Public Accounts Committee

Report on The Agri-Food and Biosciences Institute (AFBI)

Together with the Minutes of Proceedings of the Committee Relating to the Report and the Minutes of Evidence

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Membership and Powers

The Public Accounts Committee is a Standing Committee established in accordance with Standing Orders under Section 60(3) of the Northern Ireland Act 1998. It is the statutory function of the Public Accounts Committee to consider the accounts, and reports on accounts laid before the Assembly.

The Public Accounts Committee is appointed under Assembly Standing Order No. 56 of the Standing Orders for the Northern Ireland Assembly. It has the power to send for persons, papers and records and to report from time to time. Neither the Chairperson nor Deputy Chairperson of the Committee shall be a member of the same political party as the Minister of Finance and Personnel or of any junior minister appointed to the Department of Finance and Personnel.

The Committee has 11 members including a Chairperson and Deputy Chairperson and a quorum of 5.

The membership of the Committee since 23 May 2011 has been as follows:

- Ms Michaela Boyle[3] (Chairperson)
- Mr John Dallat (Deputy Chairperson)
- Mr Trevor Clarke[8]
- Mr Michael Copeland.
- Mr Alex Easton[12]
- Mr Paul Girvan
- Mr Chris Hazzard[10]
- Mr Ross Hussey
- Mr Dathí McKay[7]
- Mr Adrian McQuillan[1]
- Mr Seán Rogers[6]

1 With effect from 24 October 2011 Mr Adrian McQuillan replaced Mr Paul Frew
2 With effect from 23 January 2012 Mr Conor Murphy replaced Ms Jennifer McCann
3 With effect from 02 July 2012 Ms Michaela Boyle replaced Mr Paul Maskey as Chairperson
4 With effect from 02 July 2012 Mr Conor Murphy is no longer a Member and his replacement on this committee has not yet been announced
5 With effect from 07 September 2012 Mr John Dallat replaced Mr Joe Byrne as Deputy Chairperson.
6 With effect from 10 September 2012 Mr Sean Rogers was appointed as a Member
7 With effect from 10 September 2012 Mr Daithi McKay was appointed as a Member
8 With effect from 01 October 2012 Mr Trevor Clarke replaced Mr Alex Easton
9 With effect from 11 February 2013 Mr Sammy Douglas replaced Mr Sydney Anderson
10 With effect from 15 April 2013 Mr Chris Hazzard replaced Mr Mitchel McLaughlin
11 With effect from 07 May 2013 Mr David McIlveen replaced Mr Sammy Douglas
12 With effect from 16 September 2013 Mr Alex Easton replaced Mr David McIlveen

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List of Abbreviations

AFBI / The Institute	Agri-Food and Biosciences Institute
ALB	Arm's Length Body
the Committee	Public Accounts Committee (PAC)
C&AG	Comptroller and Auditor General
the Department	Department of Agriculture and Rural Development (DARD)
EIS	Evidence and Innovation Strategy
NDPB	Non-departmental body
PAC	Public Accounts Committee
PPEs	Post-project evaluations
R&D	Research and Development

Executive Summary

Introduction

1. The Agri-Food and Biosciences Institute (AFBI) was established as a non-departmental public body (NDPB) in April 2006. It is the Department of Agriculture and Rural Development's (the Department's) largest arm's length body (ALB), and carries out analytical and diagnostic testing for DARD and other public and commercial bodies to satisfy local, national and EU statutory requirements. AFBI also carries out research and development (R&D) for DARD, and other clients.

2. In the 6-year period from 2006-07 and 2011-12, AFBI spent £316 million and received total income of £321 million; £253 million (79%) of this income was grant-in-aid from DARD.

3. AFBI's work is important in a number of respects. It facilitates diagnosis and control of animal and plant disease outbreaks, detects changing disease patterns and the emergence of new diseases, provides assurance on food product safety and helps to maintain healthy fish stocks. However, as a large and relatively newly created organisation, AFBI carried a high degree of risk. Also, in May 1995, a Westminster Public Accounts Committee (PAC) report assessed DARD's R&D activities which were then delivered by Science Service, and was critical of the appraisal, oversight and management of this function.

4. In taking evidence, the Committee examined AFBI's performance since its establishment in the following areas:

   - financial management;
   - performance management;
   - management of the DARD-funded R&D programme; and
   - corporate governance within AFBI, and oversight of the Institute by DARD.

Overall Conclusions

5. The creation of a new ALB (particularly one as large as AFBI), requires careful planning and oversight to ensure that these are suitably structured, resourced and governed to operate effectively. In the case of AFBI, there was a significant onus on the Department to ensure that these standards were observed. However, overall, the Committee concludes that until recently, the Department abdicated its responsibility for proper oversight of the Institute.

AFBI financial management

6. The Committee is deeply disappointed that proper costing systems were not introduced within AFBI until almost seven years after its establishment, and believes this delay was characterised by a lack of foresight and inaction. The absence of these basic systems meant that AFBI did not have any proper tools for assessing its operational efficiency.

7. AFBI's corporate costs between 2006-07 and 2010-11 amounted to almost £96 million, £51 million of which was spent on maintaining and operating the Institute's estate. Elements of the estate, particularly the Newforge and Stormont sites, are either superfluous to AFBI's needs, or in very poor condition. The Committee considers that implementation of more efficient accommodation solutions have been unacceptably delayed.

8. Until 2011, AFBI's overheads were calculated using a historical rate, which dated back to at least 2003. DARD acknowledges that, up to 2011, AFBI had been charging "too low a rate" for work. The Committee believe that this was due to poor management within AFBI, and is dismayed and frustrated that up to £3.5 million income was lost as a result.

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Efficiency and effectiveness of scientific testing

9. Scientific testing for DARD is AFBI's most significant operational activity. The Committee is disappointed that there has been limited unit costing and benchmarking of costs for this testing, and cannot therefore understand how DARD can have any idea whether its significant investment in this area is delivering value for money. AFBI has also maintained an emergency response capability to help counter major outbreaks of animal and plant disease. This function is expensive, and there is a lack of hard information on the specific costs of retaining this capability. The Committee considers that DARD must assure itself that excessive costs are not being incurred.

10. The Committee welcomes AFBI's success in substantially increasing its level of non-DARD income. This has been significantly assisted by royalties from patents filed following scientific discoveries by the former Science Service. However, the Committee was extremely concerned to learn that 7 employees (or former employees) have received very significant shares of these royalties. The principal of remunerated public sector employees receiving further substantial reward simply for discharging their duties does not sit well with the Committee. The Committee demands all public sector bodies to exercise utmost scrutiny over employee claims for shares in intellectual property, and to obtain the best deal possible for the public purse.

Management of the DARD funded R&D Programme

11. Overall, the Committee considers that management of the DARD-funded programme of Research and Development (R&D) has been very poor. It is disappointing that recent shortcomings identified by the C&AG mirror those highlighted in 1995 by the Westminster PAC. Whilst new arrangements introduced by DARD have significantly strengthened control over the R&D programme, it is too early to measure the effectiveness of these, and the Committee considers that the Department abdicated its responsibility in this area for too long before making improvements.

12. AFBI has acknowledged that the 125 R&D projects examined by the C&AG did not have budgets "as such", and that it did not subject 39 projects to the required full appraisal. The Committee views this as symptomatic of inadequate project management. The Committee also considers the extent of overspends and time overruns on these projects to have been alarming. Total overspends amounted to at least £12.7 million. Projects lasted 5 years, compared with estimates of 1.5 to 3.5 years.

13. The significant cost and time overruns are unsurprising, given that the Committee does not believe that anything approaching an acceptable standard of project management was in place. For example, AFBI was unable to generate information on ongoing project costs for review, and specific dates for the expected start and end of projects had not been established. Furthermore, AFBI's annual review to determine whether projects should continue took no consideration of project costs.

14. The Committee notes that post-project evaluations (PPEs) are well advanced for completed DARD-funded R&D projects. However, the measurement of outcomes achieved could be significantly strengthened through assessment of direct benefits delivered to the agri-food industry, and the extent to which the industry implements AFBI research findings.

15. In 1995, the Westminster PAC expressed concerns over the poor market success of a seed potato breeding project which commenced in 1957. This project remains ongoing, and at least £7.2 million has been spent on it since 1982. This expenditure needs to be justified. Positively, the project has led to the development of a number of new varieties, but the level of market success has continued to deteriorate. The Committee welcomes new arrangements introduced by AFBI, including the appointment of a commercial partner, and an objective to recover full project costs. However, these steps are belated, and the Committee considers that DARD should have put the programme on a sounder market led footing much earlier.

Corporate governance within AFBI and oversight of the Institute by DARD

16. A range of enhanced governance and oversight arrangements for AFBI were implemented during and after the C&AG's investigation, and AFBI also plans to unit cost and benchmark its scientific testing function. The Committee considers that the Department and AFBI have been too slow to implement these improvements. It is also vital that the new procedures are underpinned by strong and pro-active scrutiny by the Department if improved outcomes are to be achieved in practice.

17. Until 2011-12, the commissioning of DARD-funded R&D projects was led by AFBI. The Committee considers that it took far too long for the Department to assume responsibility for this. Before March 2012, the decision on whether R&D projects should continue was also taken by AFBI. When DARD finally conducted an overarching review of ongoing work, two-thirds of projects were immediately terminated. The Committee considers that an effective DARD-led annual review process would have weeded out a significant number of low priority projects much sooner. Instead, projects with a total cost of £18.2 million, were allowed to drift for too long.

18. Overall, the Committee acknowledges recent improvements in financial control and governance within AFBI, and enhanced oversight of the Institute by DARD. However, the Committee believes that significantly better value for money would have been achieved had improvements been made much sooner. The Committee is not yet assured that these improvements will work effectively in practice or be sustained, particularly given the failure of the Department to implement the recommendations of the 1995 Westminster PAC report. Consequently, the Committee will monitor the performance of AFBI and DARD's oversight of the Institute, and examine progress against our recommendations in 12 months time.

Summary of Recommendations

Recommendation 1

Now that AFBI has developed appropriate costing systems, the Committee recommends that a clear focus is applied on identifying and implementing efficiency savings. As well as addressing the high costs of its estate, AFBI should review and benchmark its other corporate costs to identify further potential efficiencies.

Recommendation 2

The Committee recommends that AFBI annually review its fee setting procedures to ensure compliance with the principles of full cost recovery. AFBI should also provide an annual assurance statement on fee setting to the AFBI Board and the Department.

Recommendation 3

A structured and formalised framework of unit costing for scientific testing must be implemented within AFBI without further delay. Once unit costs have been established, AFBI must annually benchmark these with other service providers. As a customer, DARD must stringently review AFBI's unit costs and benchmarking outcomes to ensure it is receiving value for money, and also annually confirm that all testing undertaken is necessary to help meet departmental objectives and statutory requirements.

Recommendation 4

The Committee recommends that formal and robust budgets be prepared for all DARD-funded R&D projects. Given AFBI's totally inadequate performance in this area to date, the Department must carefully review initial budgets, and ensure that projects are re-appraised, or subject to change control where costs exceed estimates. The Committee also recommends that DARD undertake regular compliance reviews of the enhanced oversight measures for R&D to ensure these are functioning effectively in practice. In particular, the viability of projects which fail to meet key milestones must be decisively reviewed and, where necessary, closed.

Recommendation 5

The recently introduced improvements in governance must operate effectively in practice if desired outcomes are to be achieved and the client / customer relationship is to operate as intended. The Committee recommends that DARD undertake an annual assurance review of key areas including costing and charging, efficiency measurement and R&D project management, and report back to us on initial progress after the next 12 months.

Recommendation 6

The Committee believes that its inquiry into AFBI has highlighted important lessons for all departments faced with the challenge of establishing new arm's length bodies. Careful and targeted planning is required to ensure that risks are identified at an early stage, and well managed thereafter. The appropriate systems, skills and resources must also be put in place from the outset to ensure that new bodies function effectively, and are properly governed.

Introduction

1. The Public Accounts Committee (the Committee) met on 27 November 2013 to consider the Comptroller and Auditor General's report '*The Agri-Food and Biosciences Institute (AFBI)' (12 September 2013)*. The main witnesses were:

   - **Mr Noel Lavery**, Accounting Officer, Department of Agriculture and Rural Development (DARD);
   - **Mr Gerry Lavery**, Deputy Secretary, DARD;
   - **Mr Seamus Kennedy**, Chief Executive, AFBI;
   - **Mr Norman Fulton**, Director of Policy and Economics, DARD;
   - **Mr Kieran Donnelly**, Comptroller and Auditor General; and
   - **Ms Fiona Hamill**, Treasury Officer of Accounts.

2. In April 2006, the Department of Agriculture and Rural Development (the Department) moved one of its largest business functions (in both expenditure and staffing terms) into a new arm's length body (ALB), and established the Agri-Food and Biosciences Institute (AFBI). AFBI represented an amalgamation of Science Service and the Agricultural Research Institute Northern Ireland (ARINI). It is the Department's largest ALB, and carries out analytical and diagnostic testing for DARD and other public and commercial bodies to satisfy local, national and EU legislation. AFBI also carries out research and development (R&D) for DARD and other clients. R&D undertaken for DARD is intended to align with the Department's strategic goals.

3. Between 2006-07 and 2011-12, AFBI expenditure totalled £316 million, and the Institute received total income of £321 million, £253 million (79%) of this income was grant-in-aid from DARD.

4. The agri-food sector is a very valuable component of the Northern Ireland economy, and accounts for 6.5% of local employment, compared to 2.6% in the United Kingdom overall. AFBI's work is important to the sector in a number of respects, including:

   - facilitating rapid diagnosis and control of animal and plant disease outbreaks, including those posing a risk to human health;
   - detecting changing animal and plant disease patterns, and the emergence of new diseases;
   - providing assurance on the safety of food products; and
   - maintaining healthy fish stocks.

   The Committee wish to place on record its support for AFBI's scientific work, which helps protect and develop this highly important sector.

5. In September 2013, the Comptroller and Auditor General (C&AG) published a strategic review of AFBI's financial and operational performance since its establishment in April 2006. In taking evidence, the Committee examined four broad areas:

   - financial management;
   - performance management;
   - management of the DARD-funded R&D programme; and
   - corporate governance within AFBI, and oversight of the Institute by DARD.

6. As a relatively newly created organisation with a significant budget, AFBI carried a high degree of risk. Also, in May 1995, the Westminster Public Accounts Committee (PAC) reported on DARD's R&D activities which were then delivered by Science Service. PAC criticised

key aspects of the management of this function, including the lack of strategic planning; inadequate economic appraisal; lack of reliable costing systems; R&D projects being allowed to continue indefinitely despite no evidence these were delivering tangible results; and a lack of performance targets and cost budgets for R&D projects.

7. The creation of a new ALB (particularly one as large as AFBI), requires careful planning and oversight to ensure that these are suitably structured, resourced and governed to operate effectively. In the case of AFBI, there was a significant onus on the Department to ensure that these standards were observed. However, overall, the Committee concludes that until recently, the Department abdicated its responsibility for proper oversight of the Institute.

AFBI financial management

The necessary financial and costing systems have only recently been introduced in AFBI

8. AFBI provides a mix of services to a range of clients. Whilst its principal function is to deliver statutory testing and a portfolio of R&D projects for DARD, it also manages several hundred contracts for non-DARD clients.

9. As far back as 1995, the Westminster PAC expressed concern at the absence of reliable costing systems within Science Service (AFBI's main predecessor organisation). Given AFBI's mix of work, the Committee consider that both the Institute and the Department should have been alerted to the need, as a matter of priority, to develop a fully functioning costing module for accurately allocating overheads and calculating the full cost of delivering work. This would also have facilitated measurement and scrutiny of AFBI's efficiency, which was very important given the Institute's substantial overheads.

10. However, the Committee was deeply concerned to learn that between 2007-08 and 2009-10, AFBI missed four different business plan targets for introducing a costing system. The Committee was told that from 2006, AFBI had used DARD's accounting system in anticipation that Account NI would meet its needs. Whilst Account NI went live in July 2009, the Committee understands that a decision was taken in October 2008 to remove its costing module. The Committee was told that AFBI left Account NI in 2011, due to its unsuitability for the Institute's business needs. In December 2012, a costing module which enabled AFBI to apportion overheads and accurately identify the cost of its work was finally introduced.

11. Whilst the Committee acknowledges the challenges associated with establishing an NDPB on AFBI's scale, it considers that development of the required costing systems was characterised by a lack of foresight and inaction. At a much earlier stage than was the case, and certainly no later than October 2008, it should have been apparent that the solution to AFBI's requirements lay in a tailored bespoke system. In the event, the absence of a costing system for almost seven years meant that AFBI did not have the proper tools for identifying the full costs of delivering its work, and for assessing its operational efficiency. The Committee was astounded to learn that DARD continued to provide over £40 million grant-in-aid annually to the Institute, without costing, or efficiency of service delivery, being deemed a high priority.

AFBI's Corporate costs are high, and elements of its estate are very inefficient

12. The Committee was deeply concerned to learn of AFBI's extremely high corporate costs, which, between 2006-07 and 2010-11 amounted to almost £96 million (i.e. 37% of total spend), and wonders why measures were not taken to manage these costs. The Institute's estate has been particularly expensive to maintain and operate, incurring over £51 million of these costs. The Committee was told that on AFBI's establishment in 2006, elements of the estate inherited were either superfluous to its needs, or in very poor or obsolete condition. DARD is currently preparing an invest-to-save bid to facilitate re-location from Newforge (AFBI's Headquarters), which has particularly high overheads. Both AFBI and DARD have also acknowledged that AFBI's Stormont site is reaching the end of its life, and that replacing this will cost between £25 and £30 million.

13. Whilst the Committee welcomes the proposed re-location from Newforge, it considers that meaningful action to address AFBI's high estate costs has been unacceptably delayed and finds it unbelievable that there has been ten years of inaction since DARD established a project board to prepare for AFBI's establishment, and eight years since AFBI commenced operations. The inefficiency of the Institute's estate has been evident for many years and the Committee finds this totally unacceptable.

AFBI needs to review its procedures for income generation and charging

14. The Committee welcomes the steady increase in non-DARD income achieved by AFBI since its establishment. However, it is also essential that fees charged reflect the full cost of service delivery, and that a level playing field exists with commercial providers. Until 2011, AFBI's overheads were calculated using a historical Science Service rate, which dated back to at least 2003. DARD has acknowledged that, up to this date, AFBI charged "too low a rate". The Committee can only form the conclusion that this was attributable to poor management within AFBI, and is dismayed and frustrated that up to £3.5 million income was lost due to undercharging.

15. It is also deeply concerning that, at the time of the C&AG's audit, AFBI did not reconcile fees which were agreed with clients "up-front", with the cost and time taken to actually deliver this work. The Committee view this as essential management action which would have provided assurance that AFBI had not been significantly under-charging for this work.

16. From a governance perspective, the Committee is disappointed at the apparent lack of scrutiny and challenge by AFBI's Board and senior management over the prolonged failure to capture full costs for elements of the Institute's commercial work, and at the lack of reconciliation between fees derived from estimates and the actual cost of delivering such work.

Recommendation 1

Now that AFBI has developed appropriate costing systems, the Committee recommends that a clear focus is applied on identifying and implementing efficiency savings. As well as addressing the high costs of its estate, AFBI should review and benchmark its other corporate costs to identify further potential efficiencies.

Recommendation 2

The Committee recommends that AFBI annually review its fee setting procedures to ensure compliance with the principles of full cost recovery. AFBI should also provide an annual assurance statement on fee setting to the AFBI Board and the Department.

Efficiency and effectiveness of scientific testing

The efficiency of AFBI's scientific testing has not been measured, and arrangements in this area must be strengthened significantly

17. Scientific testing undertaken for DARD is AFBI's most significant operational activity in both volume and cost terms. The Committee is therefore disappointed that very few unit costs have been calculated for the routine statutory testing delivered for DARD, and that there has only been limited benchmarking of costs with other providers. It is a fundamental tenet of any commercial relationship that the customer is aware of the cost of the service being procured and, in the absence of this, the Committee cannot understand how DARD can have any idea of whether its significant investment in this area is delivering value for money. The Committee welcomes assurances that DARD now accepts the need for enhanced unit costs and benchmarking, and wonders why it took a PAC enquiry to secure meaningful action in this area.

18. The Committee recognise the importance of AFBI's work in preventing and eradicating animal and plant disease, and in countering major disease outbreaks. In taking evidence, the Committee was repeatedly told of the importance of maintaining an emergency response capability to help achieve these objectives. Whilst witnesses acknowledged that maintaining this function is expensive, there is a lack of information on the specific costs of this service, and on how much of the DARD-funded scientific testing budget this accounts for. The Committee recognises the need for an emergency response function, but also considers AFBI and the Department must capture and review the costs of provision on an annual basis.

Recommendation 3

A structured and formalised framework of unit costing for scientific testing must be implemented within AFBI without further delay. Once unit costs have been established, AFBI must annually benchmark these with other service providers. As a customer, DARD must stringently review AFBI's unit costs and benchmarking outcomes to ensure it is receiving value for money, and also annually confirm that all testing undertaken is necessary to help meet Departmental objectives and statutory requirements.

The Committee welcomes the significant increase in AFBI's non-DARD income

19. The Committee welcomes the substantial increase in non-DARD income secured by AFBI. This has been significantly assisted by royalties from patents which were filed following scientific discoveries by the former Science Service, with AFBI receiving over £20 million income from these between 2008-09 and 2012-13. Whilst these have clearly contributed significantly to AFBI's revenue stream, the Committee is concerned that need for increased DARD support may arise in coming years, as this royalty income, by its nature, begins to subside. This further highlights the importance of AFBI delivering further efficiencies.

20. The Committee is also extremely concerned to learn that 7 employees (or former employees) have been paid very significant amounts from these royalties. The principle of remunerated public sector employees receiving further substantial reward simply for discharging their duties does not sit well with the Committee. However, the Committee recognises that current legislation requires an employer to agree some form of scheme which provides employees with a "fair share" of commercial benefits derived from intellectual property which they have developed. The Committee also acknowledges that, prior to making any payments to staff, AFBI and DARD sought two sets of professional legal advice and obtained DFP approval. The Committee demands all public bodies to exercise utmost scrutiny over claims from employees for shares in intellectual property, and to ensure that the best deal possible is obtained for the public purse. The Committee understands that one claim from a member of AFBI staff remains outstanding, and demands that the Department reports the final outcome from this case to it.

Management of the DARD funded R&D Programme

Management of the DARD-funded programme has been poor, and PAC recommendations from 1995 were not implemented

21. The Committee is very concerned that project management over the DARD-funded research and development programme has been unacceptably poor. This is amplified by the fact that, in 1995, the Westminster PAC highlighted shortcomings and made recommendations for improvement in this same area.

22. The Committee acknowledges that DARD has significantly strengthened the project management framework for the R&D programme, and assumed greater oversight in this area. However, it is too early to offer any value judgements on the effectiveness of the new arrangements. DARD must now ensure that future oversight of R&D is sufficient to ensure that risks to value for money are identified and managed at an early stage.

Forecasting of R&D project costs was inadequate, and many projects were not subject to the required economic appraisals

23. Effective project management requires robust cost budgets to be set at the planning stage, so that a baseline for measuring subsequent outcomes is established, and to ensure the appropriate level of economic appraisal is undertaken. In the Committee's view, AFBI's acknowledgement that the 125 R&D projects examined by the C&AG did not have budgets "as such", but instead had "cost estimates" is symptomatic of the inadequate project management regime in place at that time. The Committee also found that AFBI had a poor track record in estimating likely project costs. Whilst estimates for 39 of the 125 projects fell below the full economic appraisal threshold, actual costs exceeded this, and, in some cases, by very significant margins. These projects were therefore not subject to the required full appraisal.

Many projects experienced high overspends, and ran far beyond estimated completion dates

24. The Committee is very disturbed at the extent of cost overspends on R&D projects identified by the C&AG. In total, the 125 projects overspent by at least £12.7 million, which represented an average overrun of £101,000. Projects were also not delivered within target deadlines, and lasted an average of 5 years, compared with an estimated 1.5 to 3.5 years. The Committee was repeatedly told that AFBI lived within its overall budget. However, this provides no assurance or confidence whatsoever on the efficiency or effectiveness achieved by AFBI's individual activities and projects.

The standard of project management over the R&D programme fell far short of what was required

25. The Committee is not surprised at the extent of cost and time overruns, given the extremely poor standard of project management which prevailed. The absence of a costing system meant that information on ongoing costs of individual projects could not be generated for review. This left AFBI and DARD unsighted on the escalating costs of many projects. Furthermore, specific dates were not established for the expected start and end of projects. Whilst AFBI did operate an annual review process to determine whether projects should continue, this took no consideration of costs to date, or future costs of completing research. The Committee also regards it as unacceptable within a contractor-customer relationship that AFBI had autonomy in deciding whether projects should continue. Overall, the Committee considers that the quality of project management exercised by both DARD and AFBI fell well below acceptable standards, particularly for an area in which DARD spent over £40 million.

26. Whilst the Committee considers that the Department abdicated its responsibility in this area for too long, it also acknowledges that recently introduced improvements have significantly enhanced the level of control over the commissioning, management and oversight of R&D

projects. However, if successful outcomes are to be achieved, the new procedures will have to be rigorously applied in practice, and be sustained.

Recommendation 4

The Committee recommends that formal and robust budgets be prepared for all DARD-funded R&D projects. Given AFBI's totally inadequate performance in this area to date, the Department must carefully review initial budgets, and ensure that projects are re-appraised, or subject to change control where costs exceed estimates. The Committee also recommends that DARD undertake regular compliance reviews of the enhanced oversight measures for R&D to ensure these are functioning effectively in practice. In particular, the viability of projects which fail to meet key milestones must be decisively reviewed and, where necessary, closed.

Direct benefits delivered to the agri-food industry have not been measured

27. The Committee notes the fact that Post-Project Evaluations (PPEs) are well advanced for completed DARD-funded R&D projects, and that the Department has now assumed responsibility for these. The Committee also recognises the potential value of this research in a number of respects, including assisting future policy development. However, one of the Department's key strategic objectives is to "improve performance in the Marketplace". Whilst the Committee acknowledges that AFBI's work is likely to have delivered benefits to the agri-food industry, PPEs to date have largely reported academic achievements. Furthermore, actual direct benefits to the industry have been measured through estimates and assumptions. Rather than academic outcomes, the Committee believes that the principal objectives of PPEs should be to measure how the success of the research in contributing to the Department's strategic objectives, and to quantify direct benefits delivered to the industry, and the extent to which the industry implements AFBI research findings in practice.

The viability of a potato breeding project which commenced in 1957 must be decisively reviewed

28. In 1995, the Westminster PAC expressed concerns about the lack of market success achieved by a seed potato breeding project which commenced in 1957. The Westminster Committee recommended that controls be put in place to prevent long-term projects which were not achieving results continuing indefinitely. This project remains ongoing, and at least £7.2 million has been spent on it since 1982. This expenditure needs to be justified.

29. The Committee endorses the principle of supporting the local seed potato industry, so long as public money is well managed. It is positive that this project has led to the development of new potato varieties, with between 20 and 25 per cent of locally produced potatoes being AFBI developed breeds. However, it is also very disappointing that this research has not translated into market success. Local seed potato production has declined from 55,400 tonnes in 1994 to 20,200 tonnes in 2010. This lack of market success calls into question the value for money achieved for the significant public funding committed to the project. In effect, it appears that at best, this programme has helped sustain the industry on a life support machine.

30. Although very belated, the Committee welcomes new arrangements for delivering the programme. From late 2010, AFBI has appointed a commercial partner to address the lack of market success, as well as setting an objective for the project to ultimately recover its full costs. Despite these changes, the Committee believes that DARD bears significant responsibility for the lack of commercial benefits to date and for not ensuring that the programme was put on a sounder footing much earlier. Indeed, the Committee is concerned that a lack of market focus may not have been unique to this project, and that this may have been exhibited across the DARD-funded R&D programme. In the Committee's view, the acid test for this project will now will be the degree of commercial success achieved.

Corporate governance within AFBI and oversight of the Institute by DARD

The development of an improved corporate governance framework within AFBI was considerably delayed

31. A range of improved governance and oversight arrangements for AFBI were implemented during and after the C&AG's investigation. These include the development of a costing system; enhanced quarterly financial reporting to DARD; improved procedures for commissioning, appraising and managing R&D projects; and quarterly assurance reporting by AFBI's Chief Executive to DARD on R&D expenditure. AFBI also now plans to unit cost and benchmark its scientific testing. The Committee welcomes such developments, but considers that it took far too long to put such improvements in place. AFBI is by far DARD's largest NDPB, and the Department should have afforded the development of strong control environment and corporate governance framework much greater priority. Within AFBI, key developments were also much delayed. For example, only in 2011 was a Board Finance sub-committee established, and AFBI did not appoint a Corporate Affairs and Finance Director until January 2013.

32. Whilst the establishment of systems and procedures to improve governance and oversight is welcome, there is no guarantee that desired outcomes will actually be achieved. From the outset, DARD established a sponsor branch to oversee and scrutinise AFBI's operations. However, the sponsor was not alert to key shortcomings within AFBI, including the use of an outdated overhead calculation and the lack of unit costs for the majority of scientific tests conducted for DARD. The Committee also found that there was no evidence that the sponsor was aware of the significant cost and time overruns within so many R&D projects. The Committee therefore highlights the need for pro-active scrutiny to identify and address performance shortcomings.

Many R&D projects which did not address DARD's strategic objectives continued for too long

33. The Committee was surprised to learn that, until 2011-12, when the Evidence and Innovation Strategy (EIS) was introduced, the commissioning of DARD-funded R&D projects was heavily influenced by AFBI. The Committee believes that it took far too long for the Department to assume lead responsibility for determining the research to be undertaken on its behalf, particularly given the substantial funding involved. Until March 2012, the decision on whether R&D projects should continue was also taken solely by AFBI following an annual assessment. Only then did DARD undertake what the Committee considers to have been a meaningful review of the relevance of ongoing work. This review resulted in 52 projects (66 per cent of those examined) being immediately terminated.

34. Whilst the Committee was told that 80 per cent of terminated projects had completed their experimental phase, it considers it highly questionable that so many were previously extended for successive years by AFBI, but suddenly reached completion precisely at the time of DARD's overarching review. Whilst some of these projects may have achieved successful outcomes, the Committee considers it likely that many were either not addressing DARD's objectives, or were performing poorly, and that an effective DARD led annual review process would have weeded such projects out much sooner. Instead, the Committee believes that these projects, which had a final total cost of £18.2 million, were allowed to drift for far too long.

Recommendation 5

The recently introduced improvements in governance must operate effectively in practice if desired outcomes are to be achieved and the client / customer relationship is to operate as intended. The Committee recommends that DARD undertake an annual assurance

review of key areas including costing and charging, efficiency measurement and R&D project management , and report back to us on initial progress after the next 12 months.

35. Overall, the Committee acknowledges the improvements in financial control and governance within AFBI, and DARD's enhanced oversight of the Institute, but believes that the measures introduced were significantly overdue. The mix and nature of AFBI's work makes it difficult to quantify the extent to which better value for money would have been achieved had improvements been made sooner. However, the extent of shortcomings leads the Committee to conclude that, until recently best value was clearly not being achieved in the delivery of AFBI's operations. The Committee is not yet assured that these improvements will work effectively in practice or be sustained, particularly given the failure of the Department to implement the recommendations of the 1995 Westminster PAC report. Consequently, the Committee will monitor the performance of AFBI and DARD's oversight of the Institute, and examine progress against our recommendations in 12 months time.

Recommendation 6

The Committee believes that its inquiry into AFBI has highlighted important lessons for all Departments' faced with the challenge of establishing new arm's length bodies. Careful and targeted planning is required to ensure that risks are identified at an early stage, and well managed thereafter. The appropriate systems, skills and resources must also be put in place from the outset to ensure that new bodies function effectively, and are properly governed.

Northern Ireland Assembly

Appendix 1

Minutes of Proceedings of the Committee Relating to the Report

Wednesday, 13 November 2013
Room 29, Parliament Buildings

Present: Ms Michaela Boyle (Chairperson)
Mr John Dallat (Deputy Chairperson)
Mr Trevor Clarke
Mr Michael Copeland
Mr Alex Easton
Mr Paul Girvan
Mr Chris Hazzard
Mr Daithí McKay
Mr Adrian McQuillan
Mr Seán Rogers

In Attendance: Miss Aoibhinn Treanor (Assembly Clerk)
Mr Trevor Allen (Assistant Assembly Clerk)
Mrs Danielle Saunders (Clerical Supervisor)
Mr Darren Weir (Clerical Officer)
Miss Clare Rice (Bursary Student)

Apologies: Mr Ross Hussey

1.42pm The meeting opened in public session

1.43pm Mr Copeland joined the meeting

1.44pm Mr Clarke and Mr Girvan left the meeting

1.47pm Mr Girvan and Mr Clarke re-joined the meeting

1.48pm the meeting moved to closed session

1.49pm Mr Copeland and Mr Clarke left the meeting

1.51pm Mr Clarke and Mr Copeland re-joined the meeting

2.15pm Mr McKay left joined the meeting

2.24pm Mr McKay re-joined the meeting

2.24pm Mr Dallat joined the meeting

2.33pm Mr Copeland left the meeting

2.36pm Mr McKay left the meeting

2.38pm Mr Copeland re-joined the meeting

2.40pm Mr McKay re-joined the meeting

2.59pm Mr Dallat left the meeting

3.00pm Mr Dallat re-joined the meeting

3.12pm the meeting suspended

3.21pm the meeting resumed with the following Members present

Ms Michaela Boyle (Chairperson)
Mr John Dallat (Deputy Chairperson)
Mr Trevor Clarke
Mr Michael Copeland
Mr Alex Easton
Mr Paul Girvan
Mr Chris Hazzard

Mr Daithí McKay
Mr Adrian McQuillan
Mr Seán Rogers

3.33pm Mr McKay re-joined the meeting

3.41pm Mr Girvan re-joined the meeting

3.50pm Mr Copeland and Mr Rogers left the meeting

3.51pm Mr Rogers re-joined the meeting

3.52pm Mr Easton left the meeting

3.53pm Mr Clarke left the meeting

3.55pm Mr McKay left the meeting

3.57pm Mr Copeland re-joined the meeting

3.57pm Mr McQuillan left the meeting

3.58pm Mr Girvan re-joined the meeting

7. Inquiry into the Agri-Food and Biosciences Institute (AFBI)

4.10pm Mr Dallat left the meeting

4.16pm Mr Dallat re-joined the meeting

4.18pm Mr Hazzard left the meeting

4.19pm Mr Copeland left the meeting

4.26pm Mr Copeland re-joined the meeting

The Committee received briefing from the C&AG, Eddie Bradley, Paul Turley and Richard Emerson on the Audit Office's report on AFBI.

4.28pm Ms Boyle left the meeting; Mr Dallat took the Chair

[EXTRACT]

Wednesday, 20 November 2013
Room 29, Parliament Buildings

Present: Ms Michaela Boyle (Chairperson)
Mr Trevor Clarke
Mr Michael Copeland
Mr Alex Easton
Mr Paul Girvan
Mr Chris Hazzard
Mr Ross Hussey
Mr Adrian McQuillan

In Attendance: Miss Aoibhinn Treanor (Assembly Clerk)
Mr Trevor Allen (Assistant Assembly Clerk)
Mrs Danielle Saunders (Clerical Supervisor)
Mr Darren Weir (Clerical Officer)
Miss Clare Rice (Bursary Student)

Apologies: Mr John Dallat (Deputy Chairperson)
Mr Daithí McKay
Mr Seán Rogers

2:15pm The meeting opened in public session

2:35pm the meeting moved to closed session

5. Inquiry into the Agri-Food and Biosciences Institute (AFBI) – Preparation Session

The Committee identified and developed core issues arising from the Audit Office report in preparation for its forthcoming evidence session on 27 November 2013.

