF RECOMMENDATIONS**

### ***Recommendation 1***

*The panel, although concerned by reports of earlier poor supervision, was satisfied that the new arrangements in place for ensuring high supervision standards should significantly reduce the likelihood of future problems. It recommended that the Institute ensure that the mandatory training requirements are met.*

### ***Recommendation 2***

*The use of a Personal Training Programme was endorsed by the panel and potentially represented a model for best practice in training management.*

### ***Recommendation 3***

*The panel recommended that the new statistics course should form part of the mandatory training requirements (except for students in biomathematics who had formal undergraduate qualifications).*

### ***Recommendation 4***

*The panel felt that more should be done to raise awareness amongst students of the potential career options open to them, including those not related directly to science. The panel recommended that the Institute should organise a careers symposium in which ex-students were invited back to the Institute to explain how they developed their chosen career paths*

### ***Recommendation 5***

*The panel felt more should be done to help improve student financial arrangements, where this would be a low cost to the Institute. This might include loans to help with deposits on rented accommodation, cited by a number of students as a problem. The panel also felt that RRes should assess whether some of the on-site self-catering accommodation reserved for Institute staff could be made available to students. The introduction of DTAs also provided an opportunity to increase stipends, and this should also be considered.*

*The following documents were tabled during the meeting:*

List of students and sponsors  
RRes brochure and Annual Report  
List of PIs and summary of staffing statistics  
List of supervisors/co-supervisors  
Programmes for Station and Divisional seminars  
PGEC remit, members and minutes

Application form and criteria for supervisors  
Sample project proposals  
Copy of advertisements  
List of students sorted by university  
Sample interview record/notes  
Copy of agreement with Nottingham University  
Training Programme  
Sample Student's Personal Progress File  
List of courses attended  
Sample publications  
Sample course materials  
Sample 9 month and 2 year reports  
PhD Symposium programme and pictures  
List of conferences attended  
Six month assessment form  
List of mentors with their students and Terms of Reference for mentors  
Extract from staff handbook with Rothamsted Sports and Social Club information