



House of Commons

Committee of Public Accounts

Reaping the rewards of agricultural research

**Eighteenth Report of
Session 2002–03**



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*Report, together with formal minutes and
minutes of evidence*

*Ordered by The House of Commons
to be printed 30 April 2003*

HC 414

Published on 16 May 2003
by authority of the House of Commons
London: The Stationery Office Limited
£0.00

The Committee of Public Accounts

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The Reports and evidence of the Committee are published by The Stationery Office by Order of the House. All publications of the Committee (including press notices) are on the Internet at http://www.parliament.uk/parliamentary_committees/committee_of_public_accounts.cfm. A list of Reports of the Committee in the present Session is at the back of this volume.

Committee staff

The current staff of the Committee is Nick Wright (Clerk), Leslie Young (Committee Assistant) and Ronnie Jefferson (Secretary).

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Summary

Over the last ten years, annual expenditure by the Department for the Environment, Food and Rural Affairs (the Department), and its predecessor the Ministry of Agriculture, Fisheries and Food, on agriculture related research and development has been around £100 million a year. Research is commissioned through a range of research establishments, including the Department's executive agencies, research institutes, non-departmental public bodies, universities, and private companies.

The Department's research funding has been mainly aimed at developing efficient markets in which agricultural industries can thrive; protecting public, animal and plant health; and sustaining rural and marine environments. The results of research are used primarily to inform policy making or to provide information for the public good, and the results are often widely disseminated. Receipts from the commercialisation of intellectual property totalled some £0.4 million in 2001–02. Other aspects of commercialising scientific research, such as winning contracts, collaborative research with the private sector, and consultancy work have also generated small amounts of income.

On the basis of a Report by the Comptroller and Auditor General,¹ we took evidence from the Department, the Chief Executive of the Biotechnology and Biological Sciences Research Council, and the former and acting Chief Executives of the Roslin Institute. We draw the following main conclusions from our examination:

- The Department's income from commercialisation is less than 1% of its expenditure on research, suggesting that the Department lacks the leadership and enthusiasm to promote commercialisation. The Department needs to specify the outcomes expected from commercialisation, drawing for example on achievements by research bodies, other departments and universities. It should monitor trends in commercialisation activity to help determine whether enough is being done to identify opportunities for exploitation of research.
- Research establishments need to manage actively their research programmes and, as scientists may not have the necessary skills, build up expertise in identifying intellectual property and in negotiating deals to maximise commercialisation opportunities. Research establishments should develop exploitation strategies and report annually to the Department on their success.
- Negotiating deals brings specific challenges such as valuing the intellectual property to be exploited, and decisions on the form in which any receipts should be taken, for example equity shares in commercial companies or additional research funding. Research establishments need to obtain expert advice on such matters, which is independent of advice provided to other parties to the transaction.

1 C&AG's Report, *Reaping the Rewards of Agricultural Research* (HC 300, Session 2002–03)

- **Balancing efforts to commercialise the results of research with protecting the public interest can be a difficult task. To be exploited, research outcomes need to be attractive to commercial partners, but the incentives available to establishments and to individual scientists should not be such as to distort public research priorities to the benefit of commercial interests. The Department should put in place an explicit risk management strategy for reconciling effective incentives to exploitation with public policy objectives, and should maintain full transparency in its dealings with the private sector.**

1 Encouraging commercialisation

1. The level of income received by the Department from the commercialisation of research has been low, less than 1% of its research spending in 2001–02. The Department considered commercialisation to be a secondary objective of its research programme. Since the late 1980s, the primary focus of the Department's research had been to inform and improve the science evidence base which underpinned the Department's policy objectives. The Department had not set targets for exploiting intellectual property or the returns that might be made as it considered numerical targets for the exploitation of scientific research to be inappropriate. The monitoring of trends was more relevant, in its view, together with the setting of a framework and expectations for staff and contractors to identify and exploit opportunities. The job descriptions of chief executives and other appropriate staff referred to exploitation issues, and the Department had implemented awareness training and brought in intellectual property expertise.²

2. Universities receive funding from the private sector for research, and may therefore be more experienced than the Department in identifying income generating opportunities to recoup some of the costs of research. The Department considered that funding the right research, and its quality and value for money were important. It was developing further its links with research councils to create contacts and enhance expertise. The Department's research institutes had contacts with universities but the Department agreed that these contacts could be improved.³

3. The Biotechnology and Biological Sciences Research Council had been monitoring trends to assess progress on commercialisation in its sponsored institutes since 1994. It was working with the Office of Science and Technology to identify possible targets but was concerned that targets should not have perverse effects. The Department agreed to consider implementing similar processes to those used by the Council to assess progress. The Department was establishing a new committee to oversee its three laboratory science agencies, and agreed that the committee should consider an annual report on progress.⁴