2:35pm Mr Girvan left the meeting

2:40pm Mr Girvan re-joined the meeting

2:50pm Mr Hazzard joined the meeting

2:53pm Mr Copeland left the meeting

2:57pm Mr Copeland re-joined the meeting

2:58pm Mr McQuillan left the meeting

[EXTRACT]

Wednesday, 27 November 2013
Senate Chamber, Parliament Buildings

Present: Ms Michaela Boyle (Chairperson)
Mr John Dallat (Deputy Chairperson)
Mr Trevor Clarke
Mr Alex Easton
Mr Paul Girvan
Mr Chris Hazzard
Mr Daithí McKay
Mr Adrian McQuillan
Mr Seán Rogers

In Attendance: Miss Aoibhinn Treanor (Assembly Clerk)
Ms Lucia Wilson (Assembly Clerk)
Mr Trevor Allen (Assistant Assembly Clerk)
Mrs Danielle Saunders (Clerical Supervisor)
Mr Darren Weir (Clerical Officer)
Miss Clare Rice (Bursary Student)

Apologies: Mr Michael Copeland
Mr Ross Hussey

1:53pm The meeting opened in public session

1:54pm Mr Clarke joined the meeting

2:05pm Mr McKay left the meeting

2:05pm Mr Hazzard joined the meeting

2:06pm Mr Girvan left the meeting

5. Inquiry into the Agri-Food and Biosciences Institute (AFBI) – Evidence Session

The Committee took oral evidence on the above inquiry from:

- Mr Noel Lavery, Accounting Officer, Department of Agriculture & Rural Development
- Mr Gerry Lavery, Senior Finance Director, Department of Agriculture & Rural Development
- Mr Norman Fulton, Director of Policy & Economics, Department of Agriculture & Rural Development
- Dr Seamus Kennedy, Chief Executive Officer, AFBI

2:20pm Mr Hazzard left the meeting

2:37pm Mr McKay re-joined the meeting

2:43pm Mr Clarke left the meeting

2:46pm Mr Rogers left the meeting

2:49pm Mr Clarke and Mr Rogers re-joined the meeting

2:58pm Mr Hazzard re-joined the meeting

3:12pm Mr McQuillan left the meeting

3:32pm Mr Dallat left the meeting

3:38pm Mr Clarke left the meeting

3:44pm Mr Dallat re-joined the meeting

3:57pm Mr McKay left the meeting

4:03pm Ms Boyle left the meeting; Mr Dallat took the Chair

4:04pm Mr Clarke re-joined the meeting

4:08pm Ms Boyle re-joined the meeting and resumed the Chair

4:09pm Mr McKay re-joined the meeting

4:43pm Mr Hazzard left the meeting

4:46pm Mr McKay left the meeting

4:51pm Mr Hazzard re-joined the meeting

4:52pm Mr McKay re-joined the meeting

The witnesses answered a number of questions put by the Committee and agreed to provide additional information in writing.

[EXTRACT]

Wednesday, 11 December 2013
Room 29, Parliament Buildings

Present: Ms Michaela Boyle (Chairperson)
Mr John Dallat (Deputy Chairperson)
Mr Trevor Clarke
Mr Michael Copeland
Mr Alex Easton
Mr Paul Girvan
Mr Chris Hazzard
Mr Ross Hussey
Mr Daithí McKay
Mr Seán Rogers

In Attendance: Miss Aoibhinn Treanor (Assembly Clerk)
Ms Lucia Wilson (Assembly Clerk)
Mr Trevor Allen (Assistant Assembly Clerk)
Mrs Danielle Saunders (Clerical Supervisor)
Mr Darren Weir (Clerical Officer)
Miss Clare Rice (Bursary Student)

Apologies: Mr Adrian McQuillan

1.46pm The meeting opened in public session

1.50pm Mr Hazzard left the meeting

1.51pm The meeting moved to closed session

2.00pm Mr McKay joined the meeting

2.01pm Mr McKay left the meeting

2.05pm Mr Hazzard re-joined the meeting

2.06pm Mr McKay re-joined the meeting

2.09pm Mr Girvan joined the meeting

2.21pm Mr Girvan left the meeting

2.23pm Mr Girvan re-joined the meeting

2.29pm Mr McKay left the meeting

2.39pm Mr Copeland left the meeting

2.41pm Mr Clarke joined the meeting

2.44pm Mr Copeland re-joined the meeting

2.47pm Mr Clarke and Mr Hazzard left the meeting

2.49pm Mr Clarke and Mr Hazzard re-joined the meeting

3.02pm Mr Copeland left the meeting

3.29pm Mr Hazzard left the meeting

3.30pm Mr Hazzard re-joined the meeting

3.32pm Mr Girvan left the meeting

3.33pm Mr Girvan re-joined the meeting

3.54pm Mr Girvan left the meeting

3.55pm Mr Clarke left the meeting

3.57pm Mr Hussey left the meeting

4.02pm Mr McKay re-joined the meeting

4.04pm Mr Easton left the meeting

4.20pm Mr McKay left the meeting

4.21pm Mr Girvan re-joined the meeting

4.25pm Mr Clarke re-joined the meeting

6. Inquiry into the Agri-Food and Biosciences Institute (AFBI): Consideration of Issues Paper

The Committee received briefing from the C&AG, Alan Orme, Paul Turley and Richard Emerson on the inquiry's issues paper.

Agreed: The Committee noted the issues paper and agreed that the report on the inquiry be drafted on this basis.

4.33pm The meeting moved to public session

[EXTRACT]

Wednesday, 5 February 2014
Room 29, Parliament Buildings

Present: Ms Michaela Boyle (Chairperson)
Mr Trevor Clarke
Mr Alex Easton
Mr Paul Girvan
Mr Ross Hussey
Mr Daithí McKay
Mr Adrian McQuillan
Mr Seán Rogers

In Attendance: Ms Lucia Wilson (Assembly Clerk)
Mr Trevor Allen (Assistant Assembly Clerk)
Mrs Danielle Saunders (Clerical Supervisor)
Mr Darren Weir (Clerical Officer)
Miss Clare Rice (Bursary Student)

Apologies: Mr John Dallat (Deputy Chairperson)
Mr Michael Copeland
Mr Chris Hazzard

2.07pm The meeting opened in public session

2.09pm Mr Girvan joined the meeting

2.12pm Mr Clarke joined the meeting

2.18pm The meeting moved to closed session

5. Inquiry into the Agri-Foods and Biosciences Institute (AFBI) – Northern Ireland Assembly Research paper

The Committee received a briefing from Assembly Research and Information Services (RaISe) on intellectual property rights.

2.23pm Mr Easton left the meeting

2.29pm Mr Easton re-joined the meeting

6. Inquiry into the Agri-Foods and Biosciences Institute (AFBI) – Correspondence

The Committee noted requested correspondence from Mr Noel Lavery, Accounting Officer, Department of Agriculture and Rural Development, and also noted that additional information will be provided for consideration by the Committee at its meeting on 19 February 2014.

7. Inquiry into the Agri-Foods and Biosciences Institute (AFBI) – Consideration of Draft Report

The Committee considered the draft report on the inquiry into the Agri-Foods and Biosciences Institute (AFBI)

Introduction

Paragraphs 1 to 7 read and agreed

AFBI Financial Management

Paragraphs 8 and 9 read and agreed

Paragraphs 10 and 11 read, amended and agreed

2.37pm Mr Clarke left the meeting

2.50pm Mr Hussey left the meeting

3.02pm Mr McQuillan left the meeting; the meeting became inquorate

3.04pm The meeting suspended

3.15pm The meeting resumed in closed session with the following Members present:

Ms Michaela Boyle (Chairperson)
Mr Alex Easton
Mr Paul Girvan
Mr Daithí McKay
Mr Seán Rogers

Paragraphs 12 to 16 read, amended and agreed

Recommendation 1 read and agreed

Recommendation 2 read, amended and agreed

Efficiency and Effectiveness of Scientific Testing

Paragraphs 17 and 18 read, amended and agreed

Recommendation 3 read, amended and agreed

Paragraph 19 consideration deferred to the meeting of 19 February 2014

Management of the DARD funded R&D Programme

Paragraph 20 read, amended and agreed

Paragraphs 21 and 22 read and agreed

Paragraphs 23 to 25 read, amended and agreed

Recommendation 4 read, amended and agreed

Paragraph 26 read and agreed

Paragraphs 27 and 28 read, amended and agreed

Paragraph 29 read and agreed

Corporate governance within AFBI and oversight of the Institute by DARD

Paragraphs 30 to 32 read and agreed

Paragraph 33 read and agreed

Recommendation 5 read and agreed

Paragraph 34 read and agreed

Recommendation 6 read and agreed

Consideration of the Executive Summary

Executive Summary read agreed, subject to amendment to reflect agreed changes to the main report.

Consideration of Summary of Recommendations

Summary of recommendations read, amended and agreed.

Agreed: The Committee agreed to defer final consideration of the report to the meeting of 19 February 2014.

[EXTRACT]

Wednesday, 26 February 2014
Room 29, Parliament Buildings

Present: Mr John Dallat (Deputy Chairperson)
Mr Trevor Clarke
Mr Michael Copeland
Mr Alex Easton
Mr Paul Girvan
Mr Chris Hazzard
Mr Ross Hussey
Mr Daithí McKay
Mr Adrian McQuillan
Mr Seán Rogers

In Attendance: Ms Lucia Wilson (Assembly Clerk)
Mr Trevor Allen (Assistant Assembly Clerk)
Mr Darren Weir (Clerical Officer)
Miss Clare Rice (Bursary Student)

Apologies: Ms Michaela Boyle (Chairperson)

2.03pm The meeting opened in public session

2.04pm Mr Girvan and Mr Clarke joined the meeting

2.05pm The meeting moved to closed session

5. Inquiry into Agri-Food and Biosciences Institute (AFBI) – Correspondence

2.40pm Mr Copeland left the meeting

2.51pm Mr Copeland re-joined the meeting

2.52pm Mr Easton left the meeting

2.56pm Mr Easton re-joined the meeting

The Committee noted additional correspondence from Mr Noel Lavery, Accounting Officer, Department of Agriculture and Rural Development.

6. Inquiry into Agri-Food and Biosciences Institute (AFBI) – Consideration of Draft Report

The Committee continued its consideration of its report on Agri-Food and Biosciences Institute AFBI).

Paragraph 19 read and agreed.

Paragraph 20 read, amended and agreed.

Executive Summary

Paragraph 10 read, amended and agreed.

Agreed: The Committee agreed the correspondence to be included within the report

Agreed: The Committee ordered the report to be printed.

[EXTRACT]

Appendix 2

Minutes of Evidence

27 November 2013

Members present for all or part of the proceedings:

Ms Michaela Boyle (Chairperson)
Mr John Dallat (Deputy Chairperson)
Mr Trevor Clarke
Mr Alex Easton
Mr Paul Girvan
Mr Chris Hazzard
Mr Daithí McKay
Mr Adrian McQuillan
Mr Sean Rogers

Witnesses:

Professor Seamus Kennedy	*Agri-Food and Biosciences Institute*
Mr Kieran Donnelly	*Comptroller and Auditor General*
Mr Norman Fulton Mr Noel Lavery Mr Gerry Lavery	*Department of Agriculture and Rural Development*
Ms Fiona Hamill	*Treasury Officer of Accounts*

1. **The Chairperson**: I welcome Mr Noel Lavery, Mr Gerry Lavery, Professor Seamus Kennedy and Mr Norman Fulton. Mr Lavery, I assume that you are unrelated.

2. **Mr Noel Lavery (Department of Agriculture and Rural Development)**: Yes, unrelated.

3. **The Chairperson**: You are taking the lead, Noel. Do you want to formally introduce your team?

4. **Mr N Lavery**: Yes, thank you, Chair. Gerry Lavery is the senior finance director in the Department; Seamus Kennedy is the chief executive of the Agri-Food and Biosciences Institute (AFBI) and is responsible for AFBI's functions such as research, supporting innovation and response to emergencies and disease control; and Norman Fulton is head of policy and economics in the Department, the Department's head economist and head of the AFBI sponsor arrangements.

5. **The Chairperson**: Thank you. You are all very welcome to our meeting. Do you want to say anything now, Mr Lavery? Are you OK?

6. **Mr N Lavery**: I have a few opening remarks, if you are happy with that, or I am happy to go along with whatever you wish, Chair.

7. **The Chairperson**: I have a question, and then I will let you in again. The report made odd reading in the sense that the Department and AFBI put up very feeble arguments to the Audit Office's findings. The Committee Clerk will refer to the relevant paragraphs in the report.

8. **The Committee Clerk**: In paragraph 2.12, AFBI responded to the issue of potential lost income by stating that that represented 1·5% of total grant provided by the Department of Agriculture and Rural Development (DARD). On the issue of cost overruns for individual R&D projects, AFBI's response in paragraph 4.14 was that it had always lived within its overall budget. In paragraph 4.25, DARD pointed out that the longevity of the 57-year potato breeding programme was not unique in the context of the public sector.

9. **The Chairperson**: Thank you, Aoibhinn. Mr Lavery, how can you assure the Committee that you take the matter very seriously?

10. **Mr N Lavery**: I can give the Committee an absolute assurance that I take the governance and value-for-money responsibilities extremely seriously.

11. Chair, I would like to make a couple of points. The lost income point was referred to. The reference to the 1·5% was to put it into context. I absolutely recognise the point that lost income is not a good thing for the public sector. No doubt we will come on to that. It is

absolutely regrettable that it happened; it should not have happened. We can come to the reasons for that, but it was to put it into context.

12. On the cost overruns, we were merely making the point that AFBI had lived within its overall budget. I commend Professor Kennedy for his out-turn last year, which was 99·7%.

13. What was the last point?

14. **The Committee Clerk**: It was about the longevity of the 57-year potato breeding project, as mentioned in paragraph 4.25.

15. **Mr N Lavery**: No doubt we will come to that during the proceedings.

16. I have a couple of points that relate to your question about giving you an assurance on governance. AFBI is an absolutely vital organisation. Its scientific work informs DARD's policies and supports innovation in the agrifood sector. It is absolutely key to our eradication of brucellosis and has a vital emergency response capability. It is also vital on the early recognition of threats and local access of scientific facilities. Going back to your point, the Audit Office concluded, in paragraph 24 of the report:

"the development of a strong and comprehensive corporate governance framework for AFBI has been a prolonged process".

17. I absolutely accept that; it has been too prolonged. The report highlights the specific concerns, and we will deal with those.

18. In paragraph 5.26, the Audit Office concludes:

"it has taken a considerable time to develop and embed a strong and comprehensive performance management and corporate governance regime".

19. I absolutely accept that; it did take a considerable time. I absolutely take it seriously, Chair. The Audit Office highlighted a few points about the use of a historical overhead rate, the cost not being part of AFBI's systematic review for R&D and the time taken to implement the fully functioning costing system. I absolutely accept those points, and the Department and AFBI hold up their hands on those.

20. It has been two years since the fieldwork was done. The Audit Office recognises that throughout the report and, in paragraph 5.11, acknowledges the further recent improvements in governance. Paragraph 5.12 states that we have provided more precise costings, and paragraph 5.20 mentions the procedures for commissioning and managing R&D. I welcome that.

21. To give you an assurance that you were looking for at the start, I can say that, since the Audit Office's work finished, AFBI has strengthened its finance team and has implemented a financial improvement plan, which has been monitored closely by the Department; DARD has carried out a risk assessment on governance; we are moving to an enhanced regime of appraisal on scientific testing; there is enhanced DARD oversight; and I have placed a requirement on Professor Kennedy to provide me with a quarterly assurance on the management of R&D expenditure. Furthermore, there is quarterly reporting on our evidence and innovation R&D projects. I hope that that gives the Committee an assurance that we take these matters absolutely seriously and that we will be continually on top of them.

22. **The Chairperson**: Thank you, Mr Lavery. You have clearly seen the shortcomings from the 1995 report until now. We are facing, in this report, some of the shortcomings that were identified in the 1995 report. You mentioned a number of changes that have taken place. I thank you for the contribution that you have made thus far in acknowledging and identifying that there was work that needed to be done. You mentioned that AFBI had strengthened its finance team. What did you actually do?

23. **Mr N Lavery**: An additional resource has been brought into the finance team. Professor Kennedy, do you want to refer to that?

24. **Professor Seamus Kennedy (Agri-Food and Biosciences Institute)**: That is correct. There have been a number of developments. In 2010, for example, we reviewed our overall business planning process and initiated plans to develop what we refer to as the strategic cost model. That model in particular is designed to break down the corporate overheads, which relates to one of the legitimate criticisms in the report. It stated that we were applying a single corporate overhead rate to all our business. The development of that model is well under way. We have applied it to last year's annual work programme from DARD as a trial exercise, and we are in the process of applying it to the work programme for next year. We revised the overhead rate in 2010 from 59% to 110%. As Mr Lavery said, we should have done that earlier, and we accept that. As indicated in the report, the overall magnitude of that increase is a 15% increase.

25. In 2010, we left Account NI because, having tried it for a period, we found that it was not suitable for the mixture of business that we carry out in AFBI: the mix of work that we carry out for government plus the commercial side. The commercial work in AFBI now accounts for approximately one third of our total income. We developed our own in-house accounting system, which took some time. We now have it well up and running and are using it as the basis for the next development, which is the strategic cost model.

26. In 2011, I expanded the finance function in AFBI. I recruited two additional deputy principal accountants and appointed an interim head of finance at grade 6 level. That, coupled with the introduction of a finance improvement plan, which we have been working on since then, has resulted in major improvements. The additional accountancy resource that we introduced has been used to adopt a business partner approach so that our finance branch interacts much more closely with the scientific divisions that are carrying out the scientific work. Those accountants now meet all our branch heads and the head of division on a monthly basis. At those meetings, every line of income and expenditure is reviewed so that we have very accurate monitoring of our income and expenditure.

27. In 2011, I also commissioned a strategic review of the organisation and, because of the importance of AFBI to the local economy, we received support from the Strategic Investment Board (SIB) for that work. That resulted in some changes to the organisational structure: an amalgamation of two of the existing science branches to one in order to help improve efficiency. We are in the process of delegating staff budgets to individual divisions and branches to ensure that there is more ownership of those budgets. We also introduced training for senior finance managers. That is a selection of some of the improvements that have taken place.

28. **The Chairperson**: I suppose that it is safe enough to say that, when AFBI was established, the financial mechanisms that should have been in place were not as robust as they should have been. Is it safe to say that?

29. **Professor S Kennedy**: Yes, I think that we accept that point. Since the formation of AFBI, we have spent a lot of effort on developing financial systems. We were originally using a system from DARD before AFBI became a non-departmental public body (NDPB). We continued to use the DARD system for a number of years, and that was in anticipation of Account NI coming on stream, which it did. We then tried Account NI, but it was not suitable for the particular business of AFBI, and then we developed our own in-house system.

30. **Mr N Lavery**: Chair, I will just come in on that point. Coming in and looking at this afresh, it seems to me that AFBI inherited a financial accounting system that the Department was using, and some of the criticisms in the report, which are fair criticisms, are around costing and the identification of costs for individual projects, which is fair. What AFBI did not have was a proper

costing module. It has taken time to get that in place; that is now in place. It was a financial system geared up with individual cost centres that was designed more for a Department than an organisation such as AFBI.

31. **Mr Clarke**: That is a good point at which to come in. I listened to what Professor Kennedy said about the management of the organisation. How much has the Department of Agriculture and Rural Development been spending annually on AFBI since it started in 2006?

32. **Mr N Lavery**: The current budget is about £58 million.

33. **Mr Clarke**: You are on record as saying that the costing models were not right, but you have continued to annually fund it without any proper scrutiny or making sure that those models are correct.

34. **Mr N Lavery**: I have a couple of points to address that. AFBI has lived within its overall budget. Its accounts have never been qualified. It has received internal audit satisfactory assurance every year. The point that I was trying to make was about the costing system and the costing of individual projects. That is what needed to be developed. And —

35. **Mr Clarke**: Can I just stop you there? It has been living within its budget of £58 million, but Professor Kennedy admitted today that the systems have not been in place. What worries me, as a taxpayer, is that that arm's-length body gets substantial public money from the Department yet it is not satisfied that there are accountable mechanisms in place for how it manages the funds. Professor Kennedy said that it was reviewed in 2010, which was four years after the start. Was it AFBI's role to review that? Given that DARD was a large subscriber, would it not have been its role to make sure that the financial management was in place for an organisation that it is pumping millions of pounds into annually?

36. **Mr N Lavery**: Again, there are a couple of points. I want to go back to clarify: the £58 million that I referred to includes the commercial income, which is about £18 million. Our cost to DARD is currently about £40 million.

37. **Mr Clarke**: About £40 million or £50 million? OK.

38. **Mr N Lavery**: The point that I am trying —

39. **Mr Clarke**: What is £18 million between friends?

40. **Mr N Lavery**: It is the royalty and the commercial income that the organisation has earned. AFBI is primarily responsible for its financial systems, and the Department looks for an assurance on that. AFBI's systems were financial systems. As I said, its accounts were not qualified. The tenor of your question is absolutely right: the Department had a role. The Department set and agreed targets with AFBI to put those systems in place. Should the costing systems have been in place earlier? Yes, they should.

41. **Mr Clarke**: So, are you, as the permanent secretary of DARD, going to accept responsibility? I appreciate that you are relatively new to the post, so I am not going to shoot the messenger. Are you satisfied with what your predecessors were doing? You said that the proper costing model was not in place. Are you satisfied that the previous permanent secretaries got it right?

42. **Mr N Lavery**: It has been an evolving process. I will bring Gerry in to talk about the systems.

43. **Mr Clarke**: Gerry has been acting permanent secretary and head of finance, so I am interested to hear what he has to say about that.

44. **Mr N Lavery**: I have just a couple of points. As I said, there were financial accounting systems in place. The organisation has had satisfactory assurance from its internal audit. Its accounts have not been qualified. It has lived within its budget.

45. As the report rightly highlights, the costing systems take time to develop, and the overhead rate should have been used. The Audit Office identified that as lost income. That would be the primary

governance concern. The organisation has increased its royalty income year on year, so it is reducing the grant-in-aid that DARD has had to fund it. That is a positive thing, and we should recognise that.

46. You asked me about the finance systems. The AFBI board put together a subcommittee in 2011 to address its finance systems, and the Department increased its monitoring of AFBI. I give you an assurance that it will continue to do so.

47. **Mr Clarke**: Professor Kennedy, or maybe it was you, referred to paragraph 5.26, which is the last part of the report. You picked one aspect of what was said, but let us look at the words of the last bullet point in the context of you saying that it lived within budget. It states:

"strong and timely oversight is required to address the financial and operational risks associated with a new body, and ensure that measures are put in place to remedy inadequate performance."

48. So, yes, it may have lived within its budget, but the very last paragraph of the report sums it for me. There are obviously huge risks in an organisation that DARD is pumping millions into, and the last words are, "inadequate performance". That is the end of the report.

49. **Mr N Lavery**: It states:

"There are important lessons to be learnt".

50. **Mr Clarke**: I would assume that, if you are learning lessons, it is an indication that something has been going wrong.

51. **Mr N Lavery**: Absolutely. I was just making the point that we have now embedded a strong and comprehensive performance management and corporate governance regime in AFBI. The report is right: there are lessons to be learnt. This is a very large NDPB, and, in establishing that large NDPB, the Department concentrated on the financial side. As you said, I had a fresh look at this. The Department established it, put a board and an internal audit together, and ensured that it had finance systems and an internal audit function. The costing systems and a review of the overhead rate to pick up all the costs of individual R&D projects were not in place.

52. **Mr Clarke**: So, it took you eight years.

53. **Mr N Lavery**: The acceleration of the development of those has been from 2009-2010. I think that is correct.

54. Can I bring Gerry in?

55. **Mr Clarke**: Yes.

56. **Mr Gerry Lavery (Department of Agriculture and Rural Development)**: The case is well put. On the one hand, in setting up a very large NDPB, you had a real risk that the organisation would not be able to account for its expenditure, and that was dealt with by transferring to that new NDPB the accounting system that it had formerly operated in the Department. So, that risk, which was the largest risk, was mitigated. There was a risk then around knowing the full cost of each project that is funded other than by DARD grant-in-aid. That risk was recognised and put in the business plan as something that AFBI wanted to tackle. It took a number of years to do that, partly for the reasons set out by Professor Kennedy. At the time, it went through a series of iterations and a series of changes in the accounting system and then dealt with that risk.

57. **Mr Clarke**: In your own words, "It took a number of years". We are talking about DARD funding to the tune of — Mr Lavery corrected me on this — £40 million, and, as you admitted, Gerry, it took a number of years to mitigate that risk. In your opening comments, you said — it is like any organisation — that there will be risks with any new organisation. Unfortunately, this report does not focus on, nor should it, the good work that AFBI does, but we are looking at the financial management of a new organisation. On one hand, we have a very good organisation that a lot in the agriculture sector look upon as doing good work, but the good work has been overshadowed by what is in this report about the financial management. I put a lot of the responsibility back on DARD

because this is a new organisation that is probably more interested in the scientific nature of what it wants to do, but I would have thought, Mr Lavery, given the two positions that you held, that you should have had more concern about the management of the finances of the organisation, and it should not have taken eight years to get to the situation of trying to turn that round.

58. **Mr G Lavery**: I suppose that I accept that it should not have taken eight years. The progress that we have made has been too long in coming, but, arguably, it is not too late to have an impact now. The mitigation or, if you like, the explanation for why it took so long was, as I said, in part because the accounting systems were changing. However, it was also in part because of something else. If you go back to when we created AFBI, the issues that surrounded it at the time were in the nature of separating out agriculture education. That was one of the key thrusts of the O'Hare report. Doing that meant splitting up the assets that were being used by the science service to separate out those that belonged to Queen's University and those that could be transferred to AFBI. We had the same issue when we abolished the Agricultural Research Institute of Northern Ireland (ARINI), a former non-departmental public body (NDPB) and brought its assets in. We had issues around staffing, setting up the new financial and human resources processes and all the associated policies. There was a raft of work that had to be done to get the organisation up and running. That is why, frankly, we took our eye off this particular ball for a time and lost the opportunity to make further progress on costing when it should have been made.

59. **Mr Clarke**: Mr Lavery, I suppose that the only parallel I could draw is that you remind me of the old banking sector. However, you are not very much like the new banking sector, because there is an awful lot more caution. It is a wee bit like the Royal Bank of Scotland (RBS) story in which public money had to be used to bail out its mistakes. Public money is still bailing out DARD and its mistakes in allowing AFBI and its financial controls to run out of its way.

60. Noel, with reference to part 2 of the report, how has AFBI gone about identifying the full cost of its operations since it was set up in 2006?

61. **Mr N Lavery**: Sorry, could you point me to a particular paragraph?

62. **Mr Clarke**: Part 2 of the report deals with the financial management of AFBI. I am sure that you briefed yourself on the report before you came here today. How have you identified the full cost of the operation since 2006?

63. **Mr N Lavery**: The full costs of the operation would have been reported to the Department through its financial reporting system on a monthly basis and scrutinised by the Department on a monthly basis. As I said before, those would be on the financial accounts system that AFBI inherited from the Department. The full costs would then have been reported to the Department through AFBI's annual accounts. The accounting officer in the Department would have received an assurance at the end of the year on the management of that money from AFBI's accounting officer.

64. **Mr Clarke**: I draw you to the report again. When the Audit Office was compiling its report, it found that AFBI was unable to allocate 55% of its spend, or £143 million, across its operational activities between 2006 and 2011. How did that come about if you had monthly monitoring?

65. **Mr N Lavery**: That goes back to the point about the costing system. This is about the allocation of overheads, and the point is that this was a general cost that was not allocated across AFBI's activities. Those costs are now being identified through AFBI's strategic cost model. I think that —

66. **Mr Clarke**: With the work that DARD did with ABFI on its annual accounts, how did it not identify that 55% of the funding was lost or unaccounted for?

67. **Mr N Lavery**: To clarify, it was not lost or unaccounted for—

68. **Mr Clarke**: It was not allocated.

69. **Mr N Lavery**: It was not allocated to specific R&D projects. Those financial costs were picked up in a financial accounting system.

70. **Mr Clarke**: So where were they?

71. **Mr N Lavery**: They were treated as overheads in the same way as they would have been in a Department or a non-commercial organisation.

72. **The Chairperson**: Mr McQuillan, did you want to come in earlier?

73. **Mr McQuillan**: I wanted to come in on a point that Mr Kennedy raised. Mr Kennedy, you said that Account NI was not suitable for your organisation. Will you explain why?

74. **Professor S Kennedy**: It was largely because of the mix of business that AFBI carries out. Unlike a Civil Service Department, which is mainly involved in expenditure, AFBI has quite a bit of income from several hundred different contracts. As was said earlier, we did not have a suitable job-costing system that could conveniently allow us to price a job or contract. That was one reason. AFBI —

75. **Mr McQuillan**: I will stop you there. Was it not the fault of AFBI that it had not put that in place? Was that not your fault?

76. **Professor S Kennedy**: We went through several iterations of attempting to put an accounting system in place that would provide those points. In the early years of AFBI, the expectation was that Account NI, because it was being implemented in the Civil Service, would also provide AFBI's needs. It was only when we tested it that we found that it did not. Not only did it not have a job-costing module, which AFBI needed —

77. **Mr McQuillan**: From what you are saying, it seems that those in AFBI did not bother to do anything until they saw that Account NI was not going to do what they required. They only decided to put something in place after that.

78. **Professor S Kennedy**: After Account NI did not work for us we put an in-house solution —

79. **Mr McQuillan**: Before you found that Account NI did not work, I believe that you more or less sat on your hands and did not bother to do anything.

80. **Professor S Kennedy**: No. Quite a lot of work was being done in the background. As well as the job-costing module that Account NI did not have, there were special issues that applied to AFBI such as irrecoverable VAT. We have a partial VAT exemption because of the mixture of our business. We pay VAT when we make purchases or carry out work that is funded by grant-in-aid, but we cannot reclaim that VAT from HMRC. There is a particular mixture, and it took about two years to agree the appropriate treatment of VAT with HMRC as it was also new to it. Account NI does not have a module that can deal with that, whereas our in-house system does.

81. There were other issues such as the timeliness of sales invoicing and the ability to manage our cash flow. Those were areas that Account NI did not perform for AFBI because of our particular type of business.

82. **Mr Dallat**: Chairperson, I only want to make a couple of comments at this time. I understand that I will come in later.

83. **The Chairperson**: Yes, you will.

84. **Mr Dallat**: Noel, I have listened very carefully to you and I am greatly heartened by your commitment to do things totally differently in the future. How long do you think this bad management of resources and money has been going on for?

85. **Mr N Lavery**: Well —

86. **Mr Dallat**: I will tell you how long it has been going on: 20 years. How long would you have lasted in the private sector?

87. **Mr Lavery**: I am sorry. I am not with you on the point about 20 years.

88. **Mr Dallat**: I have done a little bit of research. You have been to Westminster and you have been before the Public Accounts Committee here. There are records in the Library that indicate that there have been serious concerns about this type of work for 20 years. That is fact. This is 2013 and you have given us an assurance that everything is going to be rosy in the garden. It has been Christmas every day with you for 20 years.

89. **Mr N Lavery**: I want to make a couple of points on that. You are obviously referring to the recommendations of the Westminster Public Accounts Committee in 1995. Having looked at this issue, it seems that internal audit looked at the implementation of those recommendations in 1997 and gave the Department an assurance on that. One of the major recommendations of the 1995 Westminster Public Accounts Committee report was the customer/ contractor split. The creation of AFBI was the big change in that customer/ contractor split. What the Department and AFBI underestimated was the changes that that would bring, with the need to look at the overhead rate and have a proper costing system. I have been through the main recommendations of the 1995 report and can go through them all if you wish.

90. **Mr Dallat**: Please do not.

91. **Mr N Lavery**: Sorry?

92. **Mr Dallat**: No, please do not. Just read them and implement them.

93. **Mr N Lavery**: OK, absolutely. You have my assurance on that. Most of them have been implemented or fully implemented, and I will ensure that they are.

94. **Mr Dallat**: Can I just ask one other little question? Professor Kennedy, did the scientists who worked in your department have a job sheet, or did they just do whatever they liked and whatever they wanted?

95. **Professor S Kennedy**: No, they did not do just whatever they wanted; they have a series of objectives.

96. **Mr Dallat**: Who decided?

97. **Professor S Kennedy**: It is line management, essentially.

98. **Mr Dallat**: Were they responding to the demands of the industry, or were the professors just doing what they wanted?

99. **Professor S Kennedy**: No. AFBI has a range of work. A large proportion of our work is the statutory TB, brucellosis and BSE testing that we carry out for the Department, which is maintained all the time. There is other statutory work such as veterinary drug residues and pesticides residue testing in food, all of which are statutory functions. There is also the animal disease post-mortem service, which is an examination of samples from farmers and private vets, etc. Staff do not decide what to do. They test the submissions from the Department or from private industry, as the case may be, and then develop tests to analyse that equipment.

100. **Mr Dallat**: In terms of those costings, how many people in the private sector do you think you have put out of business using public money by charging too low a rate?

101. **Mr N Lavery**: There are a couple of points with regard to, as you say, charging too low a rate. With the revision of the overhead rate it was about 15%. The Audit Office estimates that it may be up to £3·5 million, which I think is the wording in the report. I want to point out that one third of that external income is public sector. I do not know the answer to your question. All I can say is that we should have used the appropriate overhead rate. We are using it now.

102. Can I bring Norman Fulton in?

103. **Mr Norman Fulton (Department of Agriculture and Rural Development)**: You talked about the work programme. For the work that AFBI does for DARD with regard to the grant-in-aid, we set out a comprehensive annual work

programme in which we specify what we require for the statutory diagnostic analytical work and what we require from AFBI with regard to emergency response and the R&D programme. That is all carefully specified and reviewed annually, and there is regular reporting against the progress of the work programme. AFBI has other customers apart from DARD, and they will specify their requirements. AFBI has a charging policy that is in keeping with the management of public money in Northern Ireland. When operating in competitive markets, AFBI is required to set a rate that generates a return to the business for the use of assets that it deploys.

104. **Mr Dallat**: Norman, that is all very convincing, but how did you get into this mess if you did all that correctly?

105. **Mr Fulton**: This has been an evolving and improving process. AFBI was not launched as an entirely new organisation in an entirely new work programme; it was a carry-forward of the existing programmes from the Department and from the amalgamation of ARINI. Those are well-established, long-standing programmes and, over time, we have documented the various work streams. We now have a very tight process for specifying what AFBI is required to deliver to us every year.

106. **Mr Dallat**: At this stage, Chairman, I think that the incubation period for this particular institute was rather long.

107. **The Chairperson**: Thank you, Deputy Chairperson.

108. Members and Mr Lavery, we will now go into the detail of the main areas of the report. Some members have asked supplementaries to other questions. However, we have the main area and the core areas of our report. We will go into the first area.

109. **Mr McQuillan**: My question is about financial management, which is part 2 of the report. Between 2006 and 2007, AFBI spent £96 million on corporate costs. How was that managed?

110. **Mr N Lavery**: I will bring in Professor Kennedy and Gerry. It is the responsibility of AFBI to manage its own costs. Again, the accounting officer would give me, as an accounting officer, an assurance on that. They are managed through the financial reporting system to senior management in AFBI. We would get reporting from AFBI into the Department, and we would report to the departmental board.

111. **Mr McQuillan**: At no stage did the Department think that it was a high cost per head? Did alarm bells never go off?

112. **Mr N Lavery**: The Audit Office report highlights that the costs of AFBI are very high, particularly for its estate. That is something that we are addressing. The report analyses the corporate costs; some relate to AFBI and some to the estate.

113. **Mr McQuillan**: I could see AFBI not catching on, but I would have thought that the Department would have caught on because it should have been benchmarking AFBI against some other organisation of similar size to see what its corporate cost was.

114. **Mr N Lavery**: I have a couple of points. First, when AFBI was set up, its costs were staff and overheads, including its estate. That was what was established; those were the original costs. AFBI has been set efficiency targets, which it has delivered and continues to deliver. It has absorbed inflationary increases, and all its procurement is subject to public procurement. Are we seeking to reduce the costs of AFBI? Absolutely. We will be setting efficiency targets on AFBI.

115. As I said, a large element of the overheads relates to estate. That is a big issue for us. I will bring in Gerry on that.

116. **Mr G Lavery**: I have two points. First, the corporate costs include the estate and staff. Staff is a big element, and they are on the same terms and conditions as civil servants. We have control over the number of staff and over how they are paid and remunerated. That gives us an assurance that they are not, by

any means, being over-remunerated. The estate is —

117. **Mr McQuillan**: How do the royalties tie into that?

118. **Mr G Lavery**: The royalties come in as an income stream and basically offset funding that, otherwise, the taxpayer would have to give.

119. **Mr McQuillan**: Do individuals not get royalties as well?

120. **Mr G Lavery**: There is a standard intellectual property scheme in line with the arrangements in a number of public sector bodies. It is on a sliding scale, depending on how the intellectual property is exploited. For example, at the top level, the vast bulk of the income goes to the organisation. For a very small piece of intellectual property, the vast bulk goes to the individual. It is a standard scheme that is approved by the Department and the Department of Finance and Personnel (DFP).

121. **Mr McQuillan**: On the management of your estate, I understand that the property asset strategy in 2010 said that the Newforge site was insufficient and the Stormont site required a major refurbishment. What is the state of play today? Where are we at with that?

122. **Mr G Lavery**: We are working on having an estate strategy for AFBI within the estate framework for the Department as a whole. When AFBI was set up, it occupied the buildings and the property that was being used by the science service prior to its establishment.

123. Some of that property was there for a different purpose. I have mentioned that education was being hived off. The Newforge site contains lecture halls, and its atrium was built to accommodate a large number of students. That is clearly redundant. However, it would cost a significant capital amount to relocate from Newforge to another site. We need an invest-to-save initiative in that regard. Moreover, the AFBI estate has had a number of investments over the years, some of which have been significant, but some buildings are obsolescent. For example, the VSD main building at Stoney Road is reaching the end of its life and is not a good platform for the advanced technology applications that AFBI is required to do. Again, however, it would cost a significant sum to replace. Each of those initiatives would require between £25 million and £30 million, and we would be very grateful for any support that the Committee wishes to give to our bid, which will be an invest-to-save bid that will reduce running costs and increase efficiency.

124. **Mr McQuillan**: A few years ago, there was a great emphasis on invest to save. Did AFBI apply for any of that money?

125. **Mr G Lavery**: We applied for several initiatives and received some funding. However, we did not apply for those two particular initiatives because we were not absolutely ready. As you can tell, they are significant projects. For example, we are completing the business case for the replacement of the VSD main building. That business case will be available later this year.

126. **Mr McQuillan**: Are you talking about later this financial year or this calendar year?

127. **Mr G Lavery**: Later this calendar year.

128. **Mr Fulton**: We are working on a draft of the business case; it is nearly final.

129. **Mr McQuillan**: Can you give me a breakdown of the other places where you have estates or premises such as Crossnacreevy, Bushmills, Hillsborough, Loughgall and Omagh? How many staff members are on each of those premises and what are they used for?

130. **Mr N Lavery**: Professor Kennedy has those numbers.

131. **Professor S Kennedy**: The Omagh veterinary laboratory provides a service to vets and farmers in the area and receives various animal carcasses for post-mortem examination. There are about 17 or 18 staff at that site. At Hillsborough, we have — these are approximate numbers off the top of my head — approximately 100 staff. We

have approximately 270 at the veterinary sciences division at Stoney Road. We have a very small number of staff at Bushmills, where they do work for the Department of Culture, Arts and Leisure (DCAL) on the population of salmon. That is DCAL, not DARD, property. The other estate is leased by AFBI from the Department. Crossnacreevy is essentially a plant-testing station where they conduct trials mainly on grass and cereal varieties. Loughgall is essentially a plant-breeding station. There is research on mushrooms, apples and other soft fruit, and research on potatoes and grass breeding; there is also a beef facility there. It is an overflow from the Hillsborough site, which is mainly involved in sustainable agricultural research. There is a big emphasis on the environment at the minute, such as the production of greenhouse gases from livestock and soils and investigating ways of reducing greenhouse gas emissions. There is also a big slant on the environment and looking at the efficiency of nutrient utilisation and animal production, the effects on the environment and how to reduce those.

132. **Mr McQuillan**: Maybe you can give that to the Committee in writing for us to get a better look at it. It would be better for us all that way. Could you give us the sizes of those plants in the square footage of the building or the acreage of the whole site just to see the size compared to the amount of people working on it? That is what I want to try to get at.

133. Did the Department never think that there would be more value for money in buying this service in from a private company rather than going down this route? It costs £40 million for this service. Would it be cheaper to go to the market and see what we can buy out there rather than do it this way?

134. **Mr N Lavery**: That goes to the heart of whether AFBI is delivering value for money. To be clear, Ministers have decided to set up an arm's-length body, an NDPB. You asked whether we should outsource that capacity, and Mr Clarke referred earlier to AFBI's good work. This is absolutely vital to our research —

135. **Mr McQuillan**: I am not saying that it is not; I am just saying that there is a cost.

136. **Mr N Lavery**: Absolutely. If you bear with me, there are three sides to it: cost, benefits and risk. Page 53 gives a very small element of some of the excellent work that AFBI does. Let us not forget the emergency response capability that we have in AFBI; it is on our doorstep and we can call on it immediately. AFBI's work on dioxins, bluetongue and foot-and-mouth disease was vital; outsourcing it would be a major risk to our emergency response capability. The expertise in research capability, researchers, lab work and testings is all interlinked. I am sure that Seamus Kennedy could talk for a long time on that.

137. Going to your question about costs, in respect of our evidence and innovation strategy and the R&D projects that we commission from AFBI, everyone is now commissioned by the Department and has a proper appraisal. That gives us an assurance on value for money. There is a recommendation in the report about where feasible —

138. **Mr McQuillan**: You said that everybody now has an appraisal. When did that come into play?

139. **Mr N Lavery**: It came into play from our new evidence and innovation strategy in 2011. Those projects were appraised by AFBI. The Department now accepts submissions from AFBI. It does an economic appraisal, it commissions the work, and, every quarter, it monitors its own costs and those of AFBI. I can give the Committee an absolute assurance on that.

140. The Audit Office makes a recommendation on the benchmarking of unit costs, and that goes into the statutory and other testing. It talks about, where feasible, on high volume and high cost. I absolutely accept the recommendation that we should do that. Norman will be able to speak on this issue, but that will be part of our new appraisal system. Having the emergency

response capability costs money, but that then goes to the risk. The Department has to accept that there is a cost in having that, and that has been of significant benefit to the Department and to the Northern Ireland industry.

141. **Mr Fulton**: It is also important to recognise the interaction between the statutory work, the R&D work and the emergency response capability. They all mesh very closely together, and one feeds off the other. The R&D informs the statutory work. It also ensures the scientific expertise that is there to be called upon when we are required to respond to emergency, and AFBI has been on the front line of responding to emergencies on a number of occasions. It all meshes together very well. If we were to split little elements off to market-test them and to put them out to other providers, we would start to lose that integration, and the sum of the parts would not add up to what we have from AFBI.

142. **Mr McQuillan**: I take your assurances on board, and, hopefully, they will come to fruition and we will not have you before us again, and there will not be another report such as this one.

143. **Mr N Lavery**: We accept the Audit Office's recommendation on that point.

144. **Mr Clarke**: You touched on some of what I wanted to ask, but, according to paragraph 3.5, the performance in generating non-DARD income has been good. Much of that has been from royalties. I am trying to ascertain from Professor Kennedy whether AFBI research has generated any new royalty income.

145. **Professor S Kennedy**: We have had no new royalty income in recent years. To answer your first question, the total royalty income is about £6·5 million per year. Our total non-grant-in-aid income is about £18·8 million or thereabouts per year. So, the royalty income is about one third. The non-royalty income has grown from, I think, around £2 million in the year before AFBI was formed. It was around £6 million for the first year of AFBI, and it is now up at roughly £12 million.

146. **Mr Clarke**: I want to focus on the royalty as opposed to the non-royalty. Following on from what my colleague asked you about, the next question, Noel, is more for you. It is interesting when you read the report. Obviously, DARD assisted AFBI to get it off the ground. However, AFBI, the scientists or an individual in the science group had been working on a particular project, which public money assisted in getting off the ground. Was that project on the pig disease vaccine? Adrian was asking you about outsourcing work, but scientists were already working on projects before DARD pumped money into it. That says to me that, if DARD had not pumped that money in, vaccines such as that were going to be available anyway. Would it not have been cheaper to buy the vaccines off them, as opposed to sharing the royalties with them?

147. **Mr G Lavery**: Research was carried out in the 1990s on pig circovirus. The objective of that research was to assist the Northern Ireland pig industry. In the event, it identified a number of patent areas. The science service, as it then was, and Queen's University took out patents on those inventions. Those are the patents that a commercial company is now exploiting worldwide. That commercial company then remits a royalty every year. So, it was not that we or the scientists set out to create a commercial income stream.

148. **Mr Clarke**: Sorry, Gerry, let me stop you there. I do not know how you can say that, because you are not a scientist. They have to be congratulated on the field of work that they do, but I suggest that most people who come up with something innovative are trying to profit from it. So, if you are telling me today that that is not the case, I find that very difficult to accept. I will not accept that. The guys or ladies who are involved in that particular field of work are professional in what they do. They want to be world leaders or very innovative in what they do. However, they are going to do it as a cost, and you will not convince

me otherwise, nor would I put them down for that. However, I do not accept from you that that was not the purpose of someone coming up with a particular invention. You may say something else, but I do not accept that.

149. **Mr G Lavery**: As I said, our objective is to serve the needs of the local industry.

150. **Mr Clarke**: That is different.

151. **Mr G Lavery**: That is the research that we are sponsoring. It may be that some of that research has, as a consequence, something that leads to a patent and an income stream. We believe that a scheme has been put in place to allow for a fair division of that intellectual property.

152. **Mr Clarke**: Let us look at the division. In the research that AFBI is involved in and the royalties that that generates, what percentage share does AFBI get, what percentage share does DARD take and what percentage share goes to the scientist who came up with it?

153. **Mr G Lavery**: I would have to come back to you in writing on some of the detail of the actual figure work. I can say that any income that AFBI receives goes to offset costs that would otherwise have to be borne by DARD and, therefore, the taxpayer.

154. **Mr Clarke**: I would like to see the breakdown in the royalties showing how much is received on an annual basis, what it is for, the distribution of that royalty and who gets what.

155. **Mr N Lavery**: We will write to you about that.

156. **Mr Clarke**: This question is maybe more for you, Noel, given that you have been round a few houses. What is the normal practice with royalties in the public sector?

157. **Mr N Lavery**: In the houses that I have been round, Mr Clarke, that is not something that arose in the Office of the First Minister and deputy First Minister.

158. **Mr Clarke**: Is that the only place you were at?

159. **Mr N Lavery**: I was also in the Department of Enterprise, Trade and Investment (DETI) and the private sector before that. I apologise, because I cannot give you any more detail, but as Gerry said, there is a scheme for this that the Department and DFP have approved. Norman, can you add anything?

160. **Mr Fulton**: Yes. A Baker report in 1987 talked about trying to ensure that intellectual property and research findings could make their way into the economy so that benefit could be derived from research findings from public sector research organisations. So, there has been government policy on that to ensure that those benefits are captured. In AFBI, we now have a rewards scheme —

161. **Mr Clarke**: Sorry to cut you off there, Norman. I do not want you to take from me that I disagree that this should be an income generator. When something is an income generator, the issue is how that income is dispersed afterwards. The way that AFBI works reminds me of the very good health service that we have. We have some very good qualified doctors whom the public helped to qualify; public money helped to put them into their positions. However, they set up their own enterprises, and they then decide that, if you want a little operation, you will have to wait two years, but if you ring their private secretary, they will do that wee job for you privately and could fit you in next week. On top of that, they use public hospitals, public nurses and public beds. There is a conflict in how the public sector creates those wee empires within itself. So, if somebody wants to do something and wants to educate themselves without the assistance of public money, that is fair enough, but once public money comes into it, it is different. That is why I want to see the figures. Noel, I want you to give us the figures and the breakdown of how it works in AFBI and, given that you were not in one of those other houses, how it would work anywhere else in the public sector. I do not want to see that we are very generous in this field but not

equally generous in others. Norman, do you want to finish your point?

162. **Mr Fulton**: It might be helpful if we provided a copy of AFBI's rewards-to-inventors scheme, which has been approved through the Department and which is our way of implementing the Baker recommendations. We operate a deficit funding model for AFBI, and, therefore, intellectual property and the returns from it are effectively a return on investment to the Department.

163. **Mr Clarke**: That is provided that it comes to the Department.

164. **Mr Fulton**: It does, and it is very significant. It is about £6 million per annum at the minute, and that offsets the cost of the work programme that AFBI conducts by the Department. So, the Department benefits from that.

165. The third point concerns the direction of R&D and its undertaking in AFBI. The Department specifies the R&D, and it is largely for public good. It is not a case of scientists deciding what they will research; they are responding to a research agenda that the Department sets. If there is a spin-off or a by-product of intellectual property, we certainly encourage AFBI to make sure that the benefits of that intellectual property are captured. That then comes back to the Department as, effectively, a return on investment. However, it is not the purpose of the research.

166. **Mr Clarke**: So, when you say that you are saying to AFBI that you hope that it is captured, what percentage are you suggesting that it is captured at?

167. **Mr Fulton**: We can provide you with a copy of the rewards scheme that now exists in AFBI. If you are talking about very significant intellectual property, I can tell you that the vast majority will come back to the Department. However, if you are talking about very small amounts, I can say that it will largely go to the inventor. We can provide a copy of the scheme to the Committee so that you can see the detail.

168. **Mr Clarke**: So, you could see how someone like me would have a criticism of that, because, basically, they are getting paid twice for doing the same job. Public money is funding them in their position, and they are working on the innovative ideas that they are coming up with. However, they then get royalties on the back of that.

169. **Mr Fulton**: It comes back to the Baker report and the recommendation that there needs to be a connection between the research organisations and the private sector to ensure that the benefits of it flow out into the economy. That is the purpose of this.

170. **Mr Clarke**: I asked Noel a question about getting a comparison with the public sector. Chair, we could maybe get our research people to see what royalties are paid to someone who is employed in the private sector and who works in the same field as some of our larger employers in Northern Ireland. Do they get royalties for scientific work and, if so, at what proportion? We want to see that comparison.

171. **Mr N Lavery**: We might be able to provide you with comparators of research organisations elsewhere in GB and of what their schemes were, if that would be helpful.

172. **Mr Clarke**: In the public sector?

173. **Mr N Lavery**: Yes; organisations such as AFBI.

174. **Mr Clarke**: I suppose that our research people could get the figure for how much Northern Ireland plc — the private sector — pays. I am glad, Noel, that you recognised that I value the work that AFBI has done. I was on the Agriculture Committee for a period of time. I have had various meetings with the farming sector, which also values its work. People were very nervous about some of the changes that were proposed in the past because of the work that is done in specific areas. That is one side, but financial management and public money are involved. We have to be very careful in how we do it.

175. **Mr N Lavery**: I appreciate those positive comments.

176. **Mr Dallat**: I am trying to get my head round some of the figures. I am finding it increasingly difficult to understand how you get so much money to spend. It was money bags all over the place, was it not?

177. **Mr N Lavery**: I am not sure what point you are making, Mr Dallat.

178. **Mr Dallat**: The table on page 20 of the report shows that the total cost went up from £38·58 million in 2006-07 to £54·46 million in 2010-11. Over the five years, the total was £258·28 million, and you did not even have a basic costing system for the work that you were doing. Is that not a bit hard to take?

179. **Mr N Lavery**: There are a couple of points to make. Obviously, the Department bid for its budgets and was allocated those budgets. Secondly, as I said, we had a financial accounting system. The costs would have been approved by the chief executive and the Department.

180. **Mr Dallat**: Who was the chief executive?

181. **Mr N Lavery**: George McIlroy.

182. On a point that is related to Mr Clarke's earlier one, I think that AFBI stands as a very strong comparator with other public bodies in the third-party income that it has generated. The percentage of its costs that are funded directly by the public sector has gone down significantly since 2006.

183. **Mr Dallat**: I can see that the advice and teaching has definitely gone down, but the other consumables have rocketed.

184. **Mr N Lavery**: I am not sure about the 2006-07 costs. Staff and consumables went from £22·24 million in 2007-08 to £24·48 million in 2010-11. We increased our third-party income, we achieved our efficiency targets and we absorbed inflationary increases.

185. **Mr Dallat**: I do not know; I would have thought that, during a period in which the private sector was collapsing all over the place, you did pretty well.

186. **Mr N Lavery**: I think that AFBI has done well to increase its third-party income —

187. **Mr Dallat**: I am sorry; I mean that you did well getting money.

188. **Mr N Lavery**: I will bring Gerry in. I think that AFBI, like all parts of DARD, and DARD, like all parts of the public sector, has had to bid for its money. As I said, I think that AFBI's increase in third-party income stands well in comparison with the rest of the public sector.

189. **Mr G Lavery**: It is a relevant point that, rather than the private sector collapsing, the agrifood sector has performed very well in the teeth of this recession. The sector contributes £1 billion a year in value added to our economy. It supports 50,000 jobs. The strength of the case to support that sector is what sustains AFBI. AFBI, in turn, is the major provider of innovative R&D to assist the competitiveness of that sector. In one sense, I am not surprised that successive Governments, including this Executive, have decided that that is a worthwhile investment.

190. **Mr N Lavery**: Can I just make a couple of other points? Mr McQuillan asked us about the cost of the estate. That is a significant cost. I absolutely take your point on that. We would seek to reduce that cost through investment, Mr Dallat.

191. **Mr Dallat**: I am just looking at the corporate costs for the same period. The cost for casual staff was £3·7 million. For lease of land, it was £33·6 million. For rates and water, it was £5·2 million. For electricity, it was £9·6 million. For repairs and maintenance, it was £2·8 million. They seem to me to be highly significant figures at a time when you were still charging the same rate as your predecessor for the scientific exercises in which you were involved. I am sure that that is something that you would want to tell me about, Professor Kennedy.

192. **Professor S Kennedy**: There are a number of issues there. The first is that AFBI's budget is under continuous and increasing pressure as funding from the Department reduces. That means that,

basically, we have had to work harder and harder each year to generate the additional income to maintain the scientific capacity in the institute. That, in itself, drives considerable efficiencies, because it means that there is less money internally in AFBI to spend, basically.

193. **Mr Dallat**: Gerry, can you tell us how much money was lost through antiquated costing systems that had no basic foundation?

194. **Mr G Lavery**: This is an agreed report. In the report, the Audit Office estimate is that, at a maximum, £3·5 million was lost. The accounting officer already pointed out that that maximum includes services to the rest of the public sector. It is about one third. So, it would probably be an overstatement to talk about £3·5 million. As the report indicates, that was a lost opportunity to further reduce our grant to AFBI by about 1·5%, which we would dearly have liked to do. I think that your point about the estate, Mr Dallat, is very well made, if I may say so. It is what is driving us at the moment in trying to come up with invest-to-save projects for both VSD and the Newforge Lane site. The fact is that those obsolescent buildings lead to very high utility costs. They lead to rates bills for space that AFBI cannot use profitably or productively. They also lead to issues about the leasing costs between AFBI and the Department, which owns those buildings. Those costs are too high, and we want to reduce them recurrently.

195. **Mr Dallat**: I think that your points are very valid, and I agree with them. Is it true that there are very substantial buildings in which only two or three people work?

196. **Mr G Lavery**: I think that that would be an exaggeration. There is, certainly, space that is not productive, particularly, for instance, in the main building at Newforge Lane. When you walk into it, you see that it has a very large atrium, which was built for a large number of students to come through. We do not need that, and AFBI does not need it. We would like to get out of it. However, it requires a significant capital investment to put AFBI on a different site and to release that space at Newforge Lane.

197. **Mr Dallat**: Obviously, I will not be about in 20 years' time. Gerry, what will emerge from this report that will ensure that those issues that you and Professor Kennedy addressed will not be hovering over and haunting some future PAC?

198. **Mr N Lavery**: I gave you an assurance about the points that PAC had raised in 1995.

199. **Mr Dallat**: I was convinced.

200. **Mr N Lavery**: As I said, the Department has increased its oversight of AFBI. We have a strong quarterly reporting system. We have quarterly assurance and liaison meetings with AFBI reporting to the board. We now have R&D projects commissioned by DARD, and we are developing a strong costing system. Systems do evolve. Norman referenced a revolving system on testing. I can give you an assurance that, as the Audit Office said, we will benchmark where appropriate and feasible.

201. Can I just make one further point, Mr Dallat, because we talked about costs?

202. **Mr Dallat**: Yes.

203. **Mr N Lavery**: Very significant benefits come from AFBI in its research and supporting innovations, its support of the Department's policies and its emergency response. I do not think that we should lose that. It comes at a cost, but those costs are very high because of the corporate structure of AFBI's estate.

204. **Mr Dallat**: Mr Lavery, your point is valid, but I am sure that you are not suggesting to the Committee that, because you do excellent work that contributes to the industry, you can have a cavalier approach to how you spend public money.

205. **Mr N Lavery**: Absolutely not. Again, it goes to Mr Clarke's point. It is disappointing that we are here to discuss governance issues of an organisation that has been successful.

206. **Mr Dallat**: I assure you, Mr Lavery, that the Committee is not shy to give credit and praise where they are due, but, at the moment, we are discussing public money. That is our duty.

207. **Mr N Lavery**: Absolutely.

208. **Mr Dallat**: And the record has been very bad.

209. **Mr N Lavery**: I understand your point. I was seeking to give you an assurance about the enhanced systems and an assurance that I will make sure that there is proper oversight by the Department.

210. **Mr Dallat**: This could be the day for the Laverys.

211. **Mr McKay**: Paragraphs 3.10 and 3.11 of the report show that scientific testing is one of your more significant areas of business activity, with an estimated spend of £143 million between 2006-07 and 2010-11. I suppose that that is out of a budget, as John referred to, of £258 million. So, that is quite a sizeable chunk. However, it is clear from the Audit Office report that the calculation of unit costs for that work was very limited. Can you give us some background information on how that work is done and how frequently it is carried out?

212. **Mr N Lavery**: I will bring Professor Kennedy and Norman Fulton in on that. However, I will make this point again, Mr McKay: can we just make sure that we do not forget that, as well as having the unit costs and doing the tests that DARD requires, we have an emergency response capability that is part of AFBI's core cost? That is something that the Department wishes to retain, and there is a cost to that. It is linked to the scientific testing and having that expertise there. However, I just wanted to make the point that the emergency response capability is vital and has been vital to the industry where dioxins and foot-and-mouth disease are concerned.

213. **Mr Fulton**: The Audit Office report makes recommendations on benchmarking unit costs. We agree with those recommendations. Benchmarking is a very useful management tool, and we should be seeking to deploy it where we can. It is probably most appropriate to, and more likely to be possible with, high-volume, standardised tests. It is much more difficult, as the report recognises, with bespoke or low-volume tests where there might be short turnaround times. Benchmarking has its place, but it has to be used appropriately and wisely, so we will certainly be looking to respond to that positively. In AFBI, the development of the strategic cost model will take us along the path in driving down to a lower level when working out some of the detailed costs in the organisation.

214. **Mr McKay**: Have any specific benchmarking actions been taken, or are any planned?

215. **Mr Fulton**: There has been initial work in the Department, where branches looked at whether they can identify appropriate benchmarks against which to compare AFBI. It is pretty much as we expected. In some cases, benchmarks can be identified, and, in other cases, it is difficult to identify an organisation that could provide a benchmark for AFBI. In the limited comparison that we have done to date, AFBI has, broadly speaking, compared reasonably well, particularly when you take on board the overall package that it delivers. It does not just do the tests; it also provides the expert advice and interpretation that we, as a Department, require.

216. **Mr McKay**: Finally, would it be possible to get something in writing about the particular areas where there are problems with benchmarking and where things are progressing so that the Committee can have some oversight of that and the value of public money that it relates to? Has the Department considered subjecting any of the testing work to competitive tender?

217. **Mr Fulton**: We have not done so to date. Again, I think that that goes back to the earlier point that we get more from AFBI than simply the value of the test. The fact that capacity exists in AFBI that is then available for emergency response

capability is very important. It is part of, if you like, our insurance policy. The integration of the work in AFBI and the fact that the testing regime is informed by R&D are also important. If you start to separate those, you start to lose some of the benefits that we currently have. So, that is a major consideration.

218. **Mr Easton**: Gerry, you were the senior finance director.

219. **Mr G Lavery**: Yes.

220. **Mr Easton**: For how long?

221. **Mr G Lavery**: I was the senior finance director from 2003 and acting permanent secretary from August 2010 to February 2013.

222. **Mr Easton**: Paragraph 4.9 states that there was no evidence that AFBI or DARD routinely generated information on the cost of individual R&D projects and that that had to be collated specifically for the C&AG's audit. How can you explain such a complete lack of monitoring and project management over a research programme that involved tens of millions of pounds?

223. **Mr G Lavery**: The point that we are trying to bring out is that costs were assessed on the basis of the direct costs of staff and consumables. An overhead rate was applied, but funding was not ring-fenced for each approved project, and we did not operate a hundred separate budgets. So, what happened was that the management system operated by division in AFBI to contain its costs and to put them in the context of the institute's overall costs. That kept the costs under control. The costs are now actively assessed and monitored against the original projection, so there is a much firmer grip today.

224. I think that it is harsh to say that there was no project management. I think that there was project management on the basis of the annual review process. There was a detailed review process that required each project to be submitted to the head of division. It was documented. They had to put forward their findings from the past year and detail the progress that they had made, as well as to put forward proposals for any work to be done in the forthcoming year. If there was going to be a delay or a change in objectives, they had to explain why. The head of division then put that evidence forward to a group that the chief executive chaired. So there was project management. Its critical weakness — we are not trying to excuse this in any way — is that it did not address the cost. When the time for a project was extended, people did not look at the cost. They, therefore, could not have looked at the additional benefits that they were getting compared with the additional costs that they were incurring. That is the weakness. It is not that there was no project management; the project management was not comprehensive and did not address the cost.

225. **Mr Easton**: Why was it not comprehensive?

226. **Mr G Lavery**: Because we did not have a firm grip on costs, and it was not an element of that review process. That was an oversight; it should not have happened, and we can only agree to apologise to the Committee for that.

227. **Mr Easton**: You said that there was not a firm grip and there was an oversight. Who was in charge?

228. **Mr G Lavery**: Project management was, as I have said, remitted to AFBI's internal management.

229. **Mr Easton**: Were you aware of that?

230. **Mr G Lavery**: In 2010, I was aware that we were looking for a further improvement in AFBI's financial management and, at that point, as Professor Kennedy outlined, we put in place a number of initiatives to improve it. Therefore, there was an improved position with regard to the number of staff in the finance area. Subsequently, we undertook a strategic review of AFBI that put in place a revised management structure and, for the first time, created a single corporate affairs and finance director post at the same level as the deputy chief scientist post. That post was filled in January 2013. We also

improved the overhead rate at that time. A number of initiatives brought forward definite improvements in the management of R&D and finance generally in AFBI.

231. **Mr Easton**: I am delighted that you took measures to improve things, but you were in charge of finances from 2003 to 2010, and you did not know anything about it until 2010. Is that not very poor?

232. **Mr G Lavery**: It would have been, if —

233. **Mr Easton**: So you are admitting that it was very poor.

234. **Mr G Lavery**: No, I am not admitting that. Let me explain. In 2003-04, we did the preparatory work to set up AFBI, which came into being on 1 April 2006. One of the weaknesses that existed at that point was the need to further develop the costing system, and that was recognised in AFBI's business plans. In some ways, that shows the system working. It was recognised as a weakness; it was surfaced in the business plan; it was not addressed fully until 2010 with the strategic cost model.

235. **Mr Easton**: Why did you not address it until 2010?

236. **Mr G Lavery**: The very brief answer is that other issues took priority.

237. **Mr Easton**: So this was not important to you?

238. **Mr G Lavery**: This was important and, with the benefit of hindsight —

239. **Mr Easton**: It was not important enough, because there were other priorities.

240. **Mr G Lavery**: At the point when we established AFBI, as I mentioned earlier, the issues were multiple in trying to move around 800 staff. The largest NDPB in Northern Ireland since the 1970s was created in 2006, with no additional staff for corporate services in either AFBI or the Department. In 2006, we were operating under a policy, which people may recall, called Fit for Purpose, which put a cap on the number of civil servants. Therefore, we did not have the headroom simply to employ additional people to deal with the additional workload. That created a pressure in the Department and AFBI to address the numerous issues arising from setting up a new organisation. We had to absorb the staff from the Agricultural Research Institute, who had not been civil servants. Their pensions and their terms and conditions had to be sorted out, and all of that fell on the corporate service team and the finance team in AFBI, and the sponsor branch in DARD. I am certainly not trying to minimise the importance of the costing work, but that is the context in which people were working.

241. **Mr N Lavery**: May I come in, Mr Easton, having looked at this afresh? It is a point that I tried to make earlier. AFBI was set up with financial systems similar to the Department; it goes down to cost centres and individual branches. The chief executive of AFBI was assessing the projects, and the Audit Office quite rightly made the point about cost overruns on individual projects. That is because it was being managed by cost centre and by the budget area. If a budget area did not have the money, they could not have taken forward the project. That was not broken down to individual project level. That is the point that we are trying to get across.

242. AFBI lived within its overall budget. Individual budget areas within AFBI, on a functional basis, lived within their overall budget and would have had to justify any increase to Professor Kennedy and his predecessor. The Audit Office quite rightly made the point that it was not managed at individual project level. Was there a loss? I do not know, because that information was not there. Were there some benefits to projects that were continuing? Absolutely.

243. The report goes into the projects that were stopped. We now have a system whereby there is a commission by DARD, and costs are collected and managed appropriately by AFBI. As I have said, I have put an extra measure on Professor Kennedy to report to me on his stewardship of R&D expenditure. I think

that the core problem was not managing at a project level on R&D but managing on a financial basis at cost centre level.

244. **Mr Easton**: Why were projects not ring-fenced?

245. **Mr N Lavery**: I think that was because it was managed on a functional basis. Projects were ring-fenced. As I understand it, Professor Kennedy and his predecessor were getting information on individual projects and the benefits of those, along with recommendations on whether that project should continue. The financial information was at budget area level, but not at individual project level. You are quite right that it should have been at individual project level.

246. **Mr Easton**: Were your costs not spiralling out of control?

247. **Mr N Lavery**: No, because, having looked at it afresh, AFBI had to live and manage within an overall budget, which it did.

248. **Mr Easton**: OK. Back to you, Gerry. Why did your Department not request basic cost information on a regular basis for R&D projects that you were funding? It appears that you were writing AFBI a blank cheque and not carrying out any basic monitoring to ensure that that money was being managed effectively. You monitored it only once a year, according to what you have said. Why were you not doing it a lot more than that?

249. **Mr G Lavery**: We were monitoring the overall expenditure of AFBI —

250. **Mr Easton**: Once a year.

251. **Mr G Lavery**: No, we were monitoring it monthly. There was a monthly financial report to the DARD board, which showed the overall expenditure in that month and in the year to date, broken down by management categories. That showed us that AFBI was living within the budget that had been determined at the outset of the year. What we did not have was a long list of all of the separate research projects, their individual costs, and whether each was proceeding within its original budget and the budget for that year. That was a failure, but we were managing the overall expenditure of AFBI within budget. AFBI itself was doing that too.

252. **Mr Easton**: Right, so you were monitoring it once a month.

253. **Mr G Lavery**: Yes.

254. **Mr Easton**: So why were you not requesting basic cost information for the R&D projects?

255. **Mr G Lavery**: We had a commitment in the business plan that we would make progress on what we call in finance systems a costing module — a way of costing each separate project. What you have to understand is that it is a large and complex organisation. Putting a costing module in place is a matter of being able to attribute every transaction in the organisation to a specific code that will reflect down to that project level. Today, the basic unit of business for AFBI is the project, so everything goes down to one or other project throughout the organisation, as far as humanly possible.

256. **Mr N Lavery**: If it helps the Committee, I think that the premise upon the setting up of AFBI, which goes to the structure that Gerry has described, was that the management of R&D projects was AFBI's. It was AFBI's project, and it was managing it. We were getting an assurance from AFBI and we were monitoring the financial information on a monthly basis, with quarterly monitoring etc. We have now moved to a system where we are commissioning projects, and AFBI is reporting the cost to us on a project-by-project basis. That is a much better place. In the customer/contractor element, we gave all the management to AFBI. We have now taken part of that back.

257. **Mr Easton**: Things have improved, but you allowed it go on for quite a long time.

258. **Mr N Lavery**: It did, but whether there was any loss to public funds is another point. The issue that the Audit Office

identified was about the overhead rate. Again, we should not forget that a lot of the projects have delivered significant benefits.

259. **Mr Easton**: Nobody is disputing that. You talked about a loss of funds. There could be a loss of funds that you do not know about, or maybe that Gerry did not know about.

260. **Mr N Lavery**: That goes back to the point that the Audit Office raised on using the incorrect overhead rate. You are right: I do not think that the Department was aware of that. That has now been rectified.

261. **Mr Easton**: Do you not know how much was lost?

262. **Mr N Lavery**: The Audit Office identified £3·5 million. That was not on R&D within DARD. As I said, we think that about a third of that related to public sector work.

263. **Mr Easton**: So more could have been lost than you are aware of?

264. **Mr N Lavery**: No, we do not believe that more was lost.

265. **Mr Easton**: Are you 100% sure?

266. **Mr N Lavery**: We estimate that we "may" — to use the word of the Audit Office — have lost up to £3·5 million. Our view is that it is lower. The point is that that is income that could have been used by DARD and AFBI.

267. **Mr Easton**: Gerry, paragraphs 4.26 and 4.28 tell us that, until 2011-12, there was an annual assessment by AFBI of the ongoing viability of DARD-funded R&D projects. However, that took no account of costs to date or likely future costs. How can you explain such poor standards of project management?

268. **Mr G Lavery**: As I said earlier, I accept absolutely that, had the assessment included explicit consideration of costs, it would have been a better, more rounded and more comprehensive assessment. That was not done. It was too late in coming into being. However, I do not want the Committee to conclude that that represented no programme or project management. The continuation of each project was subject to a rigorous annual assessment, which went beyond simply scientific merits and relevance to policy; it went into industry competitiveness and sustainability. As I said, they were also subject to the continuation of staff resource and time availability against other work priorities, which were all constrained by the overall budget. They were working with the overall budget available to the institute. Each divisional manager would have been looking at projects to consider whether they wanted to continue to invest in them, compared with the competing demands for staff time from elsewhere in their division. There was project management. As I said, it came to a head in a documented annual review.

269. **Mr Easton**: OK. You are saying that, because of all the work priorities, the changes that were going on and the staff time that had to be put in, things were not perhaps being done as effectively as they should. Did you never to think to discuss that with anybody at a more level senior to you?

270. **Mr G Lavery**: I will not be able to give you dates, for which I apologise, but there was close engagement between the departmental board and the board of AFBI throughout 2010. That led to requests from the departmental board for additional financial information. It led to an engagement around the strategic review carried out by KPMG consultants. It led to our assisting AFBI with implementing the results of that strategic review. Therefore, we took action to improve the overall structure of and financial management within AFBI and to ensure that the issue was properly addressed by both boards. Of course, it also came up at the annual accountability meetings between the chairman and the Minister and the annual discussion between the chief executive and me.

271. **Mr Easton**: So the Minister was aware of this?

272. **Mr G Lavery**: The Minister would have been aware that there were areas that we wanted to improve.

273. **Mr Easton**: Who was the Minister at the time?

274. **Mr G Lavery**: The Minister of the day, in 2010, was Michelle Gildernew, and, since 2011, it has been Michelle O'Neill.

275. **Mr N Lavery**: On that point, a number of targets were set in AFBI's business plan. On the line of questioning that you are going down, I repeat my point: a lot of it is about AFBI's internal processes. From the viewpoint of sitting in the Department, it is absolutely our largest NDPB, but we take assurance from AFBI on its systems. I get a proactive assurance about the effectiveness of its systems. I just want to make the point that there is a shared responsibility.

276. **Mr Easton**: OK. In paragraph 4.26, we see that the final decision on whether a project should be extended rested with AFBI's chief executive. Do you accept that that arrangement was completely inappropriate in that AFBI, as the contractor, had the final say in approving extensions to work being funded by the Department?

277. **Mr N Lavery**: I will bring Norman in on how we have amended that process. I am not sure that I would go so far as to say that it was completely inappropriate. In the model that was operating then, the management of R&D had been devolved. There are lots of experiences and systems in the public sector where something that has been your responsibility is devolved to an arm's-length body. That is right and appropriate. The Department of Enterprise, Trade and Investment (DETI) devolves a lot of its work on industrial development to Invest NI. There are systems of delegations and assurances, and they were in place. We have moved to a model for the customer/contractor element that I think is better. AFBI makes proposals to the Department, which appraises those and then commissions the work. I think that that is a better system. Norman, do you want to add anything on that?

278. **Mr Fulton**: From 2006 to 2010, the initiation of projects came from AFBI to the Department. The Department considered those projects and whether they met our strategic objectives in respect of the benefits relating to innovation that they would generate for the industry, or policy benefits they would generate for the Department. Then a decision was taken on whether to allow AFBI to proceed with those projects. Once that permission was given, the responsibility for the conduct of the research came back to AFBI, and that is where it resided.

279. In 2011, we introduced a new system whereby the initiation of the project came from the Department, and AFBI was asked to respond to that call for research. It was a different approach. Under the system that we have currently, we have a number of policy leads within the Department. They own the research that they are commissioning, and they receive regular reports from the project lead in AFBI on the progress of that research and whether it is meeting milestones, keeping to budget and keeping to time. There is proactive management of those individual projects. So a different system has been put in place in the Department to manage its overall R&D portfolio.

280. **Mr Easton**: Gerry, in paragraph 4.12 we learn that, following completion of the C&AG audit, AFBI informed the NIAO that its estimate and expenditure figures for R&D projects had not included staff overheads. Does that not provide further evidence of the unreliability of management information and poor financial management in AFBI?

281. **Mr G Lavery**: The cost estimates in the table at figure 9 excludes overheads, and those in figure 10 include them. I do not want to get engaged in taking you through the detail of the tables, but I think that the key point is that those costs and variances should have been managed. We have moved on and we now have a change control process,

which should result in any change to the duration of a project, its objectives or costs being clearly and transparently discussed between AFBI and the Department, and an objective decision reached.

282. **Mr Easton**: If I ran an office — I do — when I added all my bills together, I would include what I pay my staff, what they do and all the functions. Why did AFBI not do that?

283. **Mr G Lavery**: Without going too far into it, as you can see, the source for the tables is the Audit Office, based on AFBI records provided in the course of the audit. I believe that the Audit Office derived the tables from a number of sources. AFBI was not asked to provide the complete costs of R&D projects. Therefore, the table derived does not contain the overhead costs, hence the issue around figure 10 putting those overhead costs in. The costs were available, as I understand it, from AFBI and they were added to give a more complete picture in figure 10.