4. A prominent example of commercialisation in recent years has been nuclear transfer technology, used to develop Dolly the Sheep, by the Roslin Institute. Dolly, its licensing deals and nuclear transfer technology are of greater size and significance than discoveries generally made through government sponsored research. Between April 1998 and May 1999 the technology was commercialised in two deals:

- The first deal was a partnership between the Roslin Institute and venture capitalists, 3i group. This created a spin-out company, Roslin Bio-Med. The shares in Roslin Bio-Med were owned 42% by the Roslin Institute, 42% by 3i Group, and 16% by the company's management team and two scientists at Roslin.
- The second deal involved the sale of Roslin Bio-Med to the Geron Corporation (Geron), a biotechnology firm based in the United States.

2 C&AG's Report, para 1.19: Qq 2, 6, 9–10, 12, 24, 42, 82

3 Qq 31–35

4 Qq 48, 82–83

5. Developing the technology had cost some £3 million of which the Department funded about £2 million. The Roslin Institute funded the final steps which resulted in the major breakthrough leading to Dolly. The Biotechnology and Biological Sciences Research Council increased Roslin's core funds to strengthen the basic biology of nuclear transfer, and also invested about £1.5 million over three years to a national effort involving Roslin, four universities and the Babraham Institute to improve the efficiency of cloning mice as part of the Council's initiative in gene technologies underpinning healthcare.

6. The former Chief Executive of the Roslin Institute said that the Department had not encouraged him to exploit the nuclear transfer technology by seeking funding from a venture capital partner, and subsequently by selling to an American corporation. He saw these decisions, however, as his responsibility rather than the Department's, who did not have the necessary expertise. Nevertheless, termination of the Department's funding on the basis that exploitation opportunities were more likely in the medical than agricultural field had caused difficulties for the Roslin Institute.⁵

7. The former Chief Executive considered that it was important to fund research in the public sector to a point close to proof of concept stage. There were now funds run by the Department of Trade and Industry, for example, to take forward opportunities from this stage, where other public funding would not be available. Control of intellectual property should lie with the chief executives of public sector research establishments as negotiations were often fast, and the technology itself could change over a short time frame. There had to be a lead negotiator with the authority to negotiate, and an understanding of the scientific and commercial parameters within which they were working. Expertise was also important in identifying intellectual property, in negotiating deals and in handling the proceeds, particularly where equity in companies was received. Good scientific research might not necessarily be exploitable to bring financial returns.⁶

8. In line with recommendations in the Baker Report,⁷ the Department was planning to delegate ownership and control of all intellectual property to research establishments, except where there were valid reasons for not doing so. The Department had already devolved much of the management and maintenance of patents and other intellectual property to research establishments. These bodies would make decisions on the most appropriate way to protect and exploit intellectual property but as part of its monitoring of contractors' performance, there was scope for reports to the Department from contractors which outlined exploitation strategies and demonstrated how the wider public interest had been protected.⁸

9. The Department recognised the need to improve how research was commissioned, managed and transferred without being drawn into near-market research. The Government had proposed a new research parties group that would include government, academic, consumer, environmental and industry representatives. It would help design research programmes for mutual benefit, focussing on the future needs of the farming and

5 Qq 14–18

6 Qq 21–22, 50–51

7 *Creating knowledge, Creating wealth: Realising the Economic Potential of Public Sector Research Establishments*—report by John Baker to the Minister for Science and the Financial Secretary to the Treasury, August 1999

8 C&AG's Report, paras 2.25–2.26

food industries, and on how the private sector might play a part in determining research programmes. Some of the near-market research would be part funded by levy bodies with whom the Department worked through link programmes. The Department's Chief Scientific Adviser was currently preparing a new science and innovation strategy which would include knowledge transfer objectives, and take a forward look at science needs.⁹

10. Before 2002, the Department's incentive scheme for rewarding innovative scientists had not been used, and no payments to inventors had been made. The Department's research establishments now had inventors' reward schemes in place, although to date, only the Horticultural Research International had made payment under the new schemes. The Department accepted that an increase in payment to inventors was a trend it should monitor.¹⁰

11. On whether the Government as a whole was taking a sufficiently joined up approach to exploitation, the Department considered it was working better with research councils but that scope for further improvement existed. The Department acknowledged that on health issues it had focussed on animal health and public health protection rather than on whether outcomes from animal health research might have wider medicinal purposes. It needed to work better with the Department of Health on positive health benefit opportunities, and more generally the Office of Science and Technology needed to take an overview of wider opportunities like these.¹¹

12. Research establishments sponsored by the Department do not have exploitation strategies to assist them in the identification and exploitation of commercial opportunities. Such strategies are essential for highlighting opportunities and risks and should be an integral part of good risk management. In the absence of a well thought through exploitation strategy, it is difficult to judge whether inherent risks have been identified and opportunities assessed, or whether the most appropriate type and structure of deal has been selected.¹²