284. **Mr Easton**: Yes, but they were not added in at the time.

285. **Mr G Lavery**: The request was not made for information in that form, as I understand it.

286. **Mr Easton**: That should not have to be requested; that should automatically be done. Do you not agree?

287. **Mr G Lavery**: Unfortunately, the information was asked for in a particular format, as I understand it.

288. **Mr Easton**: I know but, if you are running a business, you always have all your costs. That is common sense. I am not a businessman, but that is common sense.

289. **Mr N Lavery**: To go back to the general premise behind your point, which is that the overheads should have been included in the project costs, you are absolutely right.

290. **Mr Easton**: Right. That is what I wanted to know.

291. **Mr N Lavery**: We have absolutely accepted that point, and the new costing model will do that in a much more sophisticated way, breaking it down into activity areas.

292. **Mr Easton**: So why was it not included?

293. **Mr N Lavery**: I think that that is really a question for Professor Kennedy.

294. **Professor S Kennedy**: First, I would like to apologise to the Audit Office and the Committee for any confusion caused by AFBI. The Audit Office asked for the figures used in figure 9, but we did not actually supply the compliance set of data that the Audit Office put into that figure. We informed the Audit Office that we believed that the figures used in figure 9 in the draft report were incorrect, and we formally communicated that to the Audit Office during the first round of clearing the first draft of the report. In the second draft, the Audit Office said that cost estimate figures did not include staff overheads, and AFBI again flagged the incorrect figures. At third draft, the Audit Office amended paragraph 4.12 to reflect the correct position, but did not amend figure 9 to be consistent with that corrected information. I am not trying to apportion blame or anything; I am simply giving the detail of the history of the communications. Again, I apologise if any of the confusion was caused by AFBI.

295. **Mr Easton**: Do you know how many of the projects fell under the full appraisal threshold under the initial estimates?

296. **Professor S Kennedy**: Which projects?

297. **Mr Easton**: All of them.

298. **Professor S Kennedy**: A number did, and post-project appraisals have now been completed for all the R&D projects. However, at the time of the audit, those had not been completed for all of them.

299. **Mr Easton**: You said “a number”. Do you know how many?

300. **Professor S Kennedy**: I cannot give you the details of the number off the top of my head.

301. **Mr N Lavery**: We can write to the Committee with that. I think that what was missing was a proper change control process in the management of those projects. My understanding was that the appraisals were done at the proper threshold, then costs increased, but that there was not an addendum or that was not reflected in a proper change control process. That is how such projects should be managed and that is the process that we have in place now. Is there anything that you want to add to that to give assurance, Norman?

302. **Mr Fulton**: The appraisal is supposed to be a living document, so any changes to the project in costs, deliverables, etc should trigger a reconsideration of the appraisal and an addendum or a re-examination of the appraisal to confirm that the project continues to represent value for money. That is the process that we now have in place.

303. **Mr Easton**: OK. I am getting to my last question, you will be glad to hear. Gerry, paragraph 4.15 tells us that, before 2011-12, AFBI did not record specific estimated start and end dates for projects, which makes it difficult to quantify the expected duration of projects and whether they were delivered against set timescales. Why were your project management processes so clearly inadequate?

304. **Mr G Lavery**: I think that it is more appropriate for Professor Kennedy to answer that.

305. **Professor S Kennedy**: It is correct that, for the individual projects, an actual date was not specified; it was a beginning year and an end year. The end year was always taken as 31 March, the end of the financial year. From our time and task recording systems, we could have identified when work started on a project, but the actual date was not recorded in the individual project evaluation forms.

306. **Mr Easton**: Why?

307. **Professor S Kennedy**: It should have been recorded in more detail, but it was not. Essentially, we continued with the system that had been used before in those years. However, since 2011, the detail of start dates has been included in the projects, and there is a specific schedule for reporting each quarter on every individual project both on the scientific achievements or progress of the project and the financial aspects of it. We have corrected that.

308. **Mr Easton**: Do you accept that it was very poor practice?

309. **Professor S Kennedy**: It certainly was not best practice.

310. **Mr Easton**: Who knew about it when it was going on?

311. **Professor S Kennedy**: All the project leaders who completed their forms knew about it, their heads of branch knew about it, and the senior management team would have known about it. However, the actual start date was not formally recorded on the form.

312. **Mr Easton**: Gerry, did you know at the time?

313. **Mr G Lavery**: There would have been no reason for those forms to be submitted to the Department at that stage. I do not think that we would have focused on that.

314. **Mr Easton**: Would you not be concerned, as a Department, that there were no start dates and end dates?

315. **Mr G Lavery**: That is a different question.

316. **Mr Easton**: No, it is not.

317. **Mr G Lavery**: With respect, the issue is that, as Professor Kennedy pointed out, a large number of people completed the forms, but they did not attach importance to precisely recording the start date at that time. Sitting here today, with the benefit of hindsight and with a focus on how long projects are approved for, yes, you would want to have a precise start date and end date. As Mr Fulton pointed out, there is also a requirement for a proper change control process for moving either of those dates, particularly the end date. So, yes, we attach importance to that, and we should have attached importance

to it before. I understand that it did not acquire that importance at the time.

318. **Mr N Lavery**: I just want to make a final point on that, Mr Easton. I have previously made the point that, for an NDPB within a large Department, you take assurance that the organisation has systems in place through quarterly and annual assurance statements. You would expect that sort of thing to be picked up through an internal audit system or an assurance. I just wanted to make that point. I am content with the system that we have now.

319. **Mr Easton**: According to paragraph 4.15, it was not possible to accurately identify the expected duration of the 125 projects examined by the C&AG. Can you provide us with more accurate figures?

320. **Professor S Kennedy**: Yes. We can look at each individual project and send you whatever information we can about them.

321. **Mr N Lavery**: Some of the projects will have been completed, so we will be able to give you the finalised date, and some will have had a post-project evaluation done. The new projects are commissioned by DARD.

322. **Mr Easton**: OK. You will be glad to hear that that is the end. Thank you.

323. **Mr Rogers**: Mr Lavery, I will look particularly at the seed potato aspect and at R&D in that area. First, I should acknowledge the great work done in the Loughgall breeding programme. I acknowledge that it takes over 15 years for a new seedling to get to market level and that, perhaps, 26 new varieties have been registered. It is important to put these things on record, because some people will take the comments and views expressed by the Committee as a lambasting of the project and its outcomes. It is important to acknowledge the good work that people are doing.

324. Having said that, I listened to what has been said today. Why, until fairly recently, have the recommendations of the Westminster PAC report, published in 1995, been largely ignored?

325. **Mr N Lavery**: I am not sure that I would accept that they have been largely ignored. Can I make a couple of points? Thank you for your comments about the work of AFBI in this area. I will bring Norman in later.

326. Following the 1995 report and the loss of a commercial partner, the Department commissioned an external review — the Quinn report — in 2005, which made a number of recommendations, including that the Department should continue to support but reduce its contribution progressively over time. The report also suggested that the Department should continue to promote research and plans for successful marketing. It also made the point that cessation of the project would have a traumatic effect on the sector.

327. The Department did its own economic review on the back of that report and put in place a new scheme with a new commercial partner. What we have now is a new scheme with a new commercial partner. Our objective is for full cost recovery; that is the key basis. I think that the premise of your question is about the success of the project and the costs. That is why we aim to get to a position of full cost recovery. Was that what you were getting at?

328. **Mr Rogers**: You can come in later, Mr Fulton. When I look at the two reports, I see that, in 1995, there was great concern that the Department had spent £45 million on R&D without a strategic plan. I listened to the answers to many of the questions today and I do not see great evidence of a strategic plan.

329. Another issue is that there was limited economic appraisal. Page 42 of the Northern Ireland Audit Office report gives an analysis of the appraisals and says that only 21% of full economic appraisals were completed. You also touched on the relationship between customers and contractors, but I am just not convinced that you have really taken the recommendations of the 1995

report on board. A lot of those things are coming back up again.

330. **Mr N Lavery**: I want to make sure that I give you a clear answer, Mr Rogers. Are you talking about the seed potato project or the other recommendations in the 1995 report?

331. **Mr Rogers**: I am talking about the potatoes. However, when you look at the broader picture of economic appraisal —

332. **Mr N Lavery**: OK. I am content that, in relation to economic appraisal, the Department's appraisal systems are now robust. I can give you that assurance. The report talks about pro-forma and full economic appraisal. The issue is that there should be a proper and proportionate appraisal. The Department undertakes those. I can give you that assurance.

333. On the seed potato project; Norman, do you want to talk about the work that has been done on appraisal and how we have got to where we are now?

334. **Mr Fulton**: Yes. The recommendation connected with this particular project in the1995 Westminster PAC report urged the Department to put in place:

"robust controls to prevent long-term research projects continuing indefinitely where they are not delivering results".

335. What was put in place after that was the annual review process that we discussed earlier whereby each project would have been subject to an annual review that looked at the progress of work during that year, what was achieved and the programme for the coming year etc. Those systems were put in place.

336. On the issue of:

"where they are not delivering results",

337. you indicated that this project has been delivering results in producing varieties of potatoes. It stands up very well in international comparisons. Since 1999, on average one new variety has been registered per annum. From a research perspective, it has been delivering. The difficulty and challenge has been in taking the research and commercialising it. That is part of what the Quinn report was about. However, the Quinn report pointed out the importance of that programme. To quote from the report:

"Without the benefits of new varieties from the breeding programme the seed, ware and processing sectors would continue to decline. Cessation of breeding activities would have a traumatic effect on the sector, including creating massive problems for packers and possibly processors in the future."

338. Therefore, there was great support for this programme, and stakeholder support for the programme continues. It is the commercialisation that has been a challenge. That was put in place from 2010 and, hopefully, we will see the full fruits of that in due course.

339. **Mr Rogers**: I acknowledge that you put robust controls in place. Paragraph 4.20 of the NIAO report suggests that it took until 2004, nine year after the PAC report, to put those controls in place. Why was that?

340. **Mr Fulton**: The controls were put in place very soon after the 1995 PAC report. I think that our internal audit recorded that it was fully implemented in 1997. So, the controls were there for the research project and there was a commercial partner in place until I think 2003, 2004 or 2005. Something like that.

341. **Mr G Lavery**: It was 2005. It gave notice of its withdrawal in 2003.

342. **Mr Fulton**: Yes. So, the controls were there for the conduct of the project.

343. **Mr Rogers**: I am sure that as well as the controls there would have been ongoing evaluations. However, according to the report, it was 2004 before consultants were put in place to assess the "ongoing viability".

344. **Mr Fulton**: They were brought in to have a slightly broader look. The Quinn report really looked at the relevance of DARD's support to that sector in the round. Of course, this is one aspect of it. From then on, a series of actions were taken to secure a commercial partner to take

the results from the research project and start to bring them to the market.

345. **Mr Rogers**: This is extremely important as we try to harness the potential of the agrifood strategy and everything that is coming up. However, paragraph 4.24 of the NIAO report suggests that, despite that significant investment in the project, seed potato production in Northern Ireland decreased from 55,000 tonnes in 1994 to just over 20,000 tonnes. Why has the project failed to deliver tangible market success?

346. **Mr Fulton**: I think that we need to look at what has been achieved and what has come out of the programme. Between one fifth and one quarter of the ware potato sector is served by the Navan variety, which was a product of this research programme. That is a very significant success, and Navan is also a very important variety in the Republic of Ireland. Further, about 21% of the projected variety seed area comes from varieties from the AFBI programme. So, it has had success and we hope that it will have greater success. That is the important thing in all this.

347. **Mr Rogers**: We seem to have missed the boat on a couple of varieties with potential in the European or Mediterranean markets.

348. **Mr Fulton**: Yes a couple of varieties featured in the farming press in recent weeks where great potential is seen from the commercial partners in trying to take those forward into the marketplace, so that potential is still there.

349. **Mr Rogers**: Paragraph 4.24 of the report mentions a lack of documentation which means that AFBI is unaware of the total cost of its project. It states that:

"Available documentation indicates expenditure of at least £7·2 million on the programme since 1982".

350. Can you provide more clarity on the total cost of the project?

351. **Mr Fulton**: I think that costs can be provided back to the creation of AFBI. That is not a difficulty. Currently, the combined commercial and strategic programme cost comes to about £500,000 per annum. It is difficult for the Department to go back to the early 1980s and beyond.

352. **Mr Rogers**: Paragraph 4.21 states that consultants identified a need in 2005 for an increased commercial focus on the potato-breeding programme, improved marketing and a reduction in DARD's funding. However, in reading paragraphs 4.22 and 4.23, we learn that delays in appointing commercial partners meant that DARD continued to fund the full project cost until September 2012. Have the new arrangements helped to deliver improved performance and value for money?

353. **Mr Fulton**: A new commercial partner was identified and the contract has been in place since October 2010. That offers a route to try to take the product flowing from the research programme to the market place. That is where the true value of the research will be reflected in due course. As I said, there have been successes from the programme. The single variety Navan is a very important variety in our domestic market now.

354. **Mr Rogers**: Following publication of this report, the Committee received correspondence from representatives of the seed potato industry. Their particular concern was the failure to ensure that a commercial partner was in place to help promote and market AFBI-bred varieties. I think that for only 11 years out of the 56 years of the project there was delivery on that. How do you respond to those concerns?

355. **Mr Fulton**: I think that a commercial partner was in place from 1990 through to 2004. The commercial partner withdrew at that stage, so there was a break from 2004 to 2010 until a new commercial partner was put in place. So, there have been links with commercial partners for some considerable time.

356. **Mr Rogers**: Paragraph 4.44 states that in March 2012, DARD completed a review of 79 ongoing R&D projects, which resulted in two thirds of them

being immediately terminated. Actually, the figures show that only 20% of projects continued. What were the 66% of projects that were terminated costing?

357. **Mr N Lavery**: I am not sure. We would have to write to you and give you the individual costs because we would need to ramp all of those up. The point I am making, and Norman or Seamus may want to come in, is that at that time we were developing our evidence and innovation strategy, so it not surprising that, having looked at that, we decided that a number of those projects did not fit that strategy. Is there anything else that you want to say on that?

358. **Mr Fulton**: If you look at the number of projects that were ceased at that point, we brought 52 of the 79 to a conclusion. Of those 52 projects, 40 had completed their experimental phase, so they were given a clear timeline to complete the write-up and then bring them to a close. It did not mark massive shift in those particular projects. When we published our evidence and innovation strategy in 2009, we clearly stated that, almost certainly, we would have to redirect and refocus our overall R&D agenda, particularly to increase our focus on environmental issues and increase our research evidence base around rural development. Those were specific areas in which we stated that we wanted to increase the research effort. Obviously, within a finite research budget, that would require a refocusing and a reprioritisation. We always recognised that that would have to take place.

359. **Mr Rogers**: Was it not quite drastic action to close down two thirds of the projects at that stage?

360. **Mr Fulton**: As I indicated, 80% of those that ceased had completed their experimental phase. Nothing was lost from that work. We simply asked AFBI to complete the write-up, which brought them to a close at that point.

361. **Mr Rogers**: What happened to the staff involved in the research work at that stage?

362. **Mr Fulton**: Effectively, they were redirected to the new evidence and innovation programme and the research projects that were commissioned under that programme.

363. **Mr Rogers**: I have one more question for Gerry. Something jumped out at me about project management when you were answering Mr Easton. You said something along the lines that it was not that there was no project management. That is a scary statement. Who was the project manager at that stage, and who was his or her superior?

364. **Mr G Lavery**: That would be for Dr Kennedy to respond to.

365. **Professor S Kennedy**: Each project had a project leader, as we call them in AFBI. They were the project manager for each individual project. The project leader was responsible for producing an annual progress report on each project. The projects in a particular branch were approved or commented on by the branch head. There would have been comments about whether the achievements were good during the year and whether a project was behind in its timescale etc. The various projects from the individual branches were submitted to the head of division, who again reviewed them and commented. Finally, there was an annual research review with the chief executive, who, with the head of division, and, very often, the project leader depending on the circumstances, looked at the detail, such as whether the milestones that were set out to be achieved during the year were achieved and the prospect for future progress in the following year. On the basis of that assessment, a decision was made to allow the project to continue for another year or to allow it to stop the experimental stage and move into what we call the writing-up phase. That is simply a phase in which no work is carried out; it is the period in which technology transfer to the industry would be carried out. Perhaps popular articles or scientific articles would be written and sent off to journals etc. That was the basic process.

366. **Mr Rogers**: Were any concerns expressed about the oversight process? Who was monitoring it? Was it just the project leader?

367. **Professor S Kennedy**: Do you mean —

368. **Mr Rogers**: Take, for example, the seed potato. Do we have one project manager over that thing completely?

369. **Professor S Kennedy**: Yes. In general, there is one potato expert. They are basically an expert breeder. As you indicated earlier, the scientific output from that programme has been very good. In terms of international rankings, it has averaged about one new variety per year. Mr Fulton has referred to some of the figures for Navan and other varieties in the industry.

370. **Mr Rogers**: Even taking something like the marketing of the product into account, the concern is that 20,000 tons are being produced now as opposed to 50,000 tons. How did that raise its head in the system and what is being done about it?

371. **Professor S Kennedy**: That leads into the commercialisation aspect, because, essentially, AFBI has been producing the potatoes. Norman Fulton described the process and the various stages of commercialisation with various companies. There were a number of periods when there was no commercial partner, some periods when there were, leading up the Quinn report, and there is the current contract with Potato Partners Northern Ireland.

372. **Mr Rogers**: Why are we losing out to Europe on that? Why are we not still up there as a major seed potato producer?

373. **Professor S Kennedy**: As an economist, Norman could probably answer that better than me.

374. **Mr Fulton**: It is because of the broader developments in the industry. In Northern Ireland agriculture generally over the past 20-odd years and more, we have moved increasingly towards grassland agriculture and more specialised units and away from the small-scale seed potato enterprises on individual farms that you had 20 or 30 years ago. The cropping sector more generally has contracted compared to what it was 20-odd years ago. These underlying trends are happening, and there are particular difficulties in the seed potato sector. It always had difficulties, as was pointed out in the Quinn report, with small-scale fragmentation and lack of marketing expertise. So, you had those underlying difficulties as well. A research programme would not necessarily halt the decline of the seed potato sector, nor would it lead to a resurgence in the sector. However, it was one important aspect that would contribute to a future in seed potato production. The important strategic advantage that Northern Ireland has is that it is one of the few high-grade seed potato areas in Europe because of the plant health status here. There is potential for the sector, and that was recognised in the Quinn report.

375. **Mr Hazzard**: Thanks, guys, for the information to date. I will pick up on an area that Sean was getting into: the projects that were axed. You said that they were maybe in the experimental stage anyway. Is it not fair to suggest that one of the reasons why they were axed was because, for so many years, R&D was not linked to the strategic and long-term aims of DARD and that the projects were simply not important enough to go on?

376. **Mr N Lavery**: I take your point, and that is why I referenced the evidence and innovation strategy. It is probably going too far to say that they were not linked to DARD's aims and objectives, and the report raises issues with the corporate planning. That is too far. When we brought in the evidence and innovation strategy, we had a look at the individual projects. Norman, do you want to add anything to that?

377. **Mr Fulton**: Yes. It might help the Committee if I explain the processes that existed from 2005. From then, the initiation of project proposals came from AFBI, but they came to the

Department and went to the relevant policy lead in the Department, who considered them in the context of DARD's strategic priorities and the potential benefits to either the industry or to DARD from a policy development implementation review perspective. That person looked at the costs and made a recommendation, which then went to the DARD strategy board, which was headed by the permanent secretary, and it took a decision on the conduct and either approved that project or did not.

378. I will give you some context. In the period from 2006 to 2010 when we changed to a different process, about 90 projects came forward from AFBI. Of those, only 54 were approved by the Department. So, there was strong scrutiny of the proposals coming from AFBI, and they were very much tested against the DARD strategic priorities. That process was very firmly in place.

379. **Mr Hazzard**: What criteria did DARD use to judge the projects as being either strategic or non-strategic?

380. **Mr Fulton**: There was, if you like, a scoring mechanism in place to help policy leads decide on a proposal coming forward. It looked at the proposal's relevance to DARD's strategic priorities, to the industry and to policy development implementation. So, there was a scoring mechanism to try to guide the policy leads through the process.

381. **Mr Hazzard**: So, for any project to get through, it must be part of DARD's strategic vision?

382. **Mr Fulton**: Yes, it had to be linked to strategic priorities for the Department.

383. **Mr Hazzard**: So, 52 projects that were part of DARD's strategic vision were binned. I do not see the correlation. To me, it highlights the fact that too many projects were not aligned to DARD's strategic vision. They were low priority and did not fit into the bigger picture; so it was cost-effective to bin them at a certain stage.

384. **Mr Fulton**: As I say, 80% of the projects that were ceased had completed their experimental phase and were only then —

385. **Mr Hazzard**: What does that mean in cost terms? Is that the most expensive stage?

386. **Mr Fulton**: It is.

387. **Mr Hazzard**: So most of the money had been spent already.

388. **Mr Fulton**: That is right. Effectively, they had completed the experimental stage, and it was then a case of giving them a firm timeline to complete the write-up process and move on. That certainly was in place.

389. **Mr Hazzard**: Do we know the value of those 52 projects and the money spent?

390. **Mr N Lavery**: As I said earlier, we will have to write to the Committee about that.

391. **Mr Fulton**: Moving on to the system that we put in place from 2011 —

392. **Mr Hazzard**: Before you do so, I am perturbed that, for many years, these low-priority projects went through. What role did Queen's have in the project management or oversight of any of those projects?

393. **Mr Fulton**: They were AFBI projects.

394. **Mr Hazzard**: They were strictly AFBI projects, so DARD had overall oversight then.

395. We talked briefly about project management today. Can somebody break down the team for me? Who was at the top? What level was underneath that? Who was ultimately responsible? You might argue that project management was in place, but if that was the case, those involved — and this is how it looks to many of us and the Audit Office — must have been sleeping at the wheel, because for so many projects to go through and then, inevitably, not go anywhere was a serious waste of public money. I would like to get a good picture of what that project management looked like.

396. **Mr Fulton**: In AFBI?

397. **Mr Hazzard**: Yes. Who was responsible for the DARD-funded R&D projects going through?

398. **Mr Fulton**: During the operation of the old process, a project was initiated following proposals from the AFBI project leader. That then came to the policy lead in the Department to be considered and scored. It then went to the strategy board, and a decision was taken there on whether to approve it. It then went back to AFBI, which had responsibility for delivery of the project. I will hand over to Seamus, who can describe the internal processes in AFBI.

399. **Professor S Kennedy**: As I mentioned earlier, for each project, there was a project leader, who was essentially the project manager. They had a number of staff, depending on the size of the project, who carried out the practical work. Going back to your earlier point, 40 of those 52 projects were stopped because they had come to the end of the road anyway; they were finished. The practical work had all been done. The main expense had been incurred at that stage.

400. **Mr Hazzard**: They had no value, then, going forward?

401. **Professor S Kennedy**: No. Those projects had gone through the beginning, the middle and the end. The experimental work was complete. They were normal projects.

402. **Mr Hazzard**: That is what I am saying: going forward, they were of no value to DARD.

403. **Professor S Kennedy**: No. The work covered by many of those projects would have been taken forward under new projects with, for example, a slightly different focus. Take, for example, tuberculosis: that is a long-running issue, and we have a longstanding programme of TB research. A project would typically run for three years, and then there would be another project, depending on the results coming out of the first project. So, I do not think that it is true to say that they had no value; they had a value.

404. **Mr Hazzard**: I take your point. Perhaps that is not reflected in what we thought. I am still getting my head around the fact that the projects were going through the project management process and annual reviews always in the belief that they would get to the writing-up stage.

405. **Professor S Kennedy**: Yes.

406. **Mr Hazzard**: So, for some reason, it was decided that there was no point in sending those projects through because there was no value in doing so.

407. **Professor S Kennedy**: It depended a lot on the individual projects. It depended on the nature of the work and when results that were worth writing up arrived, because it was not the case that you would always wait until completion of the experimental phase and only then start to write up.

408. **Mr Hazzard**: It may be helpful if the Committee received a list of any of those 52 projects that you are talking about that fed into a different project or was worthwhile. I do not think that the public would see it that way unless they saw that a particular project fed into a particular line of investigation. That may be helpful.

409. **Professor S Kennedy**: I just to want to add that post-project evaluations have been completed on all those projects showing their value.

410. **Mr N Lavery**: That is the point that I was going to make.

411. **Mr Hazzard**: AFBI was established in 2006, but it was only in 2010 that the call for research was issued and designed to ensure that the R&D programme was driven by DARD. Was that call for research restricted to AFBI?

412. **Mr Fulton**: Yes.

413. **Mr Hazzard**: Why not put it out to the wider market?

414. **Mr Fulton**: We have a requirement to set a work programme for AFBI. It is setting the part of the work programme that is associated with R&D. The other part is obviously the diagnostic analytical work

that AFBI would carry out for us. This is one part of the overall equation, if you like, for setting a work programme for AFBI going forward.

415. **Mr Hazzard**: OK. No problem.

416. Again, given that it was implemented only in 2011-12, why did it take DARD so long to assume the lead in commissioning that R&D work from AFBI despite the fact that DARD was paying millions of pounds annually for it?

417. **Mr Fulton**: It was a different system that we introduced. That is not to say that the previous system was wrong per se; it just had a different way of managing the research. So, we moved to a system whereby, under the evidence and innovation strategy, we wanted to be in the driving seat when it came to shaping the overall research programme to ensure that it was policy-led and policy-directed, and also that there was appropriate coverage of the research, right across all our strategic interests, so that, rather than reacting to proposals that came to us, we would steer the research agenda. That was something that we envisaged coming out of the evidence and innovation strategy. As I mentioned earlier, we recognised that it would probably mean increasing our research efforts in certain areas, such as environmental issues and the broader rural development and rural agenda. Those areas may not have received sufficient research efforts when we were reacting to proposals because we were not steering the overall agenda.

418. **Mr Hazzard**: OK. Looking at it now, it is obvious that DARD must take a much stricter line on that. Projects that go through must tie in with the strategic long-term aims of DARD. Again, I wonder what particular lessons were learned from that period. What are the standout changes or evolution that is has acquired so that we can have confidence going forward?

419. **Mr Fulton**: We now have in place quite a sophisticated architecture to guide our annual commissioning process. We have four programme management boards, which are each linked to one of the four strategic pillars of the Department. There is an annual process by which PMBs sit and consider evidence gaps. They also have a very strong stakeholder engagement process. We have an annual stakeholder conference to consider proposals that come forward from the PMBs. In some ways, it is a competitive process because each of the PMBs would probably like to commission more research than we can afford. So, overall prioritisation takes place in an overarching evidence and innovation priorities group. The four PMBs feed their proposals into that. We seek a response to our annual call from AFBI. Effectively, we pose the research question. AFBI comes forward with its proposed way to address that question. That is then considered by the policy leads and is subject to an appraisal etc. The overall final shape of the commission each year is decided on by the overarching evidence and innovation priorities group, which seeks to achieve a balance across the four PMBs and the strategic priorities for the Department.

420. **Mr Hazzard**: Who does that group consist of?

421. **Mr Fulton**: It is chaired by the head of policy group in the Department. The four PMB chairs are members of that evidence and innovation priorities group. Our science advisory branch and the departmental scientific adviser all sit on that group.

422. **Professor S Kennedy**: I just want to add the point that, when DARD approves R&D projects to be carried out in AFBI, very often, that allows us to go to other funding bodies, such as the European Union, and pull in additional funding so that we leverage in more money, which really stretches or adds value to the R&D spend that DARD invests in AFBI. That is a very important part of our work.

423. **Mr Hazzard**: What has been AFBI's record in doing that?

424. **Professor S Kennedy**: It has been quite good. We talked earlier about the growth in external income. Recently, the

Department funded a Northern Ireland contact person for agrifood to assist the industry. Not only AFBI but the universities increased their share of the forthcoming Horizon 2020 programme. So, we are gearing up to increase our drawdown of that source of funding quite substantially.

425. **Mr N Lavery**: We have targets for that under the Barroso task force initiative.

426. Mr Hazzard, you made the point about lessons that have been learnt. Initially, the Department's model for commissioning research was quite devolved. Norman talked about two different models. In essence, the arm's length has got shorter. You could take a completely different approach, which is to devolve it completely and put it out to a third party. We have chosen not to do that. We have quite strong governance control. I think that that is right at the moment. My view is to let us see how that goes.

427. **Mr Hazzard**: I think that you are right to talk about the arm being made shorter. I think that that is the case for a reason. I am trying to get at why it needed to be made shorter.

428. **Mr N Lavery**: I will bring Norman in shortly. Some of the issues that were raised about governance are part of the reason why we have done that. We also wanted to have a closer link between policy and innovation. The point that I was trying to make was that other jurisdictions may be looking at different models, one of which is to completely outsource all that research to a commercial sector. That is not a route that we have gone down.

429. **Mr Fulton**: We changed that approach for those strategic reasons to ensure that we achieved a balance of R&D across all our interests and that it was a policy-driven agenda. So, that was the prime driver for changing the model. As Noel said, Teagasc, for example, down South, is much more at arm's length. The research agenda is effectively set by Teagasc after discussing it with its stakeholders. The Department there takes more of a back seat. It is a different model. All models have their values and drawbacks. There is no one perfect model, that is for sure.

430. **Mr Hazzard**: It sounds as though this has been remedied going forward, but what about the contention that there was not the expertise in whatever project management was in place previously to ensure that R&D was part of DARD's strategic vision? Would you accept or contest that?

431. **Mr Fulton**: There were two different models. Both were based on the premise that any R&D that was approved was in line with a departmental policy objective and strategy. It is just that, under the old model, research was initiated by AFBI. Now, it is initiated in the Department. However, in both cases, it had to be policy-relevant before it was approved.

432. **Mr N Lavery**: I will just add that the Department did put in place the post of departmental scientific adviser to add its strength.

433. **The Chairperson**: OK. Mr Lavery, the C&AG's report clearly highlighted the shortcomings with the financial management, oversight and control of the R&D programme and governance in AFBI. Did the AFBI board actively challenge any of the issues identified by the C&AG, and has the board included members with the sufficient financial expertise to assist AFBI in achieving the required standard of financial management and governance? What is your assessment of the board?

434. **Mr N Lavery**: I will break that down into a couple of points. I know that the board set up a finance subcommittee in 2010-11 to deal with its oversight of this, and I suspect that that was based on internal audit reports and concerns and discussions with the Department. The financial reporting has improved significantly, and we now have a financial implementation improvement plan in place. The board has a finance subcommittee and an audit committee with individual chairs.

435. **The Chairperson**: Who chairs the board?

436. **Mr N Lavery**: The chair of the board at the minute is Seán Hogan, the chair of the finance committee is Hilary McCartan and the chair of the audit committee is Bob McCann.

437. **The Chairperson**: What is the make-up of the members on the board?

438. **Mr N Lavery**: I do not want to give you the wrong answer, so I will pass that over to Professor Kennedy.

439. **Professor S Kennedy**: The finance committee comprises Seamus McCaffrey, who, like the chair, Hilary McCartan, is an accountant, and Hilda Stewart. The chair of the audit committee is Bob McCann, and the other members are Trevor Hinds and Sarah Havlin. Trevor has an HR background, Sarah is a qualified solicitor and Bob is an accountant.

440. **The Chairperson**: Thank you.

441. **Mr N Lavery**: I have been involved in one board assessment with the chair, and the chair has been active in seeking a resolution to these issues. I would also add that the Department meets the board. Gerry, how often is that? Is it half yearly or quarterly?

442. **Mr G Lavery**: I think that it is half yearly.

443. **Mr N Lavery**: The departmental board meets the AFBI board. I can give the Committee an assurance that matters of finance and governance are very high on my agenda for that meeting.

444. **The Chairperson**: Who sits on the departmental board?

445. **Mr N Lavery**: Me, the deputy secretaries, the departmental finance director, the HR director and two independent members.

446. **The Chairperson**: Who are they?

447. **Mr N Lavery**: The two independent members are —

448. **The Chairperson**: Who are all the departmental board members?

449. **Mr N Lavery**: Sorry, I will run down the table for you. Me; Gerry; John Speers, who is currently head of policy; David Small from service delivery group; the Chief Veterinary Officer Robert Huey; the finance director Graeme Wilkinson; and corporate services director Tracey Teague. The two independent members are David Russell and Frank Caddy.

450. **The Chairperson**: That is good to know.

451. Going back to the 1995 Westminster report — some of the issues have been covered — the problems that arose from that report are similar to those we are dealing with here today. Given that the 1995 report recommendations were slow to be implemented, I suppose that, in a sense, there is no point in us being here today to discuss this if the Committee's recommendations are not implemented. We will look at the memoranda of reply that you will respond to with a view to review those in 12 months. I think that it is fair to say that we will be doing that.

452. Finally, Mr Lavery, what corporate governance arrangements are in place for AFBI? How have those been strengthened in response to the Audit Office findings?

453. **Mr N Lavery**: There are a couple of points, Chair. I recognise that, a number of times in the report, the Audit Office refers to the improved governance arrangements already put in place. Paragraph 5.11 refers to further recent improvements in governance, and paragraph 5.12 refers to the costing systems. Paragraph 5.20 states:

"DARD's procedures for commissioning and managing the research and development it procures from AFBI were substantially strengthened in 2011-12".

454. Paragraph 3.7 is about positive developments regarding business plan targets.

455. I can give the Committee an assurance that those improvements are already in place. I can give the Committee additional assurances on a couple of points. I said that the finance team

has been strengthened, and there is a finance improvement plan in AFBI. Norman referred earlier to an enhanced regime of appraisal and scientific testing. There is enhanced DARD oversight, and I have requested a report to the departmental board on the back of Norman's quarterly meetings with AFBI on the governance and budgetary issues arising in AFBI.

456. Only last month, the departmental board received a report on AFBI's performance against its business plan targets, and it will continue to do that quarterly. As I said, I have requested that Professor Kennedy, in addition to the other assurances that he gives me, gives a specific assurance quarterly on his management of R&D expenditure. Also, in the new regime on the evidence and innovation strategy, Norman's team and the team within policy are getting quarterly costs for those R&D projects. I believe that that is a comprehensive regime, in addition to the other controls that the Department has.

457. I would like to point out that last year AFBI achieved unqualified accounts and a 99·7% out-turn on its budget. That is the comment that I would like to close those remarks with.

458. **The Chairperson**: Thank you. I think that Mr Clarke wants in on that comment.

459. **Mr Clarke**: I just want to take a bit of wind out of your sails, Noel. You are very quick to tell us what you are going to do about AFBI, but what are you going to do about your own Department? It was its lack of a grasp of the finances of AFBI in the first place that brought us here today. You are quick to tell us what you are going to do to bring AFBI into line, but I did not hear what you are going to do within your own organisation, unless I missed that bit.

460. **Mr N Lavery**: There are a couple of points on that. First, on the Department's oversight of AFBI, which is where you are going, I said the departmental board will look at any issues arising from the sponsor branch's oversight of AFBI. That is the departmental board in Norman's area of the Department and its oversight of AFBI. I am getting assurances from AFBI, and I will be testing those. I will get internal audit to look at our sponsorship of AFBI and will look at AFBI's performance against its targets. There are a couple of points to make on the Department's oversight role. First, we have changed our system of commissioning research. That is an absolutely core part of what we are doing. Regarding statutory testing, we accepted the recommendation to look at benchmarking.

461. **Mr Clarke**: That is fine, because you are relatively new in post, but I will ask your colleague Gerry. This came to light in 2012, and you were the acting permanent secretary in 2010. Why had you not done something prior to 2012?

462. **Mr G Lavery**: We had a number of initiatives at the time, and they are reflected in the report.

463. **Mr Clarke**: Sorry, it was on the basis of a 1995 House of Commons report. You accepted the report from the Audit Office. If you have accepted that, you will accept the Audit Office's criticisms suggesting that those things did not change until, I think, April 2012. I think you told someone earlier that you came into post in March 2010. So, when you came into post in March 2010, I am sure that you knew that there was a particular document floating about regarding references to AFBI in the past. Has it taken Noel Lavery to come into post to fix this, or what were you doing from 2010 to 2012?

464. **Mr G Lavery**: There are two issues there. One is around the financial management from 2010. We took initiatives, reflected in the Audit Office report, which we have agreed. Our board indicated that the financial reports coming to us were insufficient. We wanted a consistent format, and we wanted them drawn from the accounting system and official returns. We recognised that AFBI was attempting to meet the needs of our board by producing ad hoc material, which meant

that every month you got the issue of the month dealt with, but you did not get that consistent financial information that you could compare month on month drawn off the accounting system. We wanted it timeously, and we wanted it to be the same data going to both boards. We did not want a report coming to us that the AFBI board did not see. Those were the issues that we were dealing with. We wanted a narrative commentary, and we have dealt with all that. That is the material that the Audit Office reflect has been the improvement in the financial relationship between the two boards. It is the effort that we made to support AFBI in getting its strategic review under way with the assistance of KPMG consultants. That review, which was undertaken in, I think, 2012 while I was still acting permanent secretary, addressed the vision, the challenges, the priorities and the operating model for AFBI. It recommended that AFBI remain an NDPB. It was the recommendation for a revised organisational structure whereby we reduce from three scientific divisions to two and create space at the table, without additional cost, for a deputy chief post to deal with finance and corporate affairs. That post was filled in January 2013 while I was still in post. So, I did take action on that.

465. Regarding the 1995 report —

466. **Mr Clarke**: That was two years after you came into post.

467. **Mr G Lavery**: If I may. The key issue in the 1995 report, which, I must admit, I read with great admiration, was the contractor/customer split. The recommendation then, because it was a report of its day, was around creating the science service as a Next Steps agency. We did not do that, but, in 2004, we brought in legislation to make AFBI a non-departmental public body, putting it at a more significant distance to create that customer/provider split. In doing that, we did tee up a number of problems for ourselves to get those systems in place. I accept that it took too long to get them in place, but the intention was there to meet the requirements set out in the 1995 PAC report. Today, we are in a very good position vis-à-vis the 1995 report.

468. **Mr N Lavery**: I fully understand the Committee's concerns, having had the 1995 report and having this hearing today. That is why I have given the Committee an assurance on my oversight of these matters. As Gerry said, the majority of concerns identified in the 1995 report have now been addressed.

469. **Mr Clarke**: Sorry, Noel, but most of those were not addressed until 2012.

470. **Mr N Lavery**: Absolutely. I am just making the point —

471. **Mr Clarke**: So, there was an awful time lapse between 1995 and 2012.

472. **Mr N Lavery**: I understand the point; I put my hand up early on, and the Audit Office said that it was too prolonged. The Department and AFBI will accept that, Mr Clarke, but, in fairness regarding the comments made earlier, the positive comments made by the Audit Office all precede me joining the Department. That sounded better in my head than the way that it came out. The Department has also put together an ALB sponsor manual, which preceded me, and the commissioning regime preceded me. I have asked internal audit to have a look at that. I added the extra quarterly reporting, and I added the R&D requirement on Professor Kennedy.

473. Chair, my view is that we now have a robust regime. Time will tell, but I can assure the Committee that we take the governance of AFBI extremely seriously. Again, I welcome the Committee's positive comments about AFBI's performance.

474. **The Chairperson**: Thank you, Mr Lavery. We can only take you at your word.

475. **Mr Rogers**: It is great to get that reassurance. I go back to the 52 projects that were scuppered after the special DARD review. Surely, if there had been effective monitoring and evaluation, and if there had been an

effective annual review and forward work plan for each one of those projects, there would not have been any need for the review. The projects that had come to the end of their lifetime would have been closed down when they were supposed to have been closed down. You would not have needed the other review.

476. **Mr N Lavery**: I go back to the point that Norman made. That was when we introduced our evidence and innovation strategy. So, we were concerned about the balance of the programme at that stage.

477. **Mr Fulton**: It was always envisaged that we would review the entire portfolio of research that was being conducted to ensure that it aligned with the new strategic direction that was set out in the strategy, and we stated that in the evidence and innovation strategy, which we published in 2009.

478. **Mr Rogers**: Surely, if the first review was effective enough, there would not have been any need for a review of the review.

479. **Mr Fulton**: Yes, but the reviews that were taking place in AFBI did not have the benefit of the evidence and innovation strategy. You have to have the strategy in place before you can review against that strategy.

480. **Mr Rogers**: I acknowledge what Mr Lavery just said about lessons being learned regarding the monitoring and evaluation and the effective review.

481. **Mr N Lavery**: We have put our hands up. The weakness in those reviews was that they looked only at benefits and did not take account of the costs, and the costs were being managed at a functional level and AFBI level. The system that we have now is very different from and much stronger than that.

482. **The Chairperson**: As I said, we can only take you at your word, and the proof will be in the pudding. We will keep the memoranda of reply that you will be responding to on review.

483. The Committee has explored deeply today. We have dug deep into the earth in order to do our research going forward with our report. We explored and tried to understand the example of poor stewardship. We will consider the evidence and produce our report in due course. There have been issues around some of the lines of questioning on the further information that your office will provide to the Committee for its report.

484. As has been said by all our members, we appreciate the good work that exists within AFBI. As you said, Mr Lavery, it provides significant benefits not only to the economy but to the farming world here. We appreciate the work that you do and continue to do, but, going forward, we will monitor the way in which the corporate governance is adhered to. As I said, we will do that through our review in 12 months.

485. On behalf of the Committee, I thank you for attending our session.

Appendix 3

Research Papers

Northern Ireland Assembly

Research and Information Service
Briefing Note

21 November 2013

Intellectual Property

What is Intellectual Property?

Intellectual property (IP) is something an individual/business/organisation creates that's unique[1]. Its value, and potential commercial value, lies in its appeal to others who might wish to use it or the goods it describes[2]. Intellectual property (IP) generally refers to:

- creations of the mind, such as inventions;
- literary and artistic works;
- designs; and
- symbols, names and images used in commerce.

National and international laws and conventions recognise the product of a person's mental efforts as an intellectual property right (IPR). An individual's creativity and innovation can be owned in the same way that they can own physical property.

Protecting Intellectual Property Rights

Legal systems recognise that dissemination of creative endeavours can benefit society and stimulate further creative activity. IPRs therefore allow originators to control access by others to the products of their creativity and benefit from it. It will often not be possible to control this access and benefit from it unless the IPRs have been applied for and granted, but some IP protection such as copyright arises automatically, without any registration, as soon as there is a record in some form of what has been created.[3]

1 UK Government. On-line guide: https://www.gov.uk/intellectual-property-an-overview

2 Irish Patents Office About Intellectual Property : http://www.patentsoffice.ie/en/about_intellectual.aspx

3 As cited above.

The main statutory intellectual property rights cover two main areas:

- industrial property, concerning patents for inventions, trademarks and industrial designs; and
- copyright.

The type of protection required depends on what has been created. For example, artistic works are protected by copyright, while inventions are protected by patents. More than one type of protection can be utilised for the same product. For example, you can patent your product and register its name as a trademark.[4]

Copyright

Copyright applies to work that is recorded in some way; rights exist in items such as literary, artistic, musical and dramatic work as well as films, sound recordings and typographical arrangements. It gives the author specific rights in relation to the work, prohibits unauthorised actions, and allows the author to take legal action against instances of infringement or plagiarism.[5]

Copyright is an automatic international right. To protect the work, the author should mark it with the copyright symbol (©), the copyright holder's name and the year the work was created. This protects the work, as it shows others that it's covered by copyright and who owns it.

To be protected by copyright, the work must be original and physically exist (it can't be just an idea). Copyright in the UK lasts for the rest of the creator's life plus 70 years. UK copyright is automatically valid in countries who have signed the Berne Convention.

Design Rights

Designs may be subject to three types of protection,

- copyright;
- unregistered design rights; and
- registered designs which may be registered nationally.

Design rights cover the appearance of a product, in particular, the shape, texture, colour, materials used, contours and ornamentation. A design right does not cover any two-dimensional elements of a design, e.g. a pattern on a product's surface. To qualify as a new design, the overall impression should be different from any existing design. Typically the creator of the design owns any rights in it, except where the work was commissioned or created during the course of employment, in which case the rights belong to the employer or party that commissioned the work.[6]

Unregistered design rights protect the shape or configuration of a marketable (or potentially marketable) product, and are used to prevent unauthorised copying of an original design. Design rights can also be bought, sold or licensed in a similar manner to copyright.[7]

A unique design created in the UK will automatically become an 'unregistered community design'. Unregistered community designs are protected across the EU for up to 3 years after you make the design public.[8]

4 UK Government. On-line guide: https://www.gov.uk/intellectual-property-an-overview

5 The UK Copyright Service Summary of intellectual property rights: http://www.copyrightservice.co.uk/copyright/intellectual_property

6 As cited above.

7 As cited above.

8 UK Government. On-line guide: https://www.gov.uk/intellectual-property-an-overview

Patents

Patents are concerned with inventions producing a technical result - of new and improved products, processes and uses that are capable of industrial application. Patents are grants made by national governments that give the creator of an invention, for a limited period, an exclusive right to use, sell or manufacture the invention. After a patent has been granted, the creator can licence it to other people or defend it against infringements.

Like trademarks, patents are registered at a national or territory level with an appointed government body.[9]

Patent registrations can be complicated and are often handled by patent attorneys. It can take more than 4 years for a patent to be granted. A patent can last for 20 years from the date it was applied for. After a patent has been held for 4 years, it must be renewed every year.[10]

Trademarks

A trademark can be a name, word, slogan, design, symbol or other unique device that identifies a product or organisation. To register a trademark, it must be clearly different from any trademarks already registered for the same type of products or services.

A trademark registration lasts 10 years and is only valid in the country of registration. It can be renewed every 10 years.[11]

Who owns intellectual property?

You or your business usually own the intellectual property if you create something.

If someone employed or subcontracted by an organisation creates something for it, their contract with the organisation should clarify who owns the intellectual property.

Application and Implications

A 2011 report by Professor Ian Hargreaves, *Digital Opportunity: A review of Intellectual Property and Growth*, identified that IP policy is an increasingly important tool for stimulating economic growth[12]. Income generated through the commercial use of Intellectual Property rights can be worth millions of pounds.

Within this context there has been a growing recognition from various government, academic and commercial organisations of the need to effectively manage and exploit the Intellectual Property that they and their staff hold.

The UK's universities are at the forefront of such moves and in May 2013 the Intellectual Property Office launched a new strategy guide called, *Intellectual Asset Management for Universities*[13]. This guide provides advice and information to universities to help them understand how they can best use their institution's IP.

In order to create the best environment for IP to be produced and transferred to practical use, a university must have a suite of IP policies and practices that reflect the university's mission. The policies have to sit in a complementary way with the core objective of knowledge

9 The UK Copyright Service Summary of intellectual property rights: http://www.copyrightservice.co.uk/copyright/intellectual_property

10 UK Government. On-line guide: https://www.gov.uk/intellectual-property-an-overview

11 As cited above.

12 Professor Ian Hargreaves, Digital Opportunity: A review of Intellectual Property and Growth (2011) http://www.ipo.gov.uk/ipreview-finalreport.pdf

13 Intellectual Property Office, New guide for Universities to manage Intellectual Property http://www.ipo.gov.uk/about/press/press-release/press-release-2011/press-release-20110519.htm

creation, scholarship and learning. An IP policy should at the very least ensure that there are arrangements in place for sharing any commercial returns from commercialisation of IP, that recognizes the range of IP activities of the university, and that displays a balance of engaging in IP work for reputational benefit, for positive social and economic impact, and for fiscal returns.[14]

Universities often find it advantageous to work in collaboration with industrial partners or other universities in order to exploit their research. In order to do this they need to have IP agreements in place that ensure that they secure the rights to continue to use existing IP and to exploit the IP that arises from research, whilst also balancing this with working collaboratively with other institutions, public or private.

Many people may have been involved in the work that leads up to IP creation and the work that subsequently reduces it to practice, such as staff, students or collaborators from elsewhere; many of these will not actually own any of the IP that is eventually generated. The legal rules of IP ownership are different for university employees and non-employees such as students, consultants, clinicians, honorary academics and employees of other bodies. It is an important responsibility to ensure that any arrangements which researchers have with others about IP they have created do not conflict with their obligations to the university under the IP policy. This will apply in particular to consultancy agreements and sub-contracting arrangements with other institutions and to any arrangements that an institution makes with third party publishers.[15]

Almost all universities now claim ownership of IP generated by their fixed-term and tenured staff, whether funded internally or by major public sources, such as the Research Councils. This is consistent with the general provisions in IP laws which give broad ownership rights to employers. There are a few exceptions, but these typically reflect situations where, for historical reasons, there are variations in the terms of employment; some staff may possess contracts entitling them to retain IP they generate. It is essential that employment contracts are updated or at least reviewed to ensure that they are consistent with the policies of the university on staff

One example of an institution which demonstrates how effective policies can underpin the commercialisation of intellectual property is Cardiff University, which has generated around £7 million in licence fees and royalties over the last five years through implementing its Innovation and Engagement Strategy. The University's research has been developed into a number of commercial ventures such as MedaPhor Limited, an ultrasound simulation business which specialises in the development and sale of advanced virtual ultrasound training systems for the healthcare service.

Since 2004 MedaPhor has benefited from over £1.3 million of investment and new product development grants. It has also created more than 40 high tech jobs in the local area. Its ScanTrainer which provides fast and effective ultrasound training has now been sold to 11 hospitals and academic institutions in the UK. The company is now expanding its distribution to Europe, the US, the Far East and the Gulf.[16]

Conclusions

- The management of Intellectual Property and the commercial exploitation of this resource for economic benefit at an individual, organisational and national level is becoming increasingly significant;

14 Intellectual Property Office, Intellectual Asset Management for universities (2013) http://www.ipo.gov.uk/ipasset-management.pdf

15 As cited above.

16 Intellectual Property Office, New guide for Universities to manage Intellectual Property http://www.ipo.gov.uk/about/press/press-release/press-release-2011/press-release-20110519.htm

- The exertion of Intellectual Property rights is likely to continue to be a key challenge for government, academic and commercial organisations and their staff
- Based on the evidence presented within this briefing note, which largely focusses on the university sector, the management and exploitation of Intellectual Property relies heavily upon policies and procedures relating to contracts of employment. Anecdotal evidence would suggest that this convention may also apply within other sectors including commercial business and government/publically funded bodies, but this information has proven impossible to confirm within the timeframe for completing this briefing note.

Northern Ireland Assembly

Research and Information Service
Briefing Note

16 January 2014

Intellectual Property Rights

Introduction

Intellectual property (IP) is the term used to describe intangible assets resulting from creative work carried out by an individual or a provider. IP can be traded in the same way as physical assets such as buildings, materials and stock and can be extremely valuable.[1]

IP can include:[2]

- an invention or new product
- a product's design or appearance
- a brand or logo
- written work, like content on a website or in a brochure
- artistic work, like photography or illustrations
- film recordings or musical compositions
- computer software

Intellectual property rights (IPRs) recognise ownership of IP and provide legal protection against imitation, theft or unauthorised reproduction and allow the owner to control what is done with the material they have created.[3] IPRs can take the form of patents, copyright, trademarks, or design rights:

- *Patents* protect technical features and processes, i.e. inventions. They reserve to the patent owner the right to make, use, import or sell the invention. They last up to 20 years, subject to payment of an annual renewal fee.

1 Health & Safety Executive - http://www.hse.gov.uk/research/iprights.pdf

2 UK Government. On-line guide: https://www.gov.uk/intellectual-property-an-overview

3 Health & Safety Executive - http://www.hse.gov.uk/research/iprights.pdf

- *Copyright* gives automatic protection (i.e. registration is not necessary) to original written, dramatic, musical and artistic works, published editions of works, sound recordings, films and broadcasts. Creator's copyright generally lasts until 70 years after death.
- *Trademarks* protect any sign that distinguishes goods and services from competitors'. They can be maintained indefinitely subject to renewal every 10 years.
- *Design rights* protect the physical appearance and visual appeal of products. Registered designs can be maintained up to 25 years subject to the payment of a renewal fee every five years. Design rights are automatic (i.e. do not need to be registered) for three dimensional aspects of a design. Unregistered design rights last for up to 15 years.[4]

IP Ownership

The law on IPRs is governed by the Patents Act, 1977 (as amended) and the Copyright, Designs and Patents Act, 1988 (as amended). Section 39 of the Patents Act makes it clear that intellectual property produced by an employee in the course of their duties becomes the property of the employer.[5]

> *39.-(1) Notwithstanding anything in any rule of law, an invention made by an employee shall, as between him and his employer, be taken to belong to his employer for the purposes of this Act and all other purposes if –*
>
> *(a) it was made in the course of the normal duties of the employee or in the*
>
> *course of duties falling outside his normal duties, but specifically assigned to him, and the circumstances in either case were such that an invention might reasonably be expected to result from the carrying out of his duties; or*
>
> *(b) the invention was made in the course of the duties of the employee and, at the time of making the invention, because of the nature of his duties and the particular responsibilities arising from the nature of his duties he had a special obligation to further the interests of the employer's undertaking.*
>
> *(2) Any other invention made by an employee shall, as between him and his employer, be taken for those purposes to belong to the employee.*

The basic legal situation is that anything created by an employee in the course of his or her employee duties automatically belongs to the employer unless there is some contract to the contrary. In the case of patentable inventions, the law also requires that should the patent result in income for the employer, then some equitable income-sharing scheme be set up with the employee.[6]

Sections 40 and 41 of the Act recognise that employees have a right to a fair share of the benefit derived by the employer from the employee's effort and skill in producing the intellectual property.[7]

> *41.-(1) An award of compensation to an employee under section 40(1) or (2) above shall be such as will secure for the employee a fair share (having regard to all the circumstances) of the benefit which the employer has derived, or may reasonably be expected to derive, from any of the following -*

4 Hargeaves Report, 'Digital Opportunity: A Review of Intellectual Property and Growth', May 2011 - http://www.ipo.gov.uk/ipreview-finalreport.pdf

5 See Intellectual Property Office's amended version of the Patents Act, 1977 (unofficial consolidation produced by Patents Legal Section, 1 October 2013) - http://www.ipo.gov.uk/pro-types/pro-patent/p-law/p-legislation.htm

6 Draft Institutional IPR Policy Statement for SCA Members and Other Organisations across the Public Sector, Naomi Korn and Professor Charles Oppenheim, March 2009 - http://sca.jiscinvolve.org/wp/files/2012/02/3.1-Draft-Institutioanl-IPR-Policy-Statement.pdf

7 See Intellectual Property Office's amended version of The Patents Act, 1977 (unofficial consolidation produced by Patents Legal Section, 1 October 2013) - http://www.ipo.gov.uk/pro-types/pro-patent/p-law/p-legislation.htm

(a) the invention in question;

(b) the patent for the invention;

(c) the assignment, assignation or grant of -

(i) the property or any right in the invention, or

(ii) the property in, or any right in or under, an application for the patent,

to a person connected with the employer.

(4) In determining the fair share of the benefit to be secured for an employee in respect of an invention which has always belonged to an employer, the court or the comptroller shall, among other things, take the following matters into account, that is to say -

(a) the nature of the employee's duties, his remuneration and the other advantages he derives or has derived from his employment or has derived in relation to the invention under this Act;

(b) the effort and skill which the employee has devoted to making the invention;

(c) the effort and skill which any other person has devoted to making the invention jointly with the employee concerned, and the advice and other assistance contributed by any other employee who is not a joint inventor of the invention; and

(d) the contribution made by the employer to the making, developing and working of the invention by the provision of advice, facilities and other assistance, by the provision of opportunities and by his managerial and commercial skill and activities.

Value and Sources of IPRs

The recent review of IP carried out by Hargreaves concludes that IP related spending has come to dominate firms' investment across the developed world. According to the report, UK firms spent £137 billion on intangible investment, or investment in IP, compared to £104 billion on fixed assets in 2008. Global trade in patent and creative industry licences is now estimated to be worth more than £600 billion a year (over 5% of all world trade).[8]

A survey of European inventors conducted in 2003, although now a bit out of date, gives some indication of the main sources of patent applications.[9] Most of the UK inventors (about 90%) were employed by companies (about 30% of these were SMEs). About 28% of the UK inventors received some monetary compensation for their innovations.

The survey report also noted that not all patents are commercially exploited - about 36% of the European patents in the sample were never used for industrial or commercial purposes. Some innovations are patented for strategic reasons (i.e. blocking rivals). Some are licensed out to other parties, and others are not used for commercial purposes because of strategic reasons or because the owners lack the assets to exploit them.[10]

The number of patent applications from Northern Ireland (relative to population size) tend to be among the lowest in the UK and lower than in the Republic of Ireland and most other regions in Western Europe (see Figure 1 and Eurostat data).[11]

8 Hargeaves Report, 'Digital Opportunity: A Review of Intellectual Property and Growth', May 2011 - http://www.ipo.gov.uk/ipreview-finalreport.pdf

9 Final Report of the Patval EU Project, 'The Value of European Patents: Evidence from a Survey of European Inventors', January 2005 - http://ec.europa.eu/invest-in-research/pdf/download_en/patval_mainreportandannexes.pdf

10 Final Report of the Patval EU Project, 'The Value of European Patents: Evidence from a Survey of European Inventors', January 2005 - http://ec.europa.eu/invest-in-research/pdf/download_en/patval_mainreportandannexes.pdf

11 Eurostat patent statistics - http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Patent_statistics

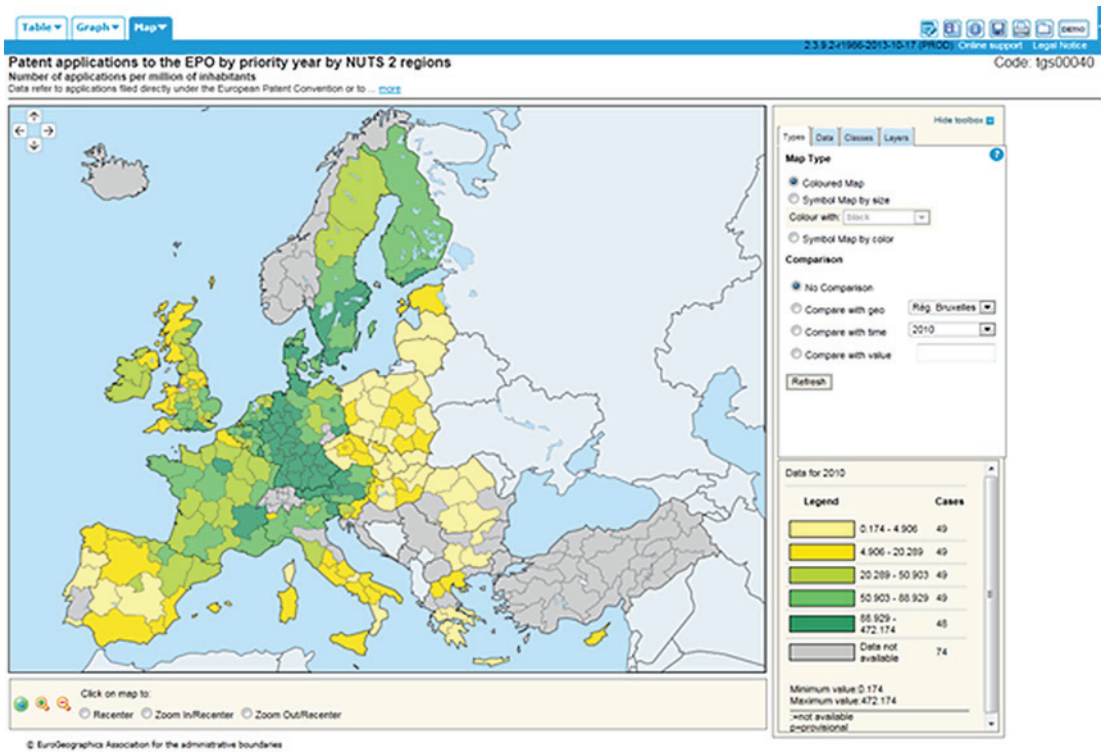

Figure 1. Patent Applications to the European Patent Office in 2010 by NUTS 2 Regions (Source: Eurostat)

The Intellectual Property Office (IPO) provides advice for businesses on IP and has produced guidelines on agreeing royalties or a price for IPRs.[12] The guidelines are aimed at those who are:

- selling or buying IPRs;
- selling or buying any asset protected by IPRs;
- selling or buying any business in which IPRs are significant assets;
- granting or taking a licence of any IPR; or
- appointing a franchisee, distributor or reseller.

For buyers and licensees, the value of IPRs will depend on factors such as whether the IPR allows them to:

- increase sales;
- price their products at a premium;
- reduce production costs;
- increase the speed of production;
- improve the quality of their products;
- create customer following;
- avoid or reduce development costs; or
- erect a barrier against competition.

The advice states that unless IPRs help to create, maintain or increase cash flow, they may have no real value. Their value will depend on their ability to generate revenue in future, or

12 Eurostat patent statistics - http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Patent_statistics

their ability to help the owner or licensee to increase or maintain market share by acting as a barrier to competition. The value of the IPR will change over time.[13]

The IPO describes a number of different approaches to valuing IPRs:[14]

- *The cost method* involves looking at the costs incurred in developing or creating the IPR, or what it might cost to develop a similar product or service. This method assumes that a potential buyer can avoid these costs by buying the IPRs. It appeals to sellers because it seems fair to them that they should receive at least as much as they have spent. However, it is an unsatisfactory method for the buyer as the costs incurred in the creation of the IPRs have no bearing on the income which the IPRs might generate in future or the amount which the buyer will have to spend to get the product to market. The method may be more appropriate when valuing IPRs which are in the early stages of development or when equivalent IPRs may easily be developed.
- *The market value method* involves looking at sales or licences of similar IPRs in the same industry sector. However, it is often difficult to use this method because it may be difficult to identify or obtain information about other transactions involving similar IPRs. The method is unlikely to be used to value patents as the value of a patent depends on its novelty, and that novelty means that comparable information is unlikely to be available.
- *The income method* involves looking at the future income which the IPRs might generate and the costs of generating that income over the economic life of the IPR. It is difficult, however, to estimate the economic life of the IPR and the potential market in order to forecast future income. The way in which the IPR is exploited, the costs involved, the time it will take to get to market, and the risks involved will also vary from business to business.
- *The relief from royalty method* is a sub-method of the income method. The thinking behind this is that if the buyer did not own the IPR, it would need to buy or take a licence of it. Therefore, the value of the IPR should be equal to the present value of the royalties which the owner does not have to pay to use the IPR.
- *Rules of thumb* - In the 1970s, Goldscheider and colleagues found that companies were paying a median royalty rate of 27% of operating profit.[15] This gave rise to a 25% rule of thumb being used by many businesses as a starting point to calculate royalty rates. Degan and Horton found that, when asked what financial measures they used in determining royalty amounts, more than half of the companies surveyed listed discounted cash flow or profit sharing analysis, while nearly a quarter used the 25% rule as a starting point.[16] In many negotiations the royalty rate actually agreed for a patent turns out to be somewhere between 25% and 33.3% of the licensee's anticipated gross profits (before tax) on sales of products which use the patent. For a trade mark the royalty rate is more likely to be between 10% and 15%. Most royalties are on net sales, so the 25% rule is adapted to give a rate on net sales. In many sectors the average royalty rate based on net sales turns out to be in the region of 5%. This is an average and the figures which underlie it vary widely. All rules of thumb ignore important factors such as the investment needed, the risks involved and the circumstances of the parties and should therefore be no more than a starting point for negotiation.[17]

13 Intellectual Property Office, 'Agreeing a price for IP rights' (IP Health Check 2) - http://www.ipo.gov.uk/whyuse/business/iphealthcheck.htm

14 Intellectual Property Office, 'Agreeing a price for IP rights' (IP Health Check 2) - http://www.ipo.gov.uk/whyuse/business/iphealthcheck.htm

15 KPMG Report (2012), 'Profitability and royalty rates across industries: some preliminary evidence' - http://www.kpmg.com/Global/en/IssuesAndInsights/ArticlesPublications/Documents/gvi-profitability-v3.pdf

16 KPMG Report (2012), 'Profitability and royalty rates across industries: some preliminary evidence' - http://www.kpmg.com/Global/en/IssuesAndInsights/ArticlesPublications/Documents/gvi-profitability-v3.pdf

17 Intellectual Property Office, 'Agreeing a price for IP rights' (IP Health Check 2) - http://www.ipo.gov.uk/whyuse/business/iphealthcheck.htm

Northern Ireland Assembly

Appendix 4

Correspondence

Correspondence relating to Potato Partners NI Ltd.

From the Assembly Liaison Officer

To: Michaela Boyle, Chair, Public Accounts Committee
From: Richard Emerson, NIAO
Date: 18th October 2013
Re: Potato Partners NI Ltd

Potato Partners NI Ltd (PPNI) wrote to NIAO on 27th September 2013 putting forward their views in relation to the recently published NIAO report on the Agri-Food and Biosciences Institute.

The C&AG replied to PPNI on 18th October. In his reply, the C&AG explained that he would copy PPNI's letter together with his reply to the Chair of the Public Accounts Committee. This was to ensure that the views expressed by PPNI are available to the Committee in advance of their forthcoming evidence session on the AFBI report. Accordingly, I have attached these documents for your information.

If you have any queries please do not hesitate to contact me.

NIAO

Kieran Donnelly
Comptroller & Auditor General

Northern Ireland Audit Office

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Mr Geoffrey Conn
Chairman PPNI
58 Tober Road
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18 October 2013

Dear Mr Conn

The Agri-Food and Biosciences Institute (AFBI)

Thank you for your letter of 27 September regarding the above report.

Firstly, I am grateful for the support of your sector for the work of NIAO in trying to ensure that value for money is achieved for the taxpayer, and for our scrutiny of Government bodies to this effect.

I note your concerns around NIAO's analysis of the potato breeding project within the recently published report on AFBI. I welcome the opportunity to explain the context to this report, and why I consider the analysis of this project within this report to have been accurate, and the conclusions reached to be justified.

Firstly, it is important to highlight that this was a very wide ranging strategic review of AFBI since its establishment in 2006. The report considered the areas of:

- financial and performance management;
- management and oversight of the DARD-funded R&D programme; and
- corporate governance within AFBI and oversight of the Institute by DARD.

As such, the study involved a very comprehensive programme of fieldwork, and in such circumstances the case studies were chosen to be illustrative of wider, more strategic and thematic issues rather than to represent detailed individual evaluations.

Within our review of the DARD-funded R&D programme delivered by AFBI, it was important for NIAO to assess the potato breeding programme. This was due to the amount of funding committed to the programme and the fact that, in 1995, the Public Accounts Committee had specifically highlighted both the lack of market success achieved by it, and its longevity. As Comptroller and Auditor General, I determined that my primary focus in assessing value for money from this project should be based on:

- total project costs;
- the extent to which meaningful and ongoing action had been taken by DARD and AFBI to review the viability of the project; and
- the strength of performance outcomes achieved by the project, and the steps taken to improve programme effectiveness.

In this respect, I consider that the report captures the relevant information and data, and it is important to note the facts around this case study were agreed with DARD through a very detailed clearance process prior to publication. The case study does not purport to be a comprehensive evaluation of the project nor does it make any value judgments about AFBI's scientific work on this project. Furthermore, given that the facts were agreed fully with DARD and AFBI, I do not accept that the presentation of these facts is ill-informed, misconceived or superficial.

Nonetheless, I would like to thank you for bringing your comments on the programme to my attention. In particular, it is evident that you have strong views around the success of the programme in developing new seed potato varieties, as well as concerns over the failure to maximise the commercial potential of such varieties over a considerable period.

Consequently, I am copying your letter together with my response to the Chair of the Public Accounts Committee to ensure that your views are available to the Committee in advance of their forthcoming evidence session on the AFBI report.

Should you wish to discuss this matter further, please do not hesitate to contact me.

Yours sincerely

Kieran Donnelly

Kieran Donnelly
Comptroller and Auditor General

LD30/9/13-4

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The Comptroller and Auditor General.
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27 September 2013

Dear Mr Donnelly,

The Agri-Food and Bioscience Institute (AFBI).

I enclose a paper submitted on behalf of the major organisations involved with the potato sector in Northern Ireland. This has been compiled in response to the references to the Potato Breeding programme in your recent report on the work of AFBI.

We felt it was important to put on record the facts relevant to this work and in particular its commercial exploitation. These did not appear to be adequately recognised in the Report which in our view underestimated the excellence of the breeding work itself and the recent efforts made by AFBI management to resolve the issues, which for many years impeded successful commercial exploitation of new varieties.

We are copying this response to the Chairs of the NI Executives Audit and Agriculture and Rural Development Committees.

Should you wish to discuss or require any additional information please feel free to contact me.

Yours sincerely,

G. G. Conn

Geoffrey Conn Chairman PPNI

Seed Potato Industry Responds to NI Audit Office report on AFBI

To the Comptroller and Auditor General and Chairs of the Agriculture and Rural Development and Audit Committees.

In responding to the Report by the NI Audit Office on the Agri-Food and Biosciences Institute, representatives of the potato industry have come together to urge the Executive to look beyond the ill-informed and superficial comments made in the report relating to the Potato Breeding work carried out by AFBI.

The various industry organisations are making this submission to Comptroller and Auditor General and the Chairs of the Agriculture and Rural Development and Audit Committees of the NI Assembly, to correct some of the misconceptions about the potato breeding programme which the report perpetuates.

First of all, as business owners and managers we fully support the work of the Audit Office in scrutinising the work of AFBI and other Government agencies, to ensure that taxpayers achieve value for money. We note and share the concern expressed about the need, within AFBI, for robust financial procedures which allow strong budgetary control to be exercised and effective project management and evaluation procedures to be adopted.

The common thread throughout the Report is the need for decision making within the organisation to be based on valid factual information. It is therefore surprising and very disappointing that the same rigor was not applied to "analysis" of the potato breeding programme in the Audit Office Report. Had this been done, the unhelpful and superficial comments on the excellent work being undertaken by AFBI on potato breeding would have been avoided.

The objection of the Audit Office to this breeding programme appears to be based on two issues – i) the duration of the programme and ii) the "lack of significant market success".

Programme Duration

Breeding programmes for crops such as potatoes are inherently long term. Even in the very best breeding programmes, and AFBI is one of those, it takes at least 10 years from a breeding cross produces a new seedling, until that "variety" is tested for uniqueness and registered with the EU authorities. Without such testing to prove its difference and obtain official registration, it can not be marketed in the EU.

It will then take a further 5 or so years of multiplication before it reaches volumes sufficient to start generating commercial returns.

In short, plant breeding is a long term process and needs to be funded on that basis – by both the public and private sector organisations involved.

Lack of Significant Market Success

We fully agree with the thrust of the Audit Office argument that the ultimate measures of research success must have an output / outcome focus with evidence of commercial benefit to the industry.

However in the case of a breeding programme, that commercial success can only be delivered through effective marketing of the new varieties – an activity which clearly is one for commercial organisations with the infrastructure and expertise to do this effectively in today's global markets. The role of the owner of the varieties, as protected by Plant Breeders Rights, in this case DANI / DARD and now AFBI, is to build arrangements which ensure effective exploitation of the innovation (the new varieties).

In short, the success of the potato breeding programme depends on two interlinked and interdependent activities – breeding and commercial exploitation.

Breeding

During the period since the breeding work started in 1957 no less than 26 varieties have been registered through the activities of the Loughgall breeding programme. The release has been accelerating in recent years, with sixteen of these having been released since the Westminster PAC report of 1995.

A number of these varieties, including Navan, Carlingford and Sunset, have been recognised by growers throughout Europe and Morocco as having considerable commercial potential. Had their commercial value been realised through effective marketing, the royalty payments earned would have ensured that the breeding programme was now self supporting, or at the very least was well on the way to that ideal.

Commercialisation

So why has this not happened? Essentially the commercial failure is down to a series of commercial decisions by DARD and its predecessors, which were at best unfortunate and at worst inept.

In 1987 all state bred varieties produced throughout the UK were sold to "Plant Breeders International" (PBI) – a part of Unilever PLC. This company (PBI) then became the owners of the varieties which would have been the main money earners for DARD / Loughgall for many years to come. PBI were granted the rights to all royalty income on these varieties, including successful varieties such as Navan, Carlingford and Nieta, for 25 years. This decision effectively cut DARD / Loughgall off from the income stream from all its breeding activities up to that time.

Although breeding then continued at Loughgall there was no means of marketing these varieties until a new commercial partner was appointed by DARD in 1995. This arrangement broke down in 2003; again leaving no commercial partner to market the new varieties still emanating from the Loughgall breeding programme.

Despite multiple representations from local growers, breeders, and merchants asking DARD to resolve the situation quickly, it was only in 2010 with the direct involvement of AFBI Senior Management and the arrival of staff in DARD prepared to address the sensitive issues involved, that a new commercial partner was appointed.

This summary indicates that in the 56 years since breeding work commenced, in only11 of those years has there been an active commercial partner involved in promoting and marketing the varieties bred at Loughgall and who could deliver a return to DARD / AFBI for their breeding investment.

The situation is summed up succinctly in the independent report of the "Support Arrangements and Mechanisms for the Potato Sector" completed for DARD in 2005 by Peter Quinn Consultancy Services which stated –

"In recent years Loughgall has been successful in breeding a considerable number of new varieties which were accepted for the National List and from which significant royalties would have accrued to NIHPBS (AFBI) under a different legislative framework. At present Loughgall is producing new varieties for the National List more regularly than is happening in the Netherlands, which is one of the world's major potato producers".

The situation has been exacerbated in the 7 years between effective commercial arrangements (2003 – 2010) when, not only was commercialisation stalled, but stock levels of varieties were kept to a minimum. This meant that when the contract was signed in 2010 the new commercial partner was starting to multiply up from a zero stock base.

Current Situation

Despite this prolonged period of commercial turmoil it says a lot for the excellence of the AFBI staff that they have continued to work with enthusiasm and diligence – resulting in 10 new varieties being released since the failure of the commercial arrangements in 2003.