13. A lack of expertise exists within many research establishments to advise on how to identify intellectual property and to exploit it commercially. The Department was encouraging establishments to have closer links with the Office of Science and Technology, and with Partnerships UK which had special expertise in developing public-private partnerships. The Department had also secured funding to build its capacity for sharing expertise and best practice across agencies through the sharing of an expert on intellectual property and exploitation.¹³

9 *Investing in Innovation, A strategy for science, engineering and technology, July 2002; Response to the Report of the Policy Commission on the Future of Farming and Food by HM Government, Cm 5709, December 2002 ; Qq 37-41*

10 C&AG's Report, Figure 14: Qq 44-47

11 Qq 13, 53-54

12 C&AG's Report, para 3.11

13 Qq 8, 11

2 Protecting the public interest

14. The Biotechnology and Biological Sciences Research Council said that before commercialisation assumed its present profile, the rules on conflicts of interest had focussed on making sure research monies were fairly distributed. The Office of Science and Technology now specified what interests had to be declared.¹⁴ The Council accepted that conflicts of interest could exist between the public interest and private companies' commercial interests. These had to be managed, for example by people withdrawing from the decision-making process. All those participating on the Council's committees, its institutes' governing boards, and its senior scientists had to declare any potential conflicts of interest.¹⁵

15. On wider perceived conflicts of interest between the public good and commercial interests, such as arose on the genetic modification of crops, the Department said that the way forward lay in scientific and economic studies, and in encouraging public debate. One of the reasons behind the Department's move away from near-market research had been to limit the risk of conflicts arising from the Department becoming too close to commercial interests. The Department confirmed that commercial companies were not influencing and directing scientific research involving farm scale tests of genetically modified crops.¹⁶

16. Another issue was whether the Department should see exploitation and a return for the taxpayer as a primary interest, or whether funding should become someone else's responsibility if the original research objective was complete. There was a risk that government would lose control of key innovations and discoveries which could have major implications for the public good. The former Chief Executive of the Roslin Institute said that only about one in 10,000 discoveries reached the marketplace in terms of drugs and cures, and some \$600 million was needed to take a drug through the regulatory process to the marketplace. To be useful, technology had to be taken to the next stage, which might mean a consortium between private and public sector.¹⁷

17. On whether it was appropriate to look to the commercial sector for a partner rather than for example to universities or other parts of government, the Council suggested that it was important for the public sector to focus on top-class science and knowledge transfer for the public good. There was collaboration with international public sector bodies. For example its institutes collaborated with European institutes through framework programmes. The public sector did not however have funds to risk on major commercialisation.¹⁸

18. There is a need to balance incentivising individual scientists by offering them the chance to participate in the rewards of their research with the impact on other scientists working in research. The Department considered that many scientists were more motivated by the acclaim received from visible, high quality science than financial reward

14 Qq 55-57

15 *ibid*

16 Qq 58-63, 70-71, 73

17 Qq 64-67

18 Qq 68-69

In distributing licensing income to inventors, the acting Chief Executive of the Roslin Institute said that the relative contributions of those working in the team were assessed and the income distributed accordingly. Team awards also existed.¹⁹

19. There is also a need to balance financial incentives to individual scientists with financial rewards to be retained by the research body, for example to fund further research. The former Chief Executive of the Rosin Institute considered that scientists who had been less successful in exploitation were not discouraged by incentives paid to more successful colleagues. Rewards should go to the scientists personally, but also to their laboratories and to their departments within the research establishment, which were also important to scientists. As a result other scientists would be encouraged to exploit commercialisation opportunities for their own teams.²⁰

20. In the transaction to commercialise the technology behind the birth of Dolly the Sheep two scientists received financial rewards but other scientists received nothing. The two scientists had invested their own funds, but nevertheless there was a risk of creating tensions within the organisation. The former Chief Executive of the Roslin Institute noted that all the scientists involved with Dolly had been rewarded through the Rewards for Inventors scheme, and that the two scientists were rewarded for taking the invention through to the next stage, a requirement of the venture capital company.²¹

21. On whether the public sector received an appropriate return on its investment in the commercialisation of research behind the birth of Dolly the Sheep (Figure 1), the Department believed that a return of around five times its investment was reasonable, although the scientists and management received a return of 16 times. The Biotechnology and Biological Sciences Research Council considered that the public sector as a whole, including the Roslin Institute, had taken a significant share of the deal (53.5%).²²

Figure 1: Outcomes from the deals to commercialise nuclear transfer technology

- The nuclear transfer patents (applied for and granted between 1995 and 2000) are co-owned by the Roslin Institute, the Biotechnology and Biological Sciences Research Council and the Department.
- In 1998, the Roslin Institute granted PPL Therapeutics, a British company based in Scotland, a licence to develop and commercialise nuclear transfer as a better way to create transgenic animals producing therapeutic proteins in their milk. From 1998 the Roslin Institute received some £100,000 a year in licence fees from PPL Therapeutics.
- 3i Group, the venture capital company, planned to invest some £6 million into developing the Dolly technology at Roslin. Roslin Bio-Med—a spin-out company—was set up by Roslin and 3i in 1998 to commercialise the technology and was granted a licence to exploit nuclear transfer patents.