Indeed, confirmation of this is obtained through an analysis of the seed potatoes registered in NI in 2013 which shows that 21% of the protected varieties grown here had their origins in the AFBI breeding programme. The figure rises, to almost 30% of the high grade protected variety pre-basic seed grown.

The new commercial partner, selected in 2010 through a competitive process, was Potato Partners NI Ltd. This Company incorporates both local breeders and merchants as well as a large European company with active marketing arrangements in more than 60 countries across the world. This arrangement now provides exciting new opportunities to commercialise the Loughgall varieties through involvement of a professional marketing organisation which is active outside areas such as the Mediterranean Basin, traditionally serviced by Northern Ireland merchants. The facility also still exists for other NI breeders to avail of the expertise within AFBI, as a commercial service.

In Conclusion

We believe that the simplistic statements in the NI Audit Office Report on AFBI which relate to the potato breeding programme have been based on an incomplete understanding of the complex issues involved and inadequately reflect both the strong commercial focus of the breeding team at AFBI Loughgall and the effectiveness of their work. It also fails to recognise the recent actions taken by AFBI management who, once they had the delegated responsibility for the programme, took resolute action, supported by DARD, to ensure that the programme becomes financially sustainable and meets the needs of the industry in the future.

Signed: Date 29 October 2013

Geoffrey Conn. Chairman PPNI .....

Robin Cherry. Chairman NIPMA .....

Adrian Jamison. Chairman UFU Potato Committee .....

Correspondence of 22 November 2013 from DARD

Department of
Agriculture and
Rural Development
www.dardni.gov.uk

From the Permanent Secretary
Noel Lavery

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Aoibhinn Treanor
Committee Clerk
Public Accounts Committee
Northern Ireland Assembly
R.371 Parliament Buildings
Ballymiscaw, Stormont
Belfast BT4 3XX

Date: 22 November 2013

Dear Aoibhinn

NIAO Report: The Agri-Food and Bio-Sciences Institute: 12 September 2013

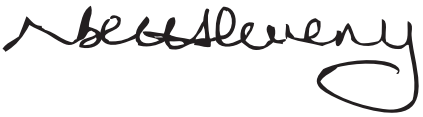
My Department has been in discussions with the NIAO regarding some minor factual errors that we have identified in our preparation for the evidence session on the above NIAO report. Eddie Bradley of NIAO has asked that I write to you outlining these errors so that you may inform the Committee before the hearing on 27 November 2013.

The minor errors which we have agreed need to be amended in this report are as follows:

- **Para 3.4 (2nd last sentence)**: The 2005-06 date referred to in this sentence should read 2006-07.
- **Appendix 1 (text under the heading 2010-11)**: The line of text in this Appendix "AFBI did not have formal BP targets for scientific testing" is not factually correct.

I would be grateful if you could notify the Committee of these minor errors.

Yours sincerely



Noel Lavery
Permanent Secretary

cc Eddie Bradley, Gerry Lavery, Norman Fulton, Lisa-Jane McIlveen, Professor Seamus Kennedy

Correspondence of 3 December 2013 to DARD

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03 December 2013

Dear Noel,

Public Accounts Committee Inquiry into the Agri-Food and Biosciences Institute (AFBI)

Thank you for participating in the meeting of the Public Accounts Committee on 27 November 2013, and for the evidence you provided in relation to the above inquiry.

During the meeting you agreed to provide additional information about a number of issues raised to assist the Committee with its deliberations. I would ask that you provide the following information.

- In relation to all of the AFBI sites, a breakdown of their functions, purpose, area, running costs and staffing numbers.
- In relation to the generation of royalties, officials in attendance undertook to provide the Committee with a breakdown of the royalties received per annum; what those royalties relate to; information on the distribution of those royalties in terms of the percentage share to AFBI, to DARD and to the scientist(s) whose work led to the generation of the royalties; and elaboration of the argument relied upon at the hearing that royalties offset running costs that would otherwise have to be paid by DARD.
- The Baker report of 1987 was discussed in terms of intellectual property and research findings making their way into the economy and driving benefits from research findings out of public sector organisations. The Committee requests a breakdown, with associated figures, of how a return on intellectual property to the inventor works within AFBI, and elsewhere in the public sector.
- A copy of AFBI's rewards to inventors scheme.
- Comparative data on the schemes run by similar research organisations in other jurisdictions.
- An overview of problems the Department has encountered with benchmarking of AFBI, how and in which areas benchmarking is progressing and the order of associated public expenditure. Also, please provide information in relation to where benchmarking **is** delivering results;
- Clarification of how many of the R&D projects referred to in the NIAO report were completed under full appraisal threshold and under the initial estimates.

- The Committee was informed that Post Project Appraisals have now been completed for all the R&D projects and that a proper change control process is now in place, where it was previously missing. The Committee would request information on when the process was introduced and the impact that it has had on projects since its introduction.
- The Committee was puzzled that it had not been possible to establish the expected duration of the 125 projects examined by the NIAO. Witnesses submitted that from the information retained in relation to the projects it might be possible to provide the finalised date for those projects that are completed and those that have had PPEs carried out. Please provide the Committee with more accurate information in relation to each individual project and indicate why it is possible to provide this information at this stage but it was not possible when the NIAO conducted its fieldwork.
- In March 2012, a DARD review of AFBI's R&D projects resulted in two thirds of the projects being immediately terminated. Please provide a breakdown of the cost that had been incurred by each project at the time of termination. Witnesses submitted that value was retained by the public sector as research from these projects was diverted into other subsequent bodies of work. Please elaborate on how this learning was captured, which of the 52 terminated projects fed into other projects, how the Department measures the value of this work and the progress and lessons learned from the Post Project Evaluations of those projects.

I should be grateful if you would reply with the information requested to the email addresses above by Tuesday 17 December 2013. If you have any data handling concerns about the content of your reply, please state and explain them clearly for the Committee's consideration.

Yours sincerely,

Michaela Boyle

Chairperson
Public Accounts Committee

Correspondence of 17 December 2013 from DARD

Department of
Agriculture and
Rural Development
www.dardni.gov.uk

From the Permanent Secretary
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Ms Michaela Boyle MLA
Chairperson
Public Accounts Committee
Room 371
Parliament Buildings
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Belfast

Date: 17 December 2013

Dear Michaela

Public Accounts Committee inquiry into the Agri-Food and Biosciences Institute (AFBI)

Thank you for your letter of 3 December in which you requested additional information in relation to a number of issues that were discussed at the Public Accounts Committee hearing on 27 November. I have attached to this letter detailed responses to all save one of your requests, and I hope that the responses are clear and assist the Committee with its deliberations.

The only outstanding issue, I believe, relates to royalties. The following is intended as a partial response to the Committee's request:

"In relation to the generation of royalties, officials in attendance undertook to provide the Committee with a breakdown of the royalties received per annum; what those royalties relate to; information on the distribution of those royalties in terms of the percentage share to AFBI, to DARD and to the scientist(s) whose work led to the generation of the royalties and elaboration of the argument relied upon at the hearing that royalties offset running costs that would otherwise have to be paid by DARD."

Breakdown of royalties received by AFBI

AFBI receives royalty income from patents which are licensed to animal health companies. These include royalties in relation to sales of a salmon pancreatic disease vaccine and a vaccine against post-weaning multi-systemic wasting syndrome in pigs. The first is by far the less significant of the two, e.g. of the £6.3m gross income from royalties recorded in 2012/13, £347k was received in respect of the Salmon pancreatic disease patent.

INVESTOR IN PEOPLE

The table below has been drawn from AFBI's accounts. From 2008/09 royalties received were reported as a distinct income stream.

Year	Gross Royalty Income
2008/09	£2.375m
2009/10	£2.857m
2010/11	£4.056m
2011/12	£5.248m
2012/13	£6.30m

The 2011/12 accounts indicate that "Royalty income is received gross of a 10% administration fee".

In addition scientists received a share of 10% of royalties in relation to the first patent, inline with AFBI's Rewards to Inventors Policy. This policy was approved by DFP in 2010 and is attached for your reference.

In relation to the second royalty income stream, a proportion was also paid to scientists. These payments were made as a result of claims brought against DARD/AFBI under the 1977 Patents Act. The claims were brought prior to the approval of AFBI's Rewards to Staff Policy. Whilst most of these cases were settled out of court, one remains outstanding. Both DARD and AFBI have obtained legal advice in relation to the disclosure to the Committee of the percentage share of royalties to the scientists for this second royalty income stream. The advice received is subject to further consideration and clarification and, as a result, I am unfortunately unable to provide you with the breakdown requested by the Committee at this point in time. I apologise sincerely for this and would like to assure you that I am seeking to resolve the issue urgently.

The contribution that AFBI's royalty income makes to running costs

AFBI's net royalty income for 2012/13 exceeded £5m; this was after deductions for costs and payments to scientists. AFBI's gross expenditure for this year was £58.8m (excluding taxation). DARD provided £40.0m of resource and depreciation budget, with the balance of funding, some £18.8m, derived from AFBI's external income. Included within this external income was a gross royalty receipt of £6.3m. As noted previously, the net benefit to AFBI of the royalty income, after taking into account deductions, exceeded £5m. Without this income, AFBI would have been forced to ask DARD to reduce its Assigned Work Programme or to provide additional funding to meet this cost.

Please let me know if you require any further information or clarification on any of the responses provided to the Committee's information requests. I will write to you again at the very earliest opportunity in relation to the breakdown of royalty income request.

Yours sincerely

Noel Lavery

Permanent Secretary

Enc:

- Annex 1- AFBI site information
- Annex 2 – Baker Report 1999
- Annex 3- Intellectual Property within AFBI, in the public sector and in other jurisdictions
- Annex 4- AFBI's Rewards to Inventors Policy
- Annex 5 - Benchmarking
- Annex 6 – Projects completed under threshold and below estimates
- Annex 7- R&D change control process
- Annex 8A – R&D project duration (narrative)
- Annex 8B – R&D project duration (spreadsheet)
- Annex 9A – Terminated projects (narrative)
- Annex 9B – Costs incurred on terminated projects at point of cessation

Annex 1: A breakdown of the functions, purpose, area, running costs and staffing numbers for each AFBI site

Newforge Lane

Agri-Environment Branch

This Branch is based at Newforge Lane and uses facilities and land at Hillsborough for its field work. Agri-Environment Branch activities are focussed on assessing the environmental impacts of agriculture, with the overall objective being to develop an integrated research programme addressing land and nutrient management issues. This includes DARD funded research on greenhouse gas emissions, water quality, soil quality and sustainable nutrient management. The Branch provides a sound scientific basis for government policy on agriculture and the environment and helps Northern Ireland comply with a range of EU legislative measures e.g. the Nitrates Action Plan. The Branch is participating in a number of cross-border and EU research projects in these areas.

Plant Health and Environmental Protection Branch

The Branch has two main activity areas: Plant Health and Biodiversity and Plant Diagnostics and Biomaterials. The Plant Health and Biodiversity programme includes the study and control of fungal, bacterial and viral diseases; vertebrate and invertebrate pests and weeds of arable, horticultural, grass, forestry and sustainable energy crops. This is linked to the Plant Diagnostics and Biomaterials programme which includes expertise in identifying plant, pest and microbial pathogens. For example, the unit confirmed the first cases of *Chalara fraxinea*, the cause of Ash Dieback in autumn 2012 and it currently provides a diagnostic service for DARD and DAFM with thousands of tests carried out on suspect ash samples during the last year.

Fisheries and Aquatic Ecosystems Branch

This Branch is located primarily at AFBI Newforge with a smaller station based at Bushmills. The key programmes within the Branch focus on marine ecosystems, coastal zone management, biological oceanography and freshwater fisheries. One of the important resources within this Branch is its marine research vessel, the Croystes. This ship is used to carry out projects in the Irish Sea, including fish stock assessments and sea bed mapping.

Much of the Branch activity is carried out to provide scientific evidence to support policy for DARD and other Government Departments, such as DCAL. The Branch, in collaboration with Agri-Environment Branch, is also involved in providing advice on sustainable management of Lough Neagh commercial and recreational fisheries.

Food Science Branch

The Branch has core expertise in food chemistry and microbiology and underpins AFBI's statutory analytical work and emergency response capability on chemical, bacterial and radionuclear contaminants. Food Science Branch also provides specialist advice to Government and the private sector. This capability is underpinned by research which the Branch conducts on behalf of DARD and other Government departments, including the Food Standards Agency, and food businesses. Collaboration with other AFBI branches allows this research to encompass the entire food supply chain through to the quality and safety of the food produced. The Branch is also UK National Reference Laboratory for Milk and Milk Products.

Agricultural and Food Economics Branch

The Branch has an established national and international reputation for providing high quality socio-economic research to support decision making in DARD and other Government Departments, Non Governmental Organisations and the private sector. The research

programme encompasses sustainability of agri-food systems, environment and climate change and rural development and policy impact analysis and includes projects on the dairy, beef, sheep meat, pigs, poultry, cereals, oilseed and liquid biofuel sectors as well as the rural environment and rural society. This provides an evidence base in relevant and accessible formats for stakeholders via policy and practice briefs, reports, research papers, seminars and tailored knowledge transfer events.

Hillsborough

Agriculture Branch

The Branch is based primarily at the 310-hectare AFBI farm at Hillsborough with a smaller unit conducting research at a monogastric research facility and endocrinology laboratory at AFBI Newforge. The Hillsborough site also includes the Renewable Energy Centre.

AFBI Hillsborough, with its specialised experimental facilities, is used in multi-disciplinary research programmes with the analytical services laboratory providing a commercial forage analysis service for the dairy, beef and sheep sectors. Branch resources are focused on the development of research programmes on climate change (measuring agricultural greenhouse gas emissions; renewable energy generation and use), sustainable livestock systems (dairy, beef, sheep and pigs & poultry) and knowledge exchange. Much of this research activity is carried out on behalf of DARD but the Branch also undertakes research for other funding bodies including EU, farmer research levy boards (AgriSearch and PigRegen Ltd) and a range of commercial companies.

Loughgall

Crops, Grassland and Ecology Branch.

This Branch is centred at the Loughgall and Crossnacreevy sites, with a small number of staff also based at Newforge.

The key objective of work within the Branch is to exploit the diversity and range of crop plants which can be successfully and economically grown in Northern Ireland while considering options and adaptations to cope with predicted climate change. The Horticulture, Plant Breeding and Land Use programme is centred AFBI Loughgall. The horticulture research programmes are aimed at meeting the needs of industry and focus on mushrooms and top fruit. Plant breeding programmes also provide the research base for the breeding of new varieties' of grass and potatoes. The land use programme includes research on short rotation willow coppice as a renewable energy option.

Crossnacreevy

Crops, Grassland and Ecology Branch.

The Plant Testing and Agronomy programme within the Branch is based at AFBI Crossnacreevy and includes the Official Seed Testing Station where the annual recommended list of grass and clover varieties is a key tool for advisers and the seed industry.

Bushmills

Fisheries and Aquatic Ecosystems Branch

Part of the Branch is located at AFBI Bushmills, based at the River Bush where there is longterm research into the ecology and population dynamics of Atlantic salmon. Its experimental facilities allow trapping and counting of wild salmon smolts (juveniles) migrating

to sea and adults returning to freshwater to spawn. This site is not owned by AFBI. It is owned and operated by DCAL.

Stormont Site & Omagh

Four of AFBI's five Veterinary Science Division (VSD) Branches (i.e. Bacteriology, Chemical Surveillance, Immunodiagnostic and Virology) are located entirely on the VSD Stormont site. Disease Surveillance and Investigation Branch is predominantly based on the Stormont site but also operates from a smaller satellite Veterinary Investigation Centre in Omagh. This laboratory in Omagh is essential in providing disease surveillance coverage (including large animal post-mortem facilities) to the west of the province.

The main areas of work of the 5 VSD Branches include:

Bacteriology Branch

The Bacteriology Branch is located in a modern building which houses suites of laboratories at biocontainment categories 2 and 3. The work programme includes statutory, analytical and research work, on the major bacterial pathogens of animal and public health significance. Much of this work underpins important DARD animal disease control programmes in areas such as bovine tuberculosis and brucellosis. Other work areas include food-borne zoonoses, paratuberculosis, botulism and mycoplasmosis. The skill base within the Branch spans from traditional bacterial culture methods, through molecular diagnostics, test development, experimental models, immunology and genetics, to experimental design and epidemiology. Bovine tuberculosis is currently a major research focus of the Branch.

Chemical Surveillance Branch (CSB)

The Branch encompasses an EU National Reference Laboratory for veterinary drug residues that provides screening and confirmatory analysis for a wide range of veterinary drug residues and marine biotoxins. Tests are carried out for residues of licensed veterinary drugs and illegal compounds in meat products from cattle, sheep, pigs, poultry and fish, milk and eggs, and animal feedingstuffs. This work is supported by basic and strategic research that has resulted in the development of novel analytical methods for a wide range of compounds.

Disease Surveillance and Investigation Branch (DSIB)

The animal disease diagnostic services provided by the AFBI Stormont and Omagh laboratories safeguards animal and public health by identifying the causes of disease in submitted material and promote the competitiveness of the agri-food industry. Surveillance for notifiable, zoonotic (transmissible to humans) and emerging diseases forms an important part of this work.

A comprehensive range of laboratory tests is available to assist in the diagnosis of animal disease and provide detailed information on the health status of herds and flocks. Specialist advice on animal diseases is given to the agricultural industry and veterinary profession.

A high throughput of diagnostic work allows AFBI to identify outbreaks of notifiable diseases, new or emerging diseases, changes in patterns of endemic diseases and conditions appropriate for further research. These activities help underpin the animal health status of Northern Ireland.

DSIB also operated the AFBI Cattle Health Scheme in Northern Ireland. Benefits of this scheme include improved disease control, improved profitability, advice on biosecurity and certification of cattle health status with regard to BVDV, IBR, L.hardjo and Johne's disease.

Immunodiagnostic Branch (IDB)

A large volume of serological testing is carried out in IDB on behalf of DARD and industry customers. This work includes serological testing in support of DARD's brucellosis eradication programme, surveillance for exotic diseases such as enzootic bovine leucosis and highly pathogenic avian influenza, equine viral serology, avian viral and Mycoplasma serology, and tests required for the export/import of animals. The Branch also maintains contingency plans for outbreaks of major epizootic diseases and encompasses a transmissible spongiform encephalopathy (TSE) testing unit.

Virology Branch

Research and development is carried out on the detection, control and early pathogenesis of viral diseases of economic importance in farm animals, poultry and fish, vaccinology, molecular virology, development of novel diagnostics and the immunopathogenesis of viral diseases. The Branch is also responsible for molecular confirmation of incidences of epizootic disease.

AFBI Estate Cost Data from April 2012 - March 2013

Location	Staff Numbers	Key buildings	Size (approx.)	Conacre & leased from private landowners	Maintenance *(funded by DARD EBF)*	Maintenance *(funded by AFBI - overall figure given)*	Rent *(under terms of lease)*	Leases *(land leased in)*	Rates	Utilities			Water Rates	Cleaning	Catering *(overall figure given)*	Security	Other Premises Costs *(CRCEES included as an overall figure here)*	Total
										Electricity	Gas (heating)	Oil (heating)						
Crossnacreevy	37	Laboratory facilities (1,325m^2), farm buildings, storage buildings	34.83 ha	33.29 ha	79,721		91,500	17,089	50,536	88,356		22,621	2,310	27,627		0		379,759
Hillsborough	102	Office accommodation (1,500m^2), conference facilities, animal accommodation, farm buildings, Renewable Energy Centre	181 ha	162 ha	202,323		500,000	54,586	109,520	164,588		56,262	22,200	21,822		4,426		1,135,727
Loughgall	56	Laboratory facilities (900m^2), office accommodation, farm buildings, storage buildings	94.77 ha	Approx. 23 ha	217,957		135,000	5,465	22,295.47	80,467		23,792	5,255	27,627		0		517,859
Newforge	304	Various laboratories (19,200m2), greenhouses/storage buildings	17 ha	None	600,389		1,785,000		626,648	281,830	207,517		49,527	116,584		175,813		3,843,308
Omagh	18	Laboratory facilities (865m^2), post mortem rooms, office accommodation, animal accommodation	1.05 ha	None	102,600		70,000		20,371	13,687		33,397	1,159	4,101		0		245,315
Stormont	284	Laboratories to include Lamont Building (11,000m2), post mortem rooms, office accommodation, animal accommodation	28.33 ha	Approx. 12 ha	913,785		1,515,000	6,000	412,237	622,125	350,634		50,911	81,404		153,096		4,105,192
Bushmills*	7	Portacabin laboratory (180m^2)	No land	None			7,036											7,036
Other**					417,815	653,199		1,913						27,904	7,127		145,900	1,253,859
TOTAL					£ 2,534,590	£ 653,199	£ 4,103,536	£ 85,053	£ 1,241,608	£ 1,251,053	£ 558,151	£ 136,072	£ 131,361	£ 307,068	£ 7,127	£ 333,335	£ 145,900	£1,488,055

* Sub-Lease of Bushmills Salmon Station from DCAL Lease of McNaughton estate

** Other Costs which are difficult to pro-rata against individual sites but need to be included.

Note: In addition to AFBI leasing in land, there is also land rented out by AFBI at Loughgall which equated to an annual income of £3,564.75

ALL FIGURES QUOTED ARE NET VALUES

HM TREASURY

Research and enterprise

August 1999

"Creating knowledge creating wealth" Realising the economic potential of public sector research establishments

A report by John Baker to the Minister for Science and the Financial Secretary to the Treasury

Contents

External links

- DTI's Research and Development website

1. Executive summary

2. Introduction and background to the study

Remit

1.1. I have been tasked by the Treasury and DTI Ministers to:

investigate the commercialisation of research in the Government's public sector research establishments ("PSREs") - focussing in particular on issues of good practice, barriers to successful commercialisation, culture, management and the PSRE-sponsor body relationship.

make recommendations for increasing the rate at which their research is successfully commercialised, consistent with other Government objectives for PSREs.

The full terms of reference are at paragraph 2.4.

Context

1.2. PSREs are a diverse collection of public bodies carrying out research in pursuit of various Government objectives, including improving quality of life and economic development through advances in basic science and informing Government policy making and statutory and regulatory functions.

1.3. In machinery of Government terms, PSREs fall broadly into two groups: those that are part of, or directly sponsored by, Government departments; and those which are sponsored by the UK Research Councils. A list of PSREs considered in this study are at Annex 1.

1.4. This study is a contribution to the Government's policy objective of improving the contribution of publicly funded science to wealth creation, and of ensuring the productive use of Government assets. It fulfils a commitment made in last year's Competitiveness White Paper which addressed the importance of translating research from both the university and Government sectors into jobs and prosperity. PSREs generate large bodies of knowledge predominantly at the taxpayer's expense, and there is a moral and economic imperative to ensure not only the advancement of knowledge but, where possible, the exploitation of that knowledge for the benefit of the nation.

1.5. In carrying out the study I noted that many PSREs are already active in commercialisation, and that Government policy has for some time encouraged this. I therefore saw my role as helping to give fresh impetus to efforts already in train, rather than suggesting totally new departures for Government. I was also clear that my task was not to review the continuing status of PSREs as public sector bodies, which is the function of the Prior Options Reviews.

Methodology

1.6. Between February and June 1999 I gathered data for my study by means of questionnaires issued to over 40 PSREs and meetings with key individuals in PSREs, their sponsor Government departments and Research Councils, and other interested bodies. I also chaired a relevant conference. I was supported by a small team of officials from the Treasury and the Office of Science Technology ("OST") within DTI. There is a description of the data gathering process in chapter two. It is important to note that my coverage of PSREs was not exhaustive.

Current practice, the scale of the knowledge transfer opportunity and principles fot this study

The current state of play

1.7. Many PSREs are engaged in commercialising their research and expertise.

1.8. PSREs' commercialisation activities take a variety of forms. Common routes are collaboration with industry to solve problems (often in the context of contract research for industry), and the licensing of technology to industry users, either directly or through intermediaries like BTG. Many PSREs are also engaged in the sale of services, data and software to the business sector. The formation of joint ventures and spin-out companies is rarer, and where is does occur is usually associated with PSREs which have links with industry where there is a strong demand for the output of research, in particular the biosciences and defence industries. In some instances, PSREs see the free dissemination of their research outputs as the most effective means of knowledge transfer, with economic benefits accruing to an industry as a whole, rather than to individual players.

1.9. Collectively, I have adopted the term "knowledge transfer" to encompass these different routes for exploiting research outputs. I see no reason to doubt that all these routes, including free dissemination of research outputs, have their place, provided that there are systems in place for ensuring that the most appropriate is chosen.

The scale of the opportunity for knowledge transfer

1.10. It is generally perceived in Government and in PSREs, and it was a theme of the conference I chaired in April, that the Government sector taken as a whole is not as advanced in the knowledge transfer arena as the best of the university sector - or as the Government sector in the US. My study did not allow a direct comparison of these sectors. Nevertheless I was anxious to determine to what extent any under performance of PSREs was a reflection of the opportunities for commercialising PSRE research (as distinct from the capabilities for commercialising).

1.11. I found that the scale of the opportunity varies greatly depending on the size and mission of the PSRE, the kind of science it does and the nature of the industry sectors for which the science is most relevant. Only a minority of the intellectual property generated in PSREs is likely to have large commercial potential. Nonetheless, much more could economically be done to ensure that opportunities for translating research into jobs and prosperity are identified and exploited.

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1.12. The strength of the demand from industry is probably the single biggest determinant of the commercialisation opportunity. An industry dominated by large successful companies, for example pharmaceuticals, has the resources to seek out and exploit PSRE research effectively. Small, fragmented, or low margin industries like sections of the UK engineering sector provides little "industry pull". If the Government wants to address PSRE commercialisation in the round, it will need to consider how to maximise industry pull, as well as "PSRE push".

1.13. I found that some PSREs questioned the relevance or appropriateness of the commercialisation agenda to their institution. I recognise that it will not be productive for all PSREs to engage with this agenda, and that the biggest advances are likely to be the result of existing players getting better at the knowledge transfer game. Nonetheless, I believe the presumption should be for all PSREs to engage.

Principles for the study

1.14. In seeking to frame recommendations for action, I found it necessary to be explicit about the principles or "ground rules" governing the form and extent of a sensible and effective Government agenda. These are as follows:

I take it as read that the first priority of each PSRE continues to be the advancement of knowledge in pursuit of the Government objectives which it serves. Commercialisation of research outputs is a second priority. Nothing I advocate in this report is intended to undermine the capacity of PSREs to deliver their primary outputs.

That said, the presumption should be in favour of pursuing knowledge transfer where possible. Government and PSREs should ask "why not?" not "why?". Where there are potential conflicts of interest (between different PSRE objectives, or for individual scientists) the aim should be to manage the conflict. The potential for conflict should not in itself be a reason not to engage in knowledge transfer.

I take it as read that the main reason for pursuing knowledge transfer is to create economic benefit for the nation, rather than generate additional revenue for the Government. Nonetheless, PSREs need the incentive to generate revenue in order to engage in wealth creation activities.

Knowledge transfer is a difficult and complex process. Government should be realistic about what is needed to do it properly: commitment, resources, skills and proper management systems. In

particular, Government must recognise that effective knowledge transfer costs money. Even the proactive management of IP, a prerequisite to commercialisation, is expensive.

PSREs are not a homogeneous universe of bodies. They encompass a very broad diversity of size, mission, types of science and constitution. There can be no question of a "one size fits all" solution for boosting the level of knowledge transfer. Nor does central Government have the means of prescribing in detail the solution for each PSRE. It should concentrate on creating, and if necessary policing, a supportive framework of rules and incentives within which the right people can make sensible decisions about commercialisation

In particular, it seems to me impossible for central Government to favour particular routes to market over others. The best route to market will depend on a host of factors concerning the nature of the PSRE, its science and its potential markets. What Government must seek to ensure is a commitment to knowledge transfer, buttressed by systems for making the best choice of route to market, after a full consideration of the options.

If Government is keen to see industry demand for PSRE outputs maximised, it must accept that industry is global and that some commercialisation deals will entail the export of UK-generated intellectual property as well as the import of foreign generated IP. This is considered further in chapter 3.

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Culture and commitment: the knowledge transfer mission

1.15. I found that technology transfer is most effectively pursued in those PSREs which see it as an explicit part of their mission and culture, and where it is enthusiastically led by senior management, and supported by the sponsor department or Research Council. These are critical success factors, but are far from universal. There is considerable scope for imbuing PSREs and their sponsors with a greater sense of mission in relation to technology transfer.

1.16. PSREs need not only commitment to knowledge transfer, but permission to pursue it whole-heartedly. Knowledge transfer is currently pursued in a public sector climate which is predominantly risk-averse. This culture is inimical to the robust pursuit of commercial opportunities and one that Government must tackle as a priority.

1.17. A more mature and less punitive attitude to risk is needed, which recognises the inevitability of failures and which promotes risk management, not risk avoidance. This is starting to be recognised in the wider context of the Modernising Government agenda, but more needs to be done, and specifically in relation to PSRE knowledge transfer. PSREs should not have to live in fear of punishment for failure after the event, but rather be obliged to have proper risk management systems before the event. The bodies who supervise and audit PSREs should be encouraged to take a portfolio approach to risk, recognising there will be winners and losers.

Recommendations

1.18. I welcome the movement in Government towards a more mature understanding and handling of risk. Treasury and OST should work with the NAO and the PAC to promulgate an accountability framework for commercialising public sector research which emphasises portfolio risk management and transparency of operation rather than incentivising risk avoidance.

1.19. A key challenge for Government is to ensure that leadership in the PSREs is committed to drive commercialisation as an explicit part of their mission. To that end and where such practice is not

already current:

All Government purchasers of PSRE research should have as part of their research mission the explicit objective of transferring PSRE research outputs to the wider economy; this should be explicitly reflected in all contracts between sponsors (and other Government purchasers of research) and PSREs.

PSREs themselves should have knowledge transfer as an explicit part of their mission

The knowledge transfer objective should be embodied in the job description and personal objectives of the PSRE chief executive and be seen as his or her personal responsibility. It should be cascaded through the personal objectives of senior management and scientific staff.

PSRE chief executives should be required to develop, implement and secure staff support for a strategy for identifying and realising opportunities for translating research outputs into wealth creating products and processes. In particular these strategies must address the management systems that will support the commercialisation effort, acquisition of the necessary market knowledge and the management of conflicts of interest.

PSRE chief executives should develop performance measures and targets against which their knowledge transfer efforts can be assessed.

As and when vacancies for PSRE chief executive posts arise, the ability to lead and motivate a PSRE's knowledge transfer activities should be an explicit recruitment criterion.

PSRE/Sponsor relationships: Control of IP and financial freedoms

1.20. I found that a number of key barriers to knowledge transfer arose in the context of the relationship between PSREs on the one hand and their sponsor bodies and other Government funders of research.

Managing intellectual property

1.21. Managing intellectual property - identifying, protecting and exploiting it - is a difficult and complex process. Some PSREs choose to outsource much of this work. This may be an appropriate route particularly for smaller PSREs who cannot support internal expertise. But the responsibility for managing IP still clearly lies with the PSRE chief executive, who must have the ability to exercise that responsibility as effectively as possible. In several instances I have found that this ability is seriously compromised by the insistence of the parent body (or other Government funder) on retaining the ownership of the IP and the authority to assign it to third parties. The result can be critical delay in negotiating licensing deals, especially if the parent wishes to have case by case involvement in decisions about the assignment of IP. I was cited instances of deals falling through altogether because of this. Worse problems arise when the PSRE receives funding from several bodies all with different policies on IP ownership and control.

Financing problems

1.22. PSREs face problems finding:

- development or pre-seed finance - typically for demonstrating the commercial feasibility of prototype products or processes. This is beyond the stage that is funded by research income, but usually before the stage at which business investors or venture capitalists are prepared to step in.
- resources for administering knowledge transfer activities - for

example the cost of the necessary advice, skills, expertise, patenting costs etc.

1.23. The problem is seriously exacerbated for those PSREs, mostly departmental PSREs, which lack the freedom to maintain and deploy surpluses. This arises when parent bodies maintain strict cash controls over their PSREs, preventing them carrying over end-year surpluses, or retaining the proceeds of commercialisation deals. The result is that the PSREs neither can afford nor have the incentive to engage in commercialisation. This is despite the Treasury's guidance on Wider Markets that public bodies should be allowed to retain their receipts from commercialisation activities.

1.24. Similar problems can arise for some Research Council institutes not all of which are content with the arrangements for dividing the proceeds of commercialisation between themselves and their parent Research Councils. Such arrangements should err on the side of generosity and provide proper incentives for the institutes. Research Councils should not and should not be seen to use these arrangements as a means of clawing back grant.

1.25. A number of PSREs also highlighted that they were not eligible to compete in their own right for Government funds available through various Government schemes aimed at promoting closer university/business links, for example University Challenge.

Recommendations

1.26. There is a pressing need to remove the bureaucratic hurdles relating to IP and financial controls. They are a particular problem for those departmental PSREs which do not have ownership and control of the IP they generate, and which are subject to tight financial and managerial controls by the parent department. These PSREs are further constrained by the civil service management code, discussed below. They are, in short, too close to central Government to have the freedoms necessary to pursue commercial objectives effectively. Their position is in contrast to that of the Research Council Institutes, which are more at arm's length from Government.

1.27. I strongly recommend that the departmental PSREs be put at greater arm's length from Government departments. Ministers should consider how this should best be done for each of these PSREs, with the presumption in favour of a move to less central control - except where there is an overwhelming case to the contrary.

1.28. Such a move would improve their capacity to engage in knowledge transfer, and by underlining the purchase/provider split might be expected to deliver wider benefits. At the same time it would not, as far as I can ascertain, undermine their capacity to deliver their primary outputs. Indeed, I have encountered no good reasons why any of the departmental PSREs should remain as such (except in the case of the very smallest, for which the administrative costs of such a change of status might be disproportionate). The Non-Departmental Public Bodies ("NDPB") model would seem to be a good one, but other options might be appropriate in some cases.

1.29. Whether or not Ministers wish to pursue this course of action, there is an overwhelming case for requiring that:

IP generated by a PSRE be owned by the PSRE and assigned by authority of the chief executive, unless effective alternative arrangements already exist (they do so in the case of the MRC, but in no other instances that I have been able to find). The case by case involvement by public sector funders of research in decisions about the assignation of intellectual property - unless they have specific expertise and support to bring to the table - does not generally seem to add value and can be harmful.

Parent organisations should allow their PSREs the full freedoms to carry forward surpluses and retain receipts and other financial freedoms which are available under the Treasury's recent Wider Markets guidance. Arrangements for dividing commercialisation receipts between sponsors/funders and PSREs should err on the side of generosity to the PSRE.

1.30. Other action is needed to address the difficulty of financing the costs of knowledge transfer

Ministers should examine the scope for extending the eligibility criteria of initiatives for promoting knowledge transfer, in particular University Challenge, to include PSREs, where these are not already eligible.

Given the importance of industry demand as a driver of knowledge transfer, Government should look at the scope for drawing PSREs into current schemes which incentivise business to participate in knowledge transfer.

In agreeing future income streams with parent bodies and other purchasers, PSREs should be explicit about the costs associated with implementing a knowledge transfer strategy. Government must be prepared to meet these costs if it wants to give parity of esteem to the knowledge transfer mission.

Government should consider earmarking some funds to meet the costs of knowledge transfer in the PSREs.

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Incentives for PSRE staff

1.31. Scientists are predominantly motivated by the conduct of research and by the esteem that derives from publication and peer review. If greater emphasis is to be placed on knowledge transfer at the Governmental and institutional level, this needs to be reflected by a rebalancing of incentives for scientists, so that there are rewards not only for doing science but also for exploiting it. This need is increasingly being recognised. Schemes for rewarding and incentivising PSRE staff for participating in technology transfer are now widespread within the Research Council Institutes and are regarded as an integral part of the process of promoting commercialisation and an entrepreneurial culture. Government should support this trend, ensuring that such incentive schemes become universal and helping to promote best practice.

1.32. It should be a requirement for PSRE chief executives that they have in place effective schemes for encouraging and rewarding the participation of scientists in knowledge transfer activities.

1.33. OST should help to exemplify and promote best practice in this area including in respect of equity and share options.

1.34. But such schemes cannot be applied in those PSREs which are part of a Government department. Here staff are debarred from gaining personally from involvement in commercialisation as a result of the way the civil service management code is applied. So the ability of a public sector scientist to participate in incentive schemes is determined by a bureaucratic "accident of birth" ie whether the body he or she works for is an NDPB (for example Research Council institute's are not covered by the code) or part of the civil service. This is an illogical and indefensible anomaly. It inhibits the pursuit of the knowledge transfer objective, ensures an inconsistent approach across the public sector and incentivises entrepreneurial scientists to take their talents out of the Government sector. The best long-term way to remove this anomaly is to put PSREs at arm's length from Government, for example as NDPBs, so that they are no longer caught by the Code. But this will take time. Therefore:

1.35. As an immediate priority Ministers should review the application of the civil service management code to the special circumstances of science commercialisation. The effective bar on certain forms of direct participation by serving Government scientists in the commercial exploitation of their research - in particular receiving equity or share options - should be removed. The principles that apply should be the same as the business appointment rules for civil servants: personal gain should not be outlawed; rather it should be permitted subject to having proper systems in place for ensuring the probity of the proposed commercialisation arrangements.

Access to commercialisation expertise

1.36. The commercialisation of scientific research is a complex business, requiring the skills of those who understand business and finance, those who understand science, and those who can effectively bridge the gap between the two. PSREs don't just require advice and encouragement but also deep private sector skills associated with originating the prospects, helping to develop the business case for potential relationships and providing hands-on commercial support during the negotiating phase. This is not easy since the right combination of such people is generally hard to find, not just for PSREs but also for universities and the private sector itself.

1.37. Just as there is no one model of technology transfer, so there is no one approach for accessing and deploying the necessary range of skills to make it happen. This is a case of horses for courses. Some PSREs effectively contract out the entire process to a third party. Other bodies, most notably the MRC, seek to retain all necessary expertise in-house, but can have difficulty recruiting good talent. Larger PSREs (or consortia of PSREs) might be able to justify recruiting in-house specialist teams, but in most cases the costs of doing so are likely to be disproportionate to the scale of the commercialisation opportunities.

1.38. Government's main concern should be to ensure that PSREs are able to access the expertise they need. There is a particular need to ensure that PSREs are not reinventing the wheel and that those which are too small to engage specialist in-house teams or buy in expensive advice, are able to, and encouraged to, network effectively to learn about existing good practice. On the other hand the PSREs which need in-house expertise should have the flexibility to attract and retain the people they need. A number of PSREs find the current public sector pay arrangementsconstrain them in this regard.

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Recommendations

1.39. Sponsors of PSREs should encourage the development of networks among PSREs for the sharing of best practice in knowledge transfer, and to promote synergies.

1.40. PSRE chief executives must ensure that they have access to the skills and experience they need for knowledge transfer.

1.41. Sponsor departments and Research Councils must where necessary support their PSREs in gaining access to relevant expertise, and they should promote a consortium approach to knowledge transfer where this is most likely to achieve critical mass of activity and economies of scale.

1.42. Ministers should consider creating a small expert unit within central Government to drive forward the knowledge transfer agenda - and provide advice, help and encouragement to PSREs and their sponsors on knowledge transfer - particularly in relation to larger

and more complex deals. Such a unit could initially be given a life of say two years, after which time its value would be reviewed.

1.43. Government should seek to improve the flexibility of PSREs to pay market rates to attract and retain people with commercialisation expertise.

2. Introduction and background to the study

2.1. Treasury and DTI Ministers asked me to investigate the commercialisation of research in the Government's Public Sector Research Establishments ("PSREs") and to make recommendation for increasing the rate at which scientific knowledge is successfully transferred to the private sector.

2.2. This follows the DTI's Competitiveness White Paper published in December 1998 in which the Government announced its intention to analyse the potential of PSREs:

"The Government is determined that the Public Sector Research Establishments make the most of the commercial potential of their research outputs. The Government will investigate existing practice and make recommendations in 1999".

2.3. This study, and my leadership of it, was announced on 10th February by the Financial Secretary Barbara Roche and the Minister for Science Lord Sainsbury in a response to written questions asked in both Houses of Parliament.

2.4. The written answer also contained the following terms of reference for the study which were agreed by both the Treasury and the Office of Science and Technology. These are:

"To investigate the commercialisation of research in the Government's public sector research establishments ("PSRE"s) and make recommendations for increasing the rate at which PSRE research outputs are successfully commercialised, consistent with other Government objectives for PSREs, with reference in particular to:

- the role of sponsor departments/Research Councils in promoting the exploitation of research in the PSREs;
- progress in improving the culture of entrepreneurship within PSREs - particularly through the adoption of new guidance on exploiting Government assets;
- the organisational capacity and expertise for managing and exploiting Government IP effectively;
- specific institutional barriers, and possible new incentives;
- spreading best practice;
- the scope for closer co-operation with the private sector."

Public sector research establishments

2.5. Public Sector Research Establishments are a diverse range of public bodies that perform scientific research in pursuit of a range of Government objectives. The main objectives include:

- Improving quality of life

For example, the MRC research establishments all have an objective to develop medical products and services which improve the quality of life for society.

- Economic development through advances in basic science

For example, some of the developments at the Institute of Arable Crop Research have led to improvements in the efficiency of arable production in the UK and across the world.

- Informing Government policy making

Perhaps the most topical example of this is the John Innes Centre's role in advising the Government on the impact of genetically modified crops.

- Statutory scientific testing and regulatory functions

As an example the Veterinary Laboratory Agency is responsible for testing animals for BSE and Tuberculosis.

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2.6. In the main each research establishment focuses on a fairly tightly defined aspect of science. The nature of the science undertaken ranges from basic and fundamental research to more applied work aimed at developing new and innovative products. It also covers a large range of scientific disciplines. These range from plant genetics and animal production to electronics and defence. Annex 1 has a list of all the PSREs considered in this study.

2.7. There is a huge range in the size of the research establishments. By far the largest PSRE is the Defence Evaluation and Research Agency ("DERA") which has over 10,000 employees and a budget of over £1 billion per year. At the other end of the scale several research establishments run by the Medical Research Council ("MRC") look into a specific aspect of medical science and have fewer than 20 people. Three quarters of the PSREs replying to our survey had between 100 and 1,000 employees and a research budget of between £5m and £28m.

2.8. There is also variety in how the PSREs are formally constituted in machinery of Government terms. The main distinction is between departmental bodies responsible to central Government Departments and research council institutes.

Departmental bodies

2.9. Excluding the very small MRC institutes, roughly half the PSREs are departmental bodies. Some of these are executive agencies of a department and some are part of the department. (A few, such as the Scottish Office's five agricultural PSREs, are Non Departmental Public Bodies ("NDPBs") which have more autonomy from Departmental control on issues relating to day to day activities but remain accountable to the relevant Secretary of State).

Research council institutes

2.10. These institutes are sponsored by and accountable to the Research Councils. Consequently, although each research council is accountable to the Office of Science and Technology, research council institutes are at more arms length. Here too there is some complexity. One PSRE (CCLRC) essentially comprises the whole of the research council, others (BBSRC & NERC) have institutes which are legally distinct entities and the MRC has research establishments which are internal departments of the council.

Charitable status

2.11. Several PSREs, including all the BBSRC institutes and many of the agricultural research institutes in Scotland, are registered charities. For most of these PSREs charitable status is a historical legacy which confers benefits, the main one being exemption from most forms of direct taxation.

2.12. Several PSREs we met during the study raised concerns that their charitable status inhibits their ability to commercialise research. Some PSREs also felt that they were at a disadvantage to universities which are exempt charities not regulated by the Charity Commission.

2.13. In general charities are unable to trade unless either the trade is for the public benefit consistent with their charitable objectives or exploiting a financial gain allows the charity to pursue its objectives. Charities can legitimately establish trading subsidiaries which are outside charity regulation and which therefore have commercial freedoms similar to conventional companies. However the additional time and effort required to establish and maintain these separate legal entities can be time and resource intensive. PSREs must determine whether the economic benefit of the commercialisation can support the resources and time required to establish a trading arm.

2.14. It is not clear that this is an issue on which I can assist further as part of my study. This is however a matter the new expert unit I recommend in chapter 7 could take forward with the Charity Commission involving the Treasury and the Office of Science and Technology as necessary.

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Focus on high quality research

2.15. All PSREs have a common purpose to undertake high quality scientific research to meet the requirements of their sponsor department or research council ("sponsor"). It is important that this remains the primary goal of each of the PSREs. None of the conclusions or recommendations arising from this report seeks to detract or divert research establishments from seeking to fulfil the scientific objectives set by their respective sponsors and the goal of producing high quality scientific research.

2.16. In the course of fulfilling their primary objective, Government policy as outlined is the Treasury's guidance "Selling Services into Wider Markets", requires all research establishments to ensure that they maximise the economic benefit of their physical and non-physical assets. All PSREs have a duty to put measures in place to identify research with commercial potential, and to ensure the effective transfer of knowledge into the private sector.

2.17. The purpose of this study is to help PSREs to improve the contribution of publicly funded science to wealth creation and to ensure the productive use of Government assets. Given that PSREs predominantly generate their knowledge at the taxpayers expense, there is a moral and an economic imperative to ensure not only the advancement of knowledge but, where possible, the exploitation of that knowledge for the wider economic benefit of the nation.

2.18. It was immediately clear from my investigation that many PSREs are already active in knowledge transfer and seems to have achieved a degree of success. Given this success and the support the Government has already shown to in this area I saw my role as helping to provide fresh impetus to efforts already in train.

2.19. It is also worth emphasising that my task was not to consider the merits or value for money of the research undertaken by each of the PSREs nor was it to consider whether any of the PSREs should be transferred to the private sector; that is a function of other reviews such as the Prior Option Review and does not fall within the remit I have been set.

Methodology

2.20. During the course of this study I have been supported by a small team of officials from the Treasury and the Office of Science and Technology within the DTI. To establish a base of knowledge for my study I issued a questionnaire to all PSREs with over 50 employees, of which there are over forty. A blank copy of this questionnaire can be found in annex 3.

2.21. I followed up the issues raised in the returned questionnaires by holding a series of meetings with individuals in PSREs, their sponsor department or research council and other interested bodies. The study however does not claim to be comprehensive. It would not have been practical to have met all interested parties and I cannot claim to have done so. My study represents a snap shot of the situation between March and June 1999 based on the responses from questionnaires and meetings. A full list of the organisations met as part of this work is held in annex 2.

2.22. In April I also chaired a conference organised by the Treasury and Arthur Andersen called "Creating Knowledge: Creating Wealth" which looked at exploiting the commercial potential of Government Intellectual Property. This also helped to inform my findings.

2.23. To encourage a frank exchange of views I assured respondents to the questionnaire and those who I met personally that the information they provided me would be treated as confidential. As a result examples referred to in this report have been anonymised unless the information is available publicly already.

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3. Current practice, the scale of exploitation opportunity and principles for this study

Current state of play

3.1. There are many forms in which establishments can transfer knowledge to the private sector. These include:

- collaboration with industry to solve problems (often in the context of contract research for industry)
- the free dissemination of information, normally by way of publication
- licencing of technology to industry users
- provision of paid consultancy advice
- the sale of data
- the creation and sale of software
- the formation of spin out companies
- joint ventures with industry
- the interchange of staff between the public and private sector.

3.2. Licencing, including the licencing of computer software is by far the most common form of formal technology transfer amongst PSREs; over 80% of PSREs who responded to the questionnaire had experience of licencing new technology. Although there are several examples of informal collaborations with industry, formal joint ventures are less common with just under half of respondents registering experience of an industrial joint venture.

3.3. The formation of spin-out companies often grabs the headlines, but these are rarer than the publicity surrounding them would suggest. Spin-outs are commonly associated with industry sectors where the demand for the research outputs is large enough to sustain new companies, such as the biosciences and the defence industries.

3.4. On the other hand several PSREs see the free dissemination of their research outputs as the most effective means of knowledge transfer. This can be an effective way of transferring research knowledge with all the economic benefit accruing to an industry as a whole rather than captured by a small number of individual players. Free dissemination of information is particularly relevant for PSREs in industries where the demand pull is weak or where there is a strong public interest in the wide dissemination of results. For example the Health and Safety Executive firmly believes that the

value to quality of life of its research on safety would be substantially reduced if the release of the information were controlled for commercial benefit.

3.5. I see no reason to question the role that each of these routes, including free dissemination of research outputs, can play in the exploitation of research. Moreover it is not difficult to envisage situations where each of these routes should be applied. What is important is that PSREs have the systems in place for ensuring that the most appropriate route is chosen in given circumstances.

The scale of the opportunity for knowledge transfer

3.6. It is generally perceived in Government and PSREs that the Government sector is not as advanced in the transfer of knowledge as the university sector, or Government sector in the US. Indeed this was a theme at the joint Arthur Andersen/HM Treasury conference that I chaired in April. My study did not allow a direct comparison of the two sectors. Nevertheless during the course of the study I was keen to determine the extent any relative under performance among PSREs was a reflection of the opportunities PSRE research provides for knowledge transfer rather than the capability and effort PSREs devote in this area.

3.7. From the questionnaire responses it is clear that significant efforts are already in place to increase knowledge transfer. Over sixty percent of respondents who are active in knowledge transfer anticipate growth of at least 20% from commercialisation activities over the next year.

3.8. Perhaps unsurprisingly, the wide variety of research undertaken by PSREs results in large disparities in the potential for commercialising research. Only a minority of the science generated by PSREs is likely to be highly valuable, although in my view a much greater percentage is likely to have the potential for knowledge transfer.

3.9. The scale of opportunity for commercialising research is determined in large part by the nature of the industry sector to which the research relates and the nature of the science being undertaken.

Nature of the relevant industry sectors.

3.10. The strength of the demand from an industry is probably the single biggest determinant of the commercial opportunity. Successful industries with large, innovative players will generate a strong demand for the results of the relevant science. Large players also help to forge pathways between scientists and companies and may ultimately acquire small spin out companies, providing an exit route for financiers such as venture capitalists.

3.11. This provides an explanation why those aspects of biomolecular science which have large pharmaceutical companies as the end-user, seems to offer large commercial potential. On the other hand, there are far fewer commercial opportunities for PSREs operating in more fragmented industries where the demand for research is weak. This is not a reflection on the quality of the research undertaken or the willingness of the PSREs to engage in knowledge transfer. Industries such as sections of the UK engineering industry are simply too small, too fragmented and too fragile to have the industry pull to generate large numbers of such exploitation opportunities.

Nature of the science being undertaken.

3.12. The nature of the science has an impact. Research which is results in revolutionary advances in products and processes, particularly biomolecular science, offers potentially large returns on investment. Meanwhile the commercial potential of research which

results in incremental improvements in products is more limited. There is of course a strong relationship between the nature of the science and the level of industry demand.

3.13. As the study progressed I found that some PSREs questioned the relevance and appropriateness of commercialisation to their establishment. I recognise that for some PSREs the commercial potential may be more limited and for others their research outputs are closely tied to other Government objectives such as policy advice or the regulatory system. The biggest advances are therefore likely to be the result of existing players improving their ability to transfer knowledge. Nonetheless, I believe the presumption should be for all PSREs to engage.

Principles for this study

3.14. In seeking to frame recommendations for action, I found it necessary to be explicit about the principles or "ground rules" governing the form and extent of a sensible and effective Government agenda. These are as follows:

I take it as read that the first priority of each PSRE continues to be the advancement of knowledge in pursuit of the Government objectives which it serves. Commercialisation of research outputs is a second priority. Nothing I advocate in this report is intended to undermine the capacity of PSREs to deliver their primary outputs.

That said, the presumption should be in favour of pursuing knowledge transfer where possible. Government and PSREs should ask "why not?" not "why?". Where there are potential conflicts of interest (between different PSRE objectives, or for individual scientists) the aim should be to manage the conflict. The potential for conflict should not in itself be a reason not to engage in knowledge transfer.

I take it as read that the main reason for pursuing knowledge transfer is to create economic benefit for the nation, rather than generate additional revenue for the Government. Nonetheless, in the majority of cases PSREs need the incentive to generate revenue in order to engage in wealth creation activities.

Knowledge transfer is a difficult and complex process. Government should be realistic about what is needed to do it properly: commitment, resources, skills and proper management systems. In particular, Government must recognise that effective knowledge transfer costs money.

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PSREs are not a homogeneous universe of bodies. They encompass a very broad diversity of size, mission, types of science and constitution. There can be no question of a "one size fits all" solution for boosting the level of knowledge transfer. Nor does central Government have the means of prescribing in detail the solution for each PSRE. It should concentrate on creating, and if necessary policing, a supportive framework of rules and incentives within which the right people can make sensible decisions about commercialisation

In particular, it seems to me impossible for central Government to favour particular routes to market over others. The best route to market will depend on a host of factors concerning the nature of the PSRE, its science and its potential markets. What Government must seek to ensure is a commitment to knowledge transfer, buttressed by systems for making the best choice of route to market, after a full consideration of the options.

Conflicts of interest

3.15. Some PSREs have statutory or regulatory duties to fulfill.

Examples include the John Innes Centre's role in advising on genetically modified organisms and the Veterinary Laboratory Agencies role in testing for diseases such as BSE and TB. For these organisations, commercialisation of research raises potential conflicts of interest with the PSREs duties.

3.16. In order to maintain their credibility and avoid their judgement being called into question, PSREs advising Government or fulfilling a regulatory role need to be, and to be seen to be, impartial. Therefore before entering into deals to commercialise research, PSREs must ensure that they have proper measures in place for identifying and addressing conflicts of interest. At the extreme, these measures may include identifying organisations a research establishment should not enter deals with where they result in economic benefit for the PSRE.

Benefits for the UK Economy

3.17. I have received suggestions that to reward the taxpayer for its investment in research, deals should be restricted to ensure that the UK receives the economic benefit from the commercialisation of research rather than international competitors. While I can appreciate the sentiment behind these suggestions I believe that they overlook the increasingly global nature of industry.

3.18. If the Government is keen to see industry led demand for PSRE research it must accept that industry is global. Some commercialisation deals will entail the export of UK-generated intellectual property but conversely many UK companies benefit from importing the results of research performed overseas. It seems to me that the Government cannot sensibly resist overseas industry demand for UK Government research. On the other hand it does seem legitimate for the Government to consider ways of protecting UK interests in such deals. In particular striving to ensure:

- PSRE research capabilities are not weakened
- proceeds to the tax payer are maximised and wherever possible ploughed back into research.

There is also scope for seeking to build measures to protect the UK's interests into contracts with overseas partners, for example, the rapid distribution of the final product in the UK and where possible manufacturing of the final product is in the UK.

4. Culture and commitment: the knowledge transfer mission

4.1. As I discussed in the previous chapter of this report there is a wide variation in the extent of PSREs involvement in and commitment to commercialisation of their research.

4.2. In those PSREs which make the most of their commercialisation opportunities senior management and scientists working at the bench share a belief in the knowledge transfer agenda. As an example, I was impressed by the determination and vision for knowledge transfer demonstrated by senior managers at the Roslin Institute. Although they have the advantage of working in an industry which is responsive to new development, the team at Roslin appear committed to ensuring that the benefits of their research reach the wider world.

4.3. At the other end of the scale, some PSREs recognise that their research should be commercialised wherever possible, but feel that their work lacks the potential for knowledge transfer.

4.4. Whilst I recognise the wide variation in the commercial potential of research undertaken by PSREs which I discussed in the previous chapter of this report, there is scope for a much more ambitious can do approach to knowledge transfer. This is fundamentally about

embedding a knowledge transfer mission in PSRE's institutional culture.

4.5. Because of the tight constraints many funders have placed on their research budgets it is clear that some PSREs are highly motivated to seek opportunities to augment their research income. Several PSREs cited this as a key driver in their commercialisation activities. One body told me that vital areas of research have been saved through their ability to raise money from commercialisation of their research. The lesson I draw from this is that financial incentives cannot be overlooked as part of fostering a pro-knowledge transfer culture. This theme is developed in chapters 5 and 6.

The knowledge transfer mission

4.6. To create a clear mission for knowledge transfer and to ensure that scientists and PSREfunders clearly recognise the importance of this agenda, exploitation needs to become a transparent and integral part of the objectives of the establishment and it's sponsor.

4.7. Each of the Research Councils already have the commercialisation of research as one of their key objectives. But this objective needs to be applied across the PSRE universe to include departmental bodies. Therefore Government Departments need to ensure that as part of their mission statement they have an explicit objective of transferring PSRE research outputs to the wider economy.

4.8. This objective also needs to be passed down to become an integral part of each PSRE's mission. Sponsor departments and Research Councils should ensure that each PSRE has knowledge transfer as an explicit objective. Moreover knowledge transfer needs to be explicitly reflected in all research contracts between public sector funders of research and PSREs, whether or not those funders sponsor the PSRE in question.

All Government purchasers of PSRE research (whether or not from the sponsors of the PSRE) should have as part of their research mission the explicit objective of transferring PSRE research outputs to the wider economy; this should be explicitly reflected in all contracts with PSREs.

PSREs themselves should have knowledge transfer as an explicit part of their mission

The role of PSRE managers

4.9. As with all management challenges, the drive for greater knowledge transfer needs to be led from the top. Knowledge transfer is best pursued in an environment that encourages and supports scientists in their efforts to commercialise their research. PSRE managers have a crucial role here. They are in a unique position to lead by example, to instil in their organisation a strong culture that encourages and rewards commercialisation and to put formal processes in place to encourage knowledge transfer. Even where much of the effort is outsourced to a third party, responsibility must lie with PSRE Chief Executives.

4.10. The formal processes that PSRE management need to put in place include:

- ensuring procedures are in place for identifying, proactively managing and protecting IP (which may include outsourcing these activities);
- recognising commercialisation efforts in both the remuneration and the promotion processes;
- recruiting individuals with commercialisation expertise into the organisation or ensuring PSRE staff have access to commercialisation expertise;

- developing performance measures and targets against which their knowledge transfer efforts will be assessed; and
- ensuring there is training on IP protection and commercial opportunities for PSRE staff.

4.11. PSRE managers are also the public face of the establishment. It is through the promotion of the PSRE to third parties that an institute can attract potential collaborators and identify potential areas for commercialisation. It is also management's responsibility to form the contacts with industry and other research establishments that form the building blocks for potential future collaboration.

- A key challenge for Government is to ensure that leadership in the PSREs is committed to drive forward commercialisation as an explicit part of their mission.
- The knowledge transfer objective should be embodied in the job description and personal objectives of the PSRE chief executive and be seen as his or her personal responsibility. It should be cascaded through the personal objectives of senior management and scientific staff.
- PSRE chief executives should be required to develop, implement and secure staff support for a strategy for identifying and realising opportunities for translating research outputs into wealth creating products and processes. In particular these strategies must address the management systems that will support the commercialisation effort, acquisition of the necessary market knowledge and the management of conflicts of interest.
- PSRE chief executives should develop performance measures and targets against which their knowledge transfer efforts can be assessed.
- As and when vacancies for PSRE chief executive posts arise, the ability to lead and motivate a PSRE's knowledge transfer activities should be an explicit recruitment criterion.

Reduce risk aversion

4.12. PSREs need not only a commitment to knowledge transfer, but also permission to pursue it whole-heartedly. However, knowledge transfer is currently undertaken in a climate which is predominantly risk-averse. As not all attempts at commercialisation of research are going to be successful, this culture can inhibit the robust pursuit of commercial opportunities.

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4.13. PSRE managers, their sponsors and funders need to be able to accept an element of risk in an attempt to transfer knowledge from the public to the private sector. Given the uncertainty of generating a return on the upfront costs of commercialisation, PSRE managers should carefully evaluate risk and balance this with the scale of the opportunity. This is difficult in the prevailing culture of accountability for public spending which incentivises risk avoidance rather than risk management.

4.14. The Government should encourage well thought through risk taking as an integral part of the knowledge transfer process. What is required is an environment that encourages PSRE managers to take decisions where the outcome, although uncertain, provides substantial potential upside for the wider economy and the possibility of significant returns to the PSRE itself whilst explicitly recognising that there is also a chance of failure.

Risk assessment and public expenditure

4.15. During the course of our study, several PSREs raised questions over the level of risk the public accountability framework permits them to take. At issue is a fear among some PSREs of falling foul of the National Audit Office and the Public Accounts Committee for investing public funds in projects to commercialise

research where the outcome is uncertain. If a commercialisation project fails there is a fear of being criticised for misappropriating public funds in that particular case since auditing is not conducted against a portfolio of projects.

4.16. The problems of risk management in the public sector goes wider than the scope of this review. I was encouraged to see that in the Modernising Government White Paper, the Government has outlined a more positive approach to risk. It states:

"The Government is also determined to encourage innovation and share good practice. To do this;

- we are working closely with the Public Audit Forum - which represents all the national audit agencies - to find ways of encouraging more modern and effective forms of service delivery at local as well as central level. Auditors are rightly interested in whether organisations obtain value for money. We want them to be critical of opportunities missed by sticking with the old ways, and to support innovation and risk-taking when it is well thought through. We welcome the Forum's statement that the national audit agencies will respond positively and constructively to our Modernising Government initiative. In future, people will no longer be able to use audit as an excuse for not delivering more co-ordinated and efficient services.

4.17. The Modernising Government White Paper also includes a useful statement from the Public Audit Forum on their approach to auditing risks incurred to advance innovation.

"Modernising Government represents a significant change in the public service environment, and its successful implementation will require new ways of working. The goal of achieving more efficient and effective delivery of public programmes is one that is shared between public sector managers and auditors, and the Public Audit Forum do not want fear of the risks of change to stifle worthwhile innovation designed to lead to improvements. So we encourage auditors to respond constructively and positively to Modernising Government initiatives and support worthwhile change.

"Public sector managers are of course responsible, as stewards of public resources, for assessing and managing the risks associated with innovation and increased flexibility, and for ensuring the proper conduct of public business and the honest handling of public money while pursuing innovative ways of securing improvements in public services. It remains important to ensure proper accountability but this must not be approached in a rigid way that might mean missing opportunities to deliver better value for money. And auditors will respond to this new environment positively and constructively by:

- adopting an open-minded and supportive approach to innovation (including the use of techniques tried elsewhere), examining how the innovation has worked in practice and the extent to which value for money has been achieved.
- in the process, supporting well thought through risk-taking and experimentation.
- consistent with their independent role, providing advice and encouragement to managers implementing Modernising Government initiatives by drawing on their audit work in this area, seeking to identify and promote good practice so that experience can be shared and risks minimised.

"In these ways, we believe auditors can support and encourage worthwhile change, while providing independent scrutiny and assurance, and fulfilling effectively their statutory and professional responsibilities."

4.18. There is more to be done in developing a less risk-averse culture. The National Audit Office and the Public Accounts Committee are a key part of the risk culture. I welcome the

statement of Government Policy Quoted above, but there is a clear need to develop these general principles in the specific case of knowledge transfer.

I welcome the movement in Government towards a more mature understanding and handling of risk. Treasury and OST should work with the NAO and the PAC to promulgate a accountability framework for commercialising public sector research that emphasises portfolio risk management and transparency of operation rather than incentivising risk avoidance.

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5. PSRE/Sponsor relationships: management and control of IP and financial freedoms

Management of intellectual property

5.1. Given the large volume of knowledge generated by research establishments, and the rapid pace of technological development in the market place, it is clear that organisations seeking to maximise the economic potential of their research need to have an active policy for managing and controlling their intellectual property.

5.2. The value of the knowledge produced is heavily time dependent. The value of scientific discoveries, no matter how innovative or well protected, if left undeveloped for too long will be severely depleted and may be overtaken by the market.

5.3. The management of intellectual property is a complex task that can be broken down into three steps; identification of ideas with commercial potential; the protection and defence of these ideas and their exploitation..

Identification of ideas with commercial potential

5.4. All organisations need to have processes in place for identifying research that has commercial potential. During the study I came across telling instances in which research institutes had failed to identify innovative ideas as commercial opportunities which were subsequently exploited by other organisations. Amongst these are the liquid crystal display developed at what is now the Defence Evaluation and Research Agency and the monoclonal antibody technology developed in the MRC's Laboratory of Molecular Biology in Cambridge. I have no doubt there are also instances of potentially exploitable ideas the value of which has never been realised or even identified.

5.5. Highly motivated staff who recognise the importance of commercialisation are one, very effective, means of ensuring that research with exploitation potential is identified and brought to the attention of the PSRE's management. The need to motivate and incentivise research staff is considered in more detail in chapter 6 of this report. But, to support this effort PSREs also need formal procedures for identifying ideas with commercial potential.

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5.6. It is for PSRE management to determine the most appropriate procedures for their establishments. I have encountered a range of possible mechanisms that have been adopted, these include:

- ensuring scientists, when reporting on the progress of their research, evaluate its commercial potential
- ensuring supervisors regularly review the commercial potential of their scientists' research
- arranging for technology transfer experts or specialist external

reviewers to consider applications for commercial exploitation
- ensuring that all articles and presentations of research are submitted to research supervisors or the technology transfer section prior to being made public
- outsourcing the identification of IP to a third party.

Protection and defence of intellectual property

5.7. It is well known that once research establishments have identified research which may have commercial potential they need to ensure that they have adequate protection for that innovation. All the research establishments visited during the course of our study were well aware of the importance of adequate IP protection.

5.8. IP protection is rarely straightforward. When determining how to protect their knowledge base, PSREs need to think strategically about current developments, potential competitors, and the potential the research provides for new products or services. PSREs often need to find a balance between protecting their rights over a discovery and maximising their flexibility to develop the technology into a range of products and services.

5.9. Protecting IP, and where necessary enforcing legal rights is also expensive. The costs of maintaining a patent are considerable, and once taken out a patent is only of value if the patent holder is prepared to defend their property through the courts. There is little benefit in protecting research outputs where there is no possibility of deriving revenues from the work streams either now or in the future. PSREs need to balance the costs and potential economic benefits to determine the most appropriate IP protection for their research outputs.

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Exploiting IP - Control of intellectual property

5.10. There are several factors which favour PSRE managers to retain and control their PSREs IP:

- They have a unique understanding of the scientific field in which the establishment works.
- They have direct access to the establishment's employees, many of whom have experience of knowledge transfer in the relevant markets (albeit sometimes limited).
- They usually have links to relevant industries through various stakeholder relationship, and in some cases their PSREs will be positioned as a research base responding to industry needs.

5.11. Most if not all PSREs contract out some or all of these functions. The use of private sector patent agents to advise on the technical legal matters is widespread but some PSREs manage everything else internally. At the other extreme some PSREs rely almost entirely on outside assistance from organisations such as BTG plc, while others have not found this approach satisfactory. Provided the reviewer takes all opportunities to transfer the PSRE's accumulated knowledge, I see no reason to recommend one approach over others, the choice depends very much on the three way fit between the PSRE, the commercial partners and the exploitation market. There are of course also financial considerations because these partners may be the most practical means of meeting the costs of managing and protecting IP. Whoever carried out this function responsibility for managing the IP must still rest with PSRE management.

5.12. Yet in several instances I have found that the ability to manage the IP is seriously compromised. Some PSRE sponsors and other funders of research stipulate that they should retain title of the intellectual property and require PSREs to seek their approval

during negotiations with potential collaborators. This can severely hamper knowledge transfer activities, most notably by causing a delay in negotiating licensing deals especially if the parent wishes to have a case by case involvement. This can be further complicated where PSREs need to receive approval from two or more funding organisations.

5.13. During the study I uncovered at least once instance in which managers of a PSRE reported that the prolonged approval process had resulted in a commercial opportunity not going ahead. In another case a sponsor took so long to consider the licencing of a new technology that the management of a PSRE decided to proceed without approval to avoid jeopardising the project.

5.14. Negotiating terms for commercialising research is complex. A PSRE needs to ensure that the potential of the science is maximised, and that the establishment is adequately rewarded for its contribution. The possibility of a large number of potential partners or a wide choice of potential routes to collaboration mean an establishment needs to have maximum flexibility and the ability to react quickly to proposals from potential partners.

5.15. Yet the benefits of sponsors' intervention on each transaction are unclear. I was not convinced that in general sponsors have sufficient expertise or resources to add significant value in reviewing a PSRE's deal by deal commercialisation plans, or indeed to justify this degree of involvement.

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5.16. In forming my recommendations in this area, I recognise that the Medical Research Council seems to be a case apart. The MRC has over 35 units researching into medical sciences, many of which have fewer than 20 employees. Given this diffuse structure, the MRC has formed a central team to lead and manage the knowledge transfer process. The technology transfer group in the MRC appears to fulfill this central role well, and provides its institutes with effective interventions in commercialisation cases.

5.17. I accept the need to ensure that PSREs remain aligned to their core objectives and to satisfy themselves that the requirements of accountability for public spending are properly met. But I question whether this requires detailed approval of each individual transaction during negotiations. There is an overwhelming case for sponsors to cede control of the intellectual property to their PSREs and forgo their power of veto over commercialisation decisions. Instead PSREs should be regularly asked to account for their performance against their commercialisation objectives. Sponsors have an important role in supporting PSRE commercialisation efforts and ensuring these are conducted properly. But this is entirely consistent with vesting control of IP with the PSRE itself.

There is an overwhelming case for requiring that IP generated by a PSRE be owned by the PSRE and assigned by authority of the chief executive - unless effective alternative arrangements already exist (they do in the case of the MRC - but in no other instances that I have been able to find). The case by case involvement by public sector funders of decisions about the assignation of intellectual property - unless they have specific expertise and support to bring to the table - does not generally seem to add value and can be harmful.

Financing knowledge transfer

5.18. The typical R&D cycle means that once research has been identified as having commercial potential it needs considerable effort to turn the ideas into marketable products and services. At this stage in the research cycle financing is often required to demonstrate the commercial feasibility of prototype products or

processes.

5.19. If a research establishment is unable to raise the funds to invest the initial development then there is a risk that the economic benefit of the research will be lost. This gap in funding is sometimes called the "development gap". It is beyond the stage which is funded by research income, but usually before the point at which business inventors or venture capitalists are prepared to invest. The development gap is a general problem faced by all research organisations. For PSRE's however the problem can be more acute because of the tight budgetary constraints and operating rules under which they operate.

5.20. In addition to the development costs, a PSRE also has to face the administrative costs of protecting commercialisable research, negotiating deals, and monitoring the licencing once an agreement has been reached. As a result many PSREs see the financing of knowledge transfer as a key constraint. Clearly there is some scope for PSREs to lever more funds from private sector partners to meet these costs, but there is more the Government can do.

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Financial flexibility

5.21. Although I recognise that the nature of science funding means that these budgets invariably allow little room for manoeuvre. It may be in an institute's interests to invest a small amount of their own money in ideas or research which thy believe have particular merit, rather than lose the commercial potential of the research.

5.22. Funders of research should also examine carefully the knowledge transfer strategy of the PSREs they support. To unlock the value of the research they have invested in may require funding to be explicitly directed at knowledge transfer.

In agreeing future income streams with parent bodies and other purchasers, PSREs should be explicit about the costs associated with implementing a knowledge transfer strategy. Government must be prepared to meet these costs if it wants to give parity of esteem to the knowledge transfer mission.

5.23. The financing problem is seriously exacerbated for those PSREs, mostly departmental PSREs, which lack the freedom to maintain and deploy surpluses. This arises when parent bodies impose strict cash controls over their PSREs, preventing them carrying over end-year surpluses, or retaining the proceeds of commercialisation deals. As a result of such controls PSREs neither can afford nor have the incentive to engage in commercialisation.

5.24. I identified several PSREs whose financial controls meant they were effectively unable to benefit from receipts from their commercialisation activities. This is despite the Treasury's Wider Market guidance which allows departments and non-departmental public bodies to retain receipts from commercialisation projects. It is important that these freedoms are cascaded down to provide incentives to individual PSREs.

5.25. Method of dividing the proceeds from commercialisation between sponsors/funders and their PSRE should err on the side of generosity and provide a proper an incentive for the PSRE at all levels of income. Sponsors should not use these arrangements as a means of clawing back a grant.

5.26. Some of the most effective schemes for allocating proceeds have predetermined rates which allocate income between the PSRE and the sponsor according to the size of the income. These maximise the incentives for the PSREs by allowing them to retain the majority of - if not all - revenue for relatively modest projects,

with the proportional falling as the size of the income increases. These strikes me as the right approach. Indeed I see no reason why, for moderate levels of income, a PSRE is not allowed to retain all the proceeds.

5.27. To avoid creating disincentives to commercialisation it is important to provide incentives at all levels of income. For example one research council maintain the right to retain all proceeds where they exceed 10% of a PSRE's recurring income. Although this rule has not yet been used in practice, it runs the risk of inhibiting very large commercialisation projects, despite these being the ones that can have the largest impact.

Parent organisations should allow their PSREs the full freedoms to carry forward surpluses and retain receipts and other financial freedoms which are available under the Treasury's recent Wider Markets guidance. Arrangements for dividing commercialisation receipts between sponsors/funders and PSREs should err on the side of generosity to the PSRE.

University Challenge Fund and other Government schemes

5.28. To help address the development gap in universities the Chancellor announced in the 1998 budget, a challenge fund called University Challenge. This provided £45m of development finance to be shared by competing universities who could demonstrate their potential to take their research closer to market. Funds for a further round were announced in the 1999 Budget.

5.29. In the first round Public Sector Research Establishments were able to bid in consortia led by a University, but they were unable to bid in their own right. I see no reason why PSREs should continue to be excluded from University Challenge as lead bidder. I believe that research institutes should be given the opportunity to compete on merit for access to development finance. The Government should also consider the scope for allowing PSREs access to other Government support schemes where this is not already possible. Similarly, given the importance of demand from industry in facilitating knowledge transfer, Government should look at plugging PSREs into current schemes which incentivise industry to exploit research.

Ministers should examine the scope for extending the eligibility criteria of initiatives for promoting knowledge transfer, in particular University Challenge, to include PSREs, where these are not already eligible.