19 Q 84-85

20 Q 86

21 Q 87

22 Qq 19-20

- When Roslin Bio-Med was sold in 1999 to Geron, a United States company, the Roslin Institute received 400,000 Geron shares worth some £3.7 million. Some 60,000 shares were later sold by Roslin for over £1 million. Other UK based shareholders received Geron shares worth some £13.1 million.
- The Roslin Institute received £12.5 million in research funding from Geron over a six-year period from 1999–2005 of which £10 million was to be used on developing nuclear transfer technology. New intellectual property arising from the nuclear transfer programme is co-owned by Roslin and Geron and some royalties will accrue to Roslin if any products are developed.
- Geron was granted an exclusive research and licence agreement for six years to exploit the nuclear transfer technology for all human-based biomedical applications, excepting PPL Therapeutic's interests. Geron and Roslin would become joint owners of all intellectual property arising from future research (except that arising from a specialist pigs project, the rights to which belong to Geron).
- The Department for Environment, Food and Rural Affairs received £120,000 worth of research to be carried out at Roslin and a share of any royalties.
- Nuclear transfer research continued to be carried out by Roslin staff at the Roslin site in Scotland. Over the past two years the focus of research at Roslin directed by Geron has changed to stem cell technology.

Source: C&AG's Report, Figure A

Conclusions and recommendations

Encouraging commercialisation:

- 1.** To engender an entrepreneurial spirit throughout its research establishments and to encourage a greater awareness of exploitation opportunities, the Department should co-ordinate the sharing of lessons learned from its bodies' exploitation initiatives.
- 2.** The Department should collaborate with the Biotechnology and Biological Sciences Research Council, and other successful research establishments such as the Medical Research Council, which can provide benchmarks of good commercialisation practice.
- 3.** The Department should include in its science and innovation strategy, and scientific research programmes, objectives, goals and targets for commercialisation of research outputs.
- 4.** The Department should review progress by its research establishments in making awards under the inventor incentive schemes to confirm that these schemes are encouraging greater exploitation of intellectual property.
- 5.** The Department should establish links with other government departments carrying out scientific research, such as the Department of Health, so that opportunities to develop or exploit research are taken forward in the most appropriate way, even if the research outcomes are no longer seen as directly relevant to the original commissioning department.
- 6.** The Roslin Institute, together with the Department and the Biotechnology and Biological Sciences Research Council, should identify and disseminate to other research establishments the lessons from the deals to commercialise nuclear transfer technology.
- 7.** The Department should enhance its links with the university sector to identify best practice and success in exploiting research.

Protecting the public interest:

- 8.** The establishment of joint ventures and the parties involved, should be publicly disclosed, as should the aims of the enterprise and the nature of the research to be exploited.
- 9.** In rewarding those involved in exploitation of research, research establishments should balance the financial rewards made to individual scientists with the need to motivate teams of scientists, as well as the motivational benefits of investing in improved research facilities.

Formal minutes

Wednesday 30 April 2003

Members present:

Mr Edward Leigh, in the Chair

**Mr Richard Bacon
Geraint Davies
Mr Frank Field**

**Mr David Rendel
Mr Siôn Simon
Jon Trickett**

The Committee deliberated.

Draft Report (Reaping the rewards of agricultural research), proposed by the Chairman, brought up and read.

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

Paragraphs 1 to 21 read and agreed to.

Conclusions and recommendations read and agreed to.

Summary read and agreed to.

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

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

Ordered, That the provisions of Standing Order No 134 (Select Committees (Reports)) be applied to the Report.

[Adjourned till Wednesday 7 May at half past Three o'clock

Witnesses

Wednesday 5 February 2003

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Sir John Bourn KCB, National Audit Office; **Mr Rob Molan**, HM Treasury; **Mr Brian Bender CB** and **Dr Tony Burne**, Department for Environment, Food and Rural Affairs; **Professor Julia Goodfellow CBE**, Biotechnology and Biological Sciences Research Council; **Dr Harry Griffin**, Roslin Institute; and **Professor Grahame Bulfield CBE**, University of Edinburgh

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Fourth Report	Private Finance Initiative: redevelopment of MOD Main Building	HC 298 <i>(Cm 5789)</i>
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