Given the importance of industry demand as a driver of knowledge transfer, Government should look at the scope for drawing PSREs into schemes which incentivise business to participate in knowledge transfer.

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5.30. It may be that issues on financing knowledge transfer can be addressed from within existing budgets based on the recommendations above. However I believe there is the potential for modest additional investment in this areas to reap greater rewards. Therefore I believe the Government should consider earmarking some additional funds to meet the costs of knowledge transfer in the PSREs.

The Government should consider earmarking some additional funds to meet the costs of knowledge transfer tin the PSREs.

The need for greater autonomy

5.31. In conducting this study I was struck by the contrast between

the regimes governing departmental PSREs and Research Council Institutes. In the case of the former, the financial controls imposed by the department, coupled with constraining IP policies, seem to unduly limit the scope and motivation of the PSREs to engage fully in knowledge transfer. The rules on the civil service management code (see next chapter) create an additional barrier for departmental PSREs.

5.32. During my study I have encountered no good reason why departmental PSREs should remain under such close control of their departmental sponsors, except possibly for the very smallest ones. I firmly believe that if these PSREs were put a greater arm's length from Government departments it would remove them from unnecessary constrains and improve their capacity to engage in knowledge transfer.

5.33. Providing PSREs with greater autonomy, for example as NDPBs, would not inhibit their capacity to deliver their primary outputs since it would merely be putting them in an equivalent position to research council PSREs and might make create benefits by making the distinction between purchaser and provider clearer.

5.34. Giving departmental PSREs the status of Non Departmental Public Bodies ("NDPB") would provide PSREs with the necessary level of autonomy, however I accept that there are other options which might be appropriate in some cases.

I strongly recommend that the departmental PSREs be put at greater arm's length from Government departments. Ministers should consider how this should best be done for each of these PSREs, with the presumption in favour of a move to less central control - except where there is an overwhelming case to the contrary.

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6. Incentives for PSRE staff

6.1. Many scientists enter the scientific profession motivated by their passion for science and their desire to push forward the boundaries of human understanding. I have been impressed by the commitment demonstrated by the scientists I have met during the course of my study. For most scientists the greatest reward comes from the prospect of their work leading to discoveries which benefit the public (and from the peer recognition so derived).

6.2. Scientists' career progression is largely dependent on peer review and the prestige associated with publication. As already mentioned in this report, collaborating with the private sector doesn't always come naturally. The complexities and frustrations of working with the commercial sector can act as a deterrent to commercialisation, particularly if the potential rewards are perceived as being insignificant in comparison with the professional rewards attendant on advancing human knowledge.

6.3. In order to level the playing field and encourage scientists to overcome the frustrations of collaboration the Government needs to ensure that the emphasis it now places on knowledge transfer is translated into incentives for scientists to ensure that they are recognised not just for conducting excellent science but for exploiting it.

6.4. There is a broad range of rewards which PSREs can offer their employees. As well as highlighting and proclaiming strong performances internally, PSREs are able to provide tangible rewards for commercialisation by recognising it in their promotion processes and by providing financial incentives.

6.5. Rewarding and incentivising staff to commercialise research

should be regarded as an integral part of the process of promoting commercialisation and an entrepreneurial culture. In the private sector and in many of the research council's institutes incentive schemes are now widespread.

It should be a requirement for PSRE chief executives that they have in place effective schemes for encouraging and rewarding the participation of scientists in knowledge transfer activities.

6.6. During the course of my review I found several examples of schemes in which the PSREs share with scientists the financial income from commercialisation work. Below is a table of an award to inventors scheme operated by one of the research councils which provides the inventor with a proportion of the receipts. The scheme operates on a sliding scale, designed so that the proportion paid to inventors falls as the level of income rises as shown below.

Income from commercialisation Proportion paid to inventor

- Gross receipts - the first £1,000 100%

from £1k to £50k 20%

Net receipts - from £50k to £500k 10%

- from £500k to £1m 5%
- over £1m 2.5%

6.7. This scale cannot be universally applied to all PSREs as the income ranges and the incentives given to scientists would need to take account of each PSREs potential to commercialise research. But the key features of the scheme have broader applicability. It provides significant incentives, even for relatively small commercialisation projects, while ensuring, for highly lucrative commercialisation projects, that there is an incremental incentive for scientists to generate additional profit.

6.8. Selecting a financial incentive scheme for each PSRE is not straightforward. There is a balance to be struck between on the one hand providing scientists with insufficient reward to encourage knowledge transfer and on the other hand distorting PSRE's behaviour to the detriment of the PSRE's mission or research programme.

6.9. Central Government has a part to play in this. The Office of Science and Technology's oversight of science expenditure in the UK and its close contacts with the scientific community make it well placed to gather information on the incentive schemes currently operated in Universities, PSREs and the private sector and to develop an understanding of good practice.

OST should help to exemplify and promote best practice in providing scientists with incentives for knowledge transfer including in respect of equity and share options.

The civil service management guide

6.10. For staff of departmental PSREs, arrangements which offer financial incentives as a reward for commercialisation work can constitute a breach of their conditions of employment. At issue is clause 4.3.8 of the Civil Service Management Code which stipulates that civil servants "must not use information acquired in the course of their work to advance their private financial interests".

6.11. The current interpretation of the code tends more towards a position that civil servants must not under any circumstances make profit from private ventures deriving from their Government work while they remain in its employment. This effectively rules out certain forms of direct participation by serving Government

scientists in the commercial exploitation of their research, in particular receiving equity or share options.

6.12. I believe the application of the code needs to be revised in the interests of furthering the Government's objective of encouraging knowledge transfer from PSREs to business. As currently applied, the code misunderstands the nature of intellectual property and perpetuates an inconsistent approach to knowledge transfer across the public sector.

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The Nature of Intellectual Property

6.13. It is clearly important that civil service propriety is maintained and is seen to be maintained. Civil servants should not benefit privately by virtue of their position, by trading inside information for example. This is what the code, in my reading, seeks to prevent. But entrepreneurial scientists are not exploiting their position. They are exploiting their own skills, experience and know-how as applied to and gained from their work. Where this is the case, and where there are wider benefits to be secured, such activity should be encouraged. It seems to me that scientists exploiting their know-how are a distinct category that should be recognised by the code.

6.14. It seems to me that there is some precedent for this in legislation. The rights of employees to be compensated for inventions of outstanding benefit to their employer were recognised in the Patent Act 1977. Under section 40 of the Act, employees may appeal for compensation to be paid by the employer. In addition section 42 states that the rights for employees' apply equally to Crown employees and cannot be diminished by terms of a contract.

Inconsistency

6.15. Universities play a key role in innovation and technology transfer. Many now recognise academic freedom to exploit intellectual property and in some institutions, the individual ownership of IP. Now, because of the close links which exist between universities and agencies such as NHS Trusts and Research Council-funded institutes, these arrangements are being replicated to some extent in these public sector bodies.

6.16. Underpinning this development in policy is a recognition that creating incentives for knowledge transfer is beneficial both for the advancement of science and for the economy. The current position in departmentally funded institutes covered by the civil service management code is inconsistent with the approach permitted in PSREs (often pursuing similar kinds of science in furtherance of similar Government objectives) which are NDPBs. This anomaly is difficult to defend. It also seems unlikely to lend itself towards the retention, in the public sector, of the best and most commercially oriented scientists.

6.17. The Government has started to recognise the need for change. In the Modernising Government White Paper 1998 it refers to the need to take a "more creative approach to financial and other incentives for public service staff, including a commitment to explore the scope for financial reward for staff who identify financial savings or service improvements."

6.18. It goes on: "Government departments and agencies will introduce schemes which reward staff with a sliding scale percentage of any savings or improvements made as a result of their suggestions. We will create positive incentives for success at all organisational level too. So we will look for new ways of rewarding organisation performance and success-sharing, for example by using team bonuses or by linking pay, bonuses or other

rewards to the achievement of performance or efficiency improvements."

6.19. For departmental PSREs putting this into practice in the knowledge transfer context requires clarification of the Civil Service Management Code.

Implementing Change

6.20. The current approach effectively rules out Government scientists' personal participation in commercialisation activities. A more mature approach would be one which allows such behaviour subject to defined conditions which protect the public interest. The Civil Service business appointments rules provide a good model here. These rules do not forbid civil servants to take business appointments - they provide guidance on the circumstances in which civil servants are required to obtain approval and how this should be sought. In a similar vein, civil servants should not be forbidden from making personal gain from commercialising research, but be able to gain approval subject to defined conditions being met, including the requirement for propriety.

6.21. The relaxation of the code need not compromise existing standards of propriety. On the contrary, it could help to clarify the required standards by putting a greater onus on research establishments to put in place active approval mechanisms. In universities and other public sector institutions not bound by the code, I already have practical examples of how this can be achieved.

Principles

6.22. Relaxing the Civil Service Management Code will be possible only if the important issues set out above can be squared with the requirements of propriety. It will require a set of workable rules or institutional arrangements. I suggest the following:

6.23. Serving Government scientists can participate in commercial activity provided that:

- it is reasonably clear that the activity will contribute to the aim of developing and exploiting intellectual property, to the wider benefit of the economy;
- the Crown has an appropriate share of the ownership of the IP, reflecting its investment in creating and developing the asset;
- the scientist concerned had a key involvement in the underlying research and their continuing involvement is important to the likely success of the commercial venture;
- others who played a significant role are appropriately rewarded;
- an informed view has been taken on the most appropriate route to market for the product/process in question;
- the PSRE has taken a collective view of the probity of the arrangements.

As an immediate priority Ministers should review the application of the civil service management code to the special circumstances of science commercialisation. The effective bar on certain forms of direct participation by serving Government scientists in the commercial exploitation of their research - in particular receiving equity or share options - should be removed. The principles that apply should be the same as the business appointment rules for civil servants: personal gain should not be outlawed; rather it should be permitted subject to having proper systems in place for ensuring the probity of the proposed commercialisation arrangements.

7. Access to commercialisation expertise

7.1. I have already recommended that PSREs be given ownership and control of their intellectual property and greater financial freedoms to commercialise their research. But PSREs also need expertise in commercialisation. Although there are several cases where PSREs have successfully managed to commercialise research without access to commercialisation expertise, such expertise can often prove invaluable. The benefit of experience can often help develop coherent strategies and avoid potentially costly mistakes. This was a clear theme that emerged in my study.

7.2. Lack of experience has meant several PSREs have had to learn lessons the hard way. Cases of publishing research findings before the potential for commercialisation had been explored are common, and most PSREs have learned from this. In a more recent case a PSRE licenced some of its technology, but regretted not taking a more strategic approach to technology transfer when it established a spin-out company in direct competition to the licence holder of its technology.

7.3. Commercial pressures from third parties increase the need to avoid mistakes. In recent negotiation over a consultancy agreement for a small proportion of a scientist's time, experience helped a PSRE identify and remove an unreasonable clause in the agreement. Had it not been spotted it would have resulted in the commercial partner having ownership rights to all the intellectual property produced during the lifetime of the scientist.

7.4. Organisations in the public and private sector are increasingly recognising the value of commercialisation expertise and there is strong demand for individuals who have a scientific background and practical experience in commercialising research. It isn't simply advice and encouragement that is required but also deep private sector skills associated with originating the prospects, helping to develop the business case for potential relationships and providing hands-on commercial support during the negotiating phase. Such individuals are however in short supply. For PSREs which tend to perform unique research in specialist scientific fields this skills shortage can be particularly acute.

7.5. The specialist nature of many research establishments and the considerable knowledge and experience of all PSRE managers means they are in the best position to determine the appropriate level and source of commercialisation expertise that their institute requires. I see the prime responsibility for ensuring that the PSREs have access to appropriate knowledge transfer expertise lies with the PSRE's CEO.

PSRE chief executives must ensure that they have access to the skills and experience they need for knowledge transfer.

7.6. This is not to say that PSREs have to do everything in-house. As noted in Chapter 5 there is no one approach for accessing and deploying the necessary range of skills for knowledge transfer. Some bodies, most notably the MRC, seek to retain all necessary expertise in-house, but have difficulty retaining staff once they have developed commercialisation expertise. Larger PSREs (or consortia of PSREs) might be able to justify recruiting in-house specialist teams, but in most cases the costs of doing are likely to be disproportionate to the scale of the commercialisation opportunities. Government's main concern should be to ensure that PSREs are able to get access to the expertise they need, whether or not this is retained in-house.

7.7. One consequence of the strong demand for commercialisation expertise is that individuals with relevant experience command high salaries. Public sector pay constraints, however, can mean that neither PSREs nor their sponsors are able to attract and retain the most skilled individuals. This is despite the considerable impact the expertise could have on those institutes with considerable potential

to generate income from their research. As the costs of employing commercialisation expertise comes from within their budgets, PSREs already have a strong incentive to ensure that recruited expertise achieves value for money. Given the potential impact that such experience could provide the Government should consider improving flexibility of PSREs to attract and retain commercialisation expertise. This may include greater use of short term and part time contracts.

Government should seek to improve the flexibility of PSREs to pay market rates to attract and retain people with commercialisation expertise.

Partnerships

7.8. The shortage of relevant skills and the difficulties associated with recruiting and retaining expertise means there are substantial benefits to be achieved from partnerships which allow PSREs to share knowledge transfer resources. In particular where research establishments (including higher education institutes) have experience of commercialisation there is clearly scope for sharing skills which are common to most commercialisation activities such as legal advice, understanding of commercialisation routes and generic business and marketing advice. Where skills and experience are more specifically tailored to discrete areas of science or industry, partnerships are more difficult, but by no means impossible.

Support from sponsors and central Government

7.9. As the bodies coordinating several research organisations sponsor departments and research councils should where necessary ensure that PSREs have access as necessary to the commercialisation expertise they require. There is a broad range of measures that sponsors can take to ensure access to commercialisation expertise. These include:

- establishing networks for their institutes and other research organisations to share experience and best practice on commercialisation activities
- providing regular training courses to increase awareness and knowledge of the most appropriate commercialisation techniques for their institutes
- where sponsors have several smaller research establishments, or where the nature of the skills required is common across many of the institutes it may be appropriate to establish a central commercialisation capability that is able to advise and support on issues which are generic to all their research institutes. As noted earlier, this model has worked in MRC. Elsewhere I have not been convinced that sponsors have the same degree of expertise to allow them to act other in the same way as MRC does. But nonetheless there is considerable scope for them to act in a broadly facilitating capacity.

Sponsor departments and research councils must where necessary support their PSREs in gaining access to relevant expertise, and they should promote a consortium approach to knowledge transfer where this is most likely to achieve critical mass of activity and economies of scale.

7.10. Central Government could also have a role to play in ensuring PSREs have access to relevant expertise. Clearly it would be impractical for the Government to attempt to provide detailed commercialisation expertise which is directly relevant to all the areas of science and industrial applications covered by the PSREs. But I see a role for a small central expert unit, perhaps located in the Treasury, which is capable of providing advice and expertise in defined circumstances for example for larger and more complex deals. This unit could help drive forward and monitor progress with PSRE knowledge transfer more generally. Such a unit could initially

be given a life of say two years, after which time its value is reviewed.

Ministers should consider creating a small expert unit within central Government to drive forward the knowledge transfer agenda - and provide advice, help and encouragement to PSREs and their sponsors on knowledge transfer - particularly in relation to larger and more complex deals.

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Networks

7.11. Networks are perhaps one of the most effective methods for establishing contacts and exchanging information. They bring together institutes and individuals with a common interest and provide an excellent forum for sharing best practice and making introductions to people who can be later called on for advice. A network may also provide the opportunity for two establishments to gain synergistic benefits from working together.

7.12. A strong example of this is the Biosciences Network which brings together on a regular basis the eight BBSRC institutes and the Horticultural Research Institute. This provides a good forum to learn the experiences of others and benefit from their expertise.

7.13. I would urge more networks to be established among PSREs and with the broader academic community. These could be based around industrial groups, organisations with similar science interests or common funders of their research. It seems to me that PSRE sponsors, particularly those which support a family of PSREs, are best placed to take the initiative here.

Sponsors of PSREs should encourage the development of networks among PSREs for sharing best practice in knowledge transfer and to promote synergies.

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Where am I? Home : **View Award/Grant**

Award/Grant Name: Knowledge and Technology Transfer, Innovation and Competitive Advantage: Past and Present
Award/Grant Holder: Professor Mary Rose
Co-applicant(s): Dr Sarah Jack, Dr Sarah Robinson, Dr Frank Cave, Dr Nigel Lockett
Start Date: 01/07/2007 **End Date:** 30/09/2010
Award/Grant Description

Knowledge transfer is an essential element of innovation and lies at the heart of the United Kingdom's competitiveness in the global economy. The relationships between higher education and business, which underpin this process, occur at the regional level and form the basis of unique capabilities, which evolve through time. The challenge, from the UK perspective, lies in the tension between growing awareness of the importance of knowledge transfer and the extremely limited tradition of close university-industry relations. This means the objectives, culture, policies and attitudes of business and higher education often diverge, making collaboration difficult.

This project explores the underlying forces which lead to an effective collaborative innovation environment and hence contribute to the development of unique innovation capabilities, at the regional and the national level. Of particular interest is how bridges are built between academics and business communities (particularly small and medium enterprises), how knowledge is transferred across sectors and then how such knowledge transfer can lead to innovation. By combining historical and contemporary perspectives on entrepreneurship, social capital, innovation and learning, this project focuses on the conditions which facilitate and hinder knowledge and technology transfer. The project will develop methods of evaluating knowledge transfer in order to build unique innovation capabilities.

Keywords: Innovation, knowledge transfer,technology transfer, social capital, networks

Award/Grant Amount	ESRC Grant Number	Institution	Discipline	Award/Grant Type
£229,869.74	RES-180-25-0024	Lancaster University	Management and Business Studies	Programme Fellowship

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AWARD/GRANT OUTPUTS AND DOCUMENTS

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Annex 3: Intellectual property in AFBI, in the public sector and in other jurisdictions

The Committee requests a breakdown, with associated figures, of how a return on intellectual property to the inventor works within AFBI, and elsewhere in the public sector.

1. Intellectual property that is exploited commercially and which generates a royalty income stream is distributed to the inventor in accordance with AFBI's Rewards to Inventors scheme. This scheme is firmly in line with government policy and takes account of the recommendations arising from the Baker Report. Those recommendations focussed on ensuring that intellectual property and research findings made their way into the economy so that benefit could be derived from public sector research organisations. AFBI's Reward to Inventors Scheme was approved by DFP in 2010.

2. Net revenues to AFBI are cumulative, indicating net revenue accrued during the whole life exploitation of any IP, for example any patent family derived from a single parent filing. The table below outlines how net revenue received by AFBI is shared between the inventor and AFBI.

Net Revenue Received By AFBI (£)	Inventor/Project Team Share %	AFBI Share %
(a) 0 - 1,000	100% gross	0%
(b) 1,000 - 101,000	25% net	75%
(c) >101,000	10% net	90%

3. This sharing scheme is designed to optimise the motivation of staff to identify and commercialise their research. Inventors are paid all of the first £1,000 (gross), 25% of the next £100,000 (net of costs) and 10% of monies in excess of £100,000 (net of costs).

4. As an example, an IPR-related income of £241,000 which cost £40,000 to achieve would be shared as follows:

£40,000 deducted to cover AFBI expenses, then:

Net Revenue Received By AFBI (£)	Inventor/Project Team Share £	AFBI Share £
(a) 0 - 1,000	1,000	0
(b) 1,000 - 101,000	25,000	75,000
(c) >101,000	10,000	90,000
Totals	**36,000**	**165,000**

Comparative data on the schemes run by similar research organisations in other jurisdictions.

1. In 2009, when preparing its Rewards to Inventors scheme for presentation to DFP, AFBI gathered details of comparative schemes in place in similar organisations in Northern Ireland and elsewhere in the UK. The proposed terms of AFBI's scheme were benchmarked with those schemes in operation elsewhere. A summary of the terms of each of the schemes is provided in the following paragraphs.

2. Queen's University operates a scheme whereby inventors in exploited IP are entitled to a 50% split of net royalties received from their invention. The remaining 50% is split equally between the host department and the university.

3. The University of Ulster operates a scheme whereby net royalty income is split equally 3-ways between the university, the host department and the inventor group.

4. The Department of Health, Social Services and Public Safety's "Supporting Innovation in Health and Social Care in Northern Ireland – Innovation Policy (2008)" outlines the approach to revenue sharing with inventors within Health and Social Care bodies. The initial (gross) £1000 from any revenue generation will be distributed to the inventor(s) without any deduction of any protection or exploitation costs. Revenue in excess of £1000 is distributed net of those costs and as follows:

Cumulative Net Income	**Inventor(s)**	**Inventor's Department**	**HSC Body**
£1000 to £10,000	80%	10%	10%
Over £10,000	34%	33%	33£

5. AFBI also carried out benchmarking against schemes that were in operation in scientific institutes and government bodies in Great Britain including the Biotechnology and Biological Sciences Research Council (BBSRC), the Central Laboratory of the Research Councils (CLRC), the Medical Research Council (MRC), the Central Science Laboratory (CSL, now FERA), and the Ministry of Agriculture, Fisheries and Food (MAFF, now DEFRA).

6. The table below compares the benefit that would be passed to inventors at each of these organisations based on a royalty income of £241k with £40k costs. This table shows that the AFBI scheme offers a benefit below the average of the comparator schemes.

	Reward to Staff Assuming £241,000 royalty income and £40,000 costs
BBSRC	£53,130
CLRC	£32,500
MRC	£57,824
FERA	£25,200
MAFF (DEFRA)	£25,550
Average	£38,841
AFBI Scheme	£36,000

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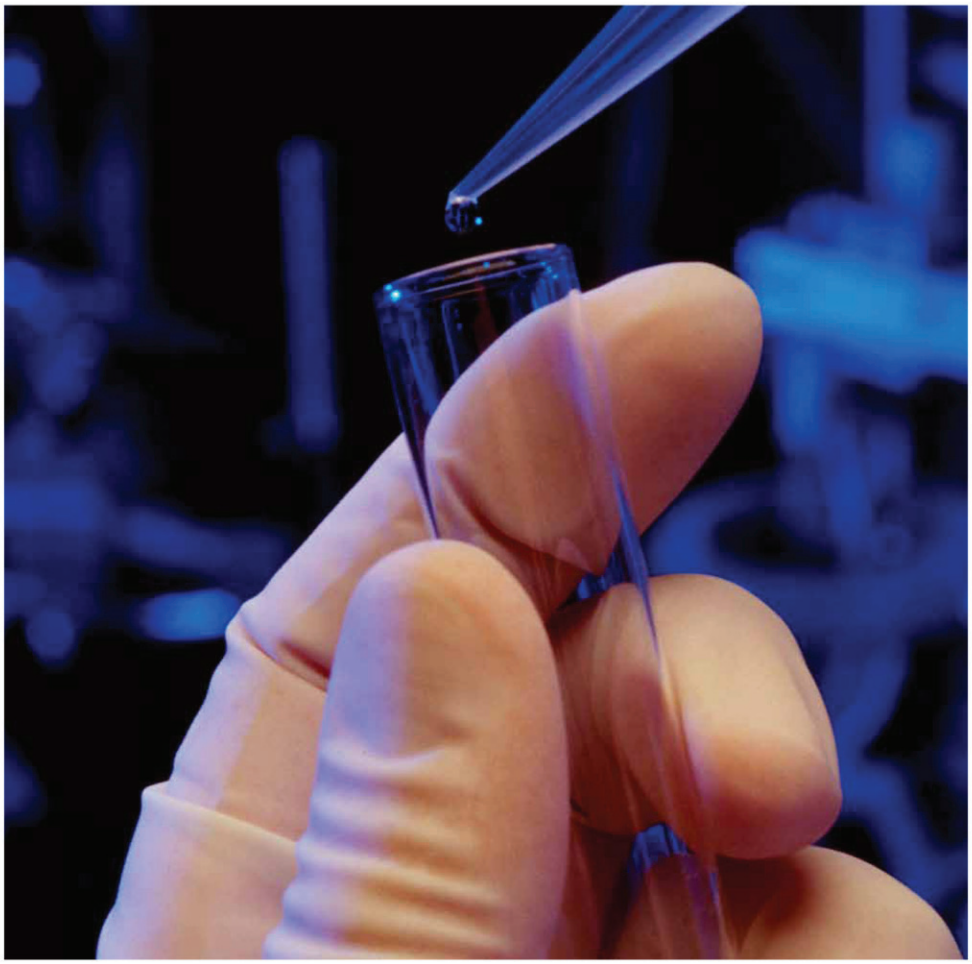
Rewards to Staff Scheme – Rewards to Inventors Policy



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Agri-Food & Biosciences Institute (AFBI)

Rewards to Staff Scheme
Rewards to Inventors Policy

Reference:	AFBI POL 02/10
Board Approval:	25 August 2010
Version:	1
Author:	AFBI Innovations

Agri-Food and Biosciences Institute

Rewards to Staff Scheme

Rewards to Inventors Policy

1. Introduction

This Rewards to Inventors Policy is being introduced in recognition of AFBI's mission to develop and exploit Intellectual Property (IP) arising from its science and research base, as part of its response to government policy objectives stemming from the Baker Report.

The aim of the Rewards to Inventors Policy is to provide incentives to staff to identify IP with commercial potential arising from their work and to give rewards where these opportunities realise an income stream for AFBI. This will ensure that AFBI staff have incentives to identify and commercialise IP, as is the case with their counterparts in the Universities and other Public Sector Research Establishments (PSREs) throughout the rest of the UK and Europe.

The arrangements set out in this Rewards to Inventors Policy will have effect from 1 April 2006, the date AFBI was established, to bring it into line with other PSREs and Institutions that have been operating within this Government policy for several years prior to the creation of AFBI.

These arrangements apply to all income derived from the commercial exploitation of AFBI Intellectual Property Rights (IPR).

2. Eligibility and Definitions

For the purposes of this Rewards to Inventors Policy, a member of staff will be eligible for a reward where Intellectual Property Rights (IPR), are commercially exploited, resulting in payment to AFBI by way of royalty, subject to eligibility under section 3.

Definitions:

IP - includes patents, registered designs, design rights, plant breeders rights, trademarks, confidential information, copyright, database rights, novel application of existing technology and designs, novel materials, use of data, software, training materials, a new device, a new management system and the use of applications and rights in confidential information (including know-how and trade secrets).

Commercial Development or Exploitation - any sale, transfer, assignment, licence or other dealing in the IP and/or the supply, sale or licence of goods or services involving the use of IP which generates revenue as defined below.

Exploitation Agreement - an agreement setting out the agreed form of exploitation to be applied to IP by way of an assignment, licence etc.

Revenue - any income received or receivable in respect of Exploitation of IP, received by AFBI from external partners and sources, as a payment for intellectual property by way of licence fees and/or royalties.

3. Staff Covered by the Rewards to Inventors Policy

The Rewards to Inventors Policy covers AFBI staff who are actively engaged in the origination of Intellectual Property Rights (IPR) or other scientific development or output which has resulted in Commercial Exploitation generating Revenue as follows:

Inventor/Promoter – Inventor as defined in the context of the UK Patents Act (1977) or lead promoter in the development of the commercially exploitable IP.

Contributor - providing demonstrable creative assistance to the Inventor in the development of the innovation or novel application thereof.

Staff who are clearly dedicated to the project team but not necessarily making a personal contribution to the innovation or novel application, e.g. facilitating data recording, technical operations, administration are not entitled to a reward unless they can be demonstrated as either Inventors or Contributors.

Where IP is created in a new invention, it is the responsibility of the inventors to formally disclose the invention to AFBI Innovations at the earliest stage possible so that the invention can be evaluated and protected. An AFBI Technology Disclosure Form should be used for the purpose. The disclosure process requires inventors to identify inventors and contributors and agree their percentage contribution to the invention; AFBI Innovations can advise on this process.

The proposed share allocation for a specific project team will be reviewed and signed-off by the CEO in advance of any commercial exploitation. AFBI will distribute the net income from IPR to the project team in line with Revenue Sharing as outlined in Section 5.

Where IP is exploited and royalties are earned by AFBI, inventors shares under this Rewards to Inventors Policy will be honoured if they are no longer employed by AFBI. In the event of a researcher's death, the entitlement shall continue for the benefit of his or her estate.

4. Calculation of Net Income

AFBI will calculate the net revenue available for distribution by offsetting any costs or expenses it incurs in the process of obtaining and maintaining exploitation that are not externally funded or otherwise recoverable including:

- costs associated with the protection of the Invention/IPR etc;
- costs associated with marketing the Invention/IPR etc;
- costs of legal work and agreements associated with the Invention/IPR etc;
- overheads in carrying out the exploitation of the Invention/IPR etc;
- costs associated with the administration of the Rewards to Inventors Policy.

All such costs will be captured, identified and calculated within AFBI's computerised cost management system wherein all staff time (and costs) and associated resource costs (consumables, overheads) and capital costs are recorded and tracked against specific, coded activities. Historical research costs will not be recovered from the royalty income. AFBI's systems will record staff time, patent costs, legal costs etc. It is highly unlikely that capital costs will need to be tracked for cost recovery purposes.

5. Revenue Sharing

The net revenue will be distributed in accordance with the Revenue Sharing table below. Net revenues to AFBI are cumulative, indicating net revenue accrued during the whole life exploitation of any IP, for example any patent family derived from a single parent filing.

Net Revenue Received By AFBI (£)	Inventor/ Project Team Share %	AFBI Share %
(a) 0 - 1,000	100% gross	0%
(b) 1,000 - 101,000	25% net	75%
(c) >101,000	10% net	90%

This Revenue Sharing is designed to optimise the motivation of staff to identify and commercialise their research. All of the first £1,000 will be paid to staff (gross), 25% of the next £100,000 (net of costs) and 10% of monies in excess of £100,000 (net of costs).

As an example, an IPR-related income of £241,000 which cost £40,000 to achieve would be shared as follows:

£40,000 deducted to cover AFBI expenses, then:

Net Revenue Received By AFBI (£)	Inventor/ Project Team Share £	AFBI Share £
(a) 0 - 1,000	1,000	0
(b) 1,001 - 100,001	25,000	75,000
(c) >100,001	10,000	90,000
Totals:	**36,000**	**165,000**

6. Payment

Staff will be paid within three months of the end of the financial year in which AFBI receives the IPR income. Payment will be due to staff while they remain in the employment of AFBI and also after they have ceased to be AFBI employees.

Payment to staff will be subject to prevailing statutory deductions and will be paid with salary.

7. Appeals

Appeals will be dealt with as outlined in AFBI Innovations guide to Relationship Management and Conflict Resolution.

8. Review

The operation of this policy will be reviewed annually.

Annex 5 – An overview of the problems the Department has encountered with benchmarking of AFBI, how and in what areas benchmarking is progressing and the order of associated expenditure. Also, please provide information in relation to where benchmarking is delivering results.

1. Some initial benchmarking work has been carried out in the Department. A number of commissioning branches have benchmarked AFBI's costs with alternative providers or comparator organisations. Benchmarking has been carried out for milk diagnostic testing, silage analysis, analytical testing in relation to food technology and Transmissible spongiform encephalopathy (TSE) testing.

2. The total annual expenditure associated with these areas and which has been subjected to benchmarking is approximately £560k.

3. Depending on the nature of the tests, branches have been able to make a direct price comparison with other suppliers (mainly private sector laboratories), although this has not been the case across the board and some branches have been unable to obtain a direct price comparison.

4. The main obstacle to benchmarking is being able to make a like for like comparison of the service which DARD demands in addition to routine testing. DARD requires and is reliant on AFBI to maintain its capability to respond appropriately in the event of an emergency which poses a threat to the agri-food economy, animal / plant health or welfare, or to public health. In these circumstances an appropriate response would include immediate availability of suitable local specialist scientific expertise, advise and resources; rapid scientific, technical and analytical support, and where necessary the redeployment of personnel, equipment and work activities to facilitate a rapid and often sustained response.

5. Without access to this local response capability DARD would have to send samples to either GB (transport difficulties) or the south (potential difficulties moving hazardous / potentially hazardous material into another Member State). Both options would also result in longer time for testing to be completed. In addition a significant concern is that there would not be the same guaranteed rapid access to scientific expertise which must be deployed on site or be immediately available to assist decision making as part of the emergency command in a crisis situation.

6. In some cases, branches reported that AFBI's costs have been more competitive than those of other providers. For others, AFBI has been more expensive when considering cost alone however when other non-monetary factors are also taken into account (expertise, ability to meet full contract specification, delivery costs, speed of results and risk), AFBI has demonstrated better value for money overall.

Annex 6: how many projects referred to in the NIAO report were completed under full appraisal threshold and under the initial estimates

- Of the 125 projects referred to in the NIAO report, 52 were completed under the full appraisal threshold of £150k and 50 were completed under their initially estimated costs.

Annex 7:

Information on when DARD's Research and Development change control process was introduced and the impact it has had on projects since its introduction

1. Since the introduction of the Evidence and Innovation (E&I) process in 2011, change control procedures have been in place. DARD has continually reviewed the monitoring arrangements to ensure that projects are carefully managed and that any changes in relation to deliverables, timescales or budget are notified quickly and that appropriate approvals for such changes are provided. The process to do that is set out below.

2. E&I projects undergo review on a quarterly basis and comprehensive annual reports are also provided by AFBI to DARD. Quarterly reports are due with DARD six weeks after the end of the quarter and annual reports are required to be submitted by AFBI eight weeks after the year end.

3. The quarterly monitoring reports submitted by AFBI provide a mechanism for DARD Policy Leads to consider the progress of the project against the research timetable, milestones, deliverables and costs, as outlined in the agreed Full Format Proposal (FFP) and provide an opportunity for the Project Lead in AFBI to identify and highlight any particular areas where the research work or outcomes are diverging from the expected pathway.

4. This provides a mechanism for determining the viability of the project both by the Project Lead and by the Policy Lead in DARD. If preliminary findings mean that the outcomes expected from the work will vary significantly from those projected in the FFP, the Project Lead and the Policy Lead discuss the implications.

5. If the DARD Policy Lead is content with the proposed change to the project's timescales, deliverables or cost, they alert the relevant Programme Management Board (PMB) Chair and Science, Evidence and Innovation Policy Division (SEIPD) to the change. SEIPD reviews the change in light of both scientific considerations and budget restrictions. The FFP and appraisal are then revisited and updated as appropriate and in that review, if there is a significant variance, or DARD decides to amend a project or amend its objectives, the project is escalated to the relevant PMB and if necessary to Evidence and Innovation Priorities Group (EIPG) for consideration. All parties must agree to the change before it is affected.

6. The nature of research itself means that the scope and direction of a project often has to be reconsidered as interim results become available. The process in place allows information that becomes available at each stage to be fed into the review of the project and, if necessary, it allows necessary adjustments to be made to maximize the benefits of the project, the outputs it delivers and, as a result, the value for the Department.

7. This process has been in place since 2011 and allows for regular consideration of projects. However, we do keep our procedures under review and during 2014 we will update our change control process. This will take account of our experience in operating the existing process over the last three years with the anticipated main difference being that AFBI Project Leads will be able to alert their DARD Policy Leads to changes to projects without having to wait for a formal quarterly monitoring return.

Annex 8A: information in relation to the duration of the 125 projects examined by the NIAO and an explanation as to why it is possible to provide this information at this stage but it was not possible when the NIAO conducted its fieldwork

1. At the time of the NIAO's fieldwork, 80 of the 125 projects examined were ongoing and 45 were completed.

2. The expected duration of the 80 ongoing projects was provided to the NIAO on the basis of start year and estimated end year, as specified in the original project proposals. It was not possible to provide the NIAO with the final duration of the ongoing projects given their continuing status at the time of the NIAO's fieldwork. However, the status of those projects has since moved on following their review by DARD in March 2012 and it is now possible to calculate their actual duration. This information is provided at Annex 8B.

3. The expected duration of the 45 completed projects was provided to NIAO based on their start year and end year as specified in the original project proposals. Actual start and end dates for the completed projects were provided to NIAO which enabled their duration to be calculated.

Note: Out-turn duration calculated from Outturn StartDate (i.e. Earliest date costed to project on TTRS) and Out-turn End (i.e. Final Report Date or LatestDate on TTRS if Final Report not submitted)

Annex 8 B - R&D project duration

		Proposal Expected	Out-turns			PPE
Project	Title	Duration	StartDate	EndDate	Duration	completed?
0096	The economic implications of agricultural policy and market reforms in transition economies.	4	01/02/01	25/09/07	6.6	Yes
0011	The influence of Low Voltage Electrical Stimulation (LVES) on red meat quality.	4	01/07/00	03/08/07	7.1	Yes
0021	Factors affecting the sensory quality of potatoes.	3	01/09/01	01/07/09	7.8	Yes
0099	Development of near infrared reflectance spectroscopy (NIRS) calibrations to predict the in vivo digestibility of grass.	3	01/07/00	23/09/10	10.2	Yes
0101	The formation of social relationships in pigs: implications for housing and management practices.	4	01/07/02	22/06/11	9.0	Due 2014
0114	An examination of the potential contribution of cross breeding to improve the profitability of dairying in Northern Ireland.	6	01/04/01	24/08/12	11.4	Due 2015
0260	An investigation of the effect of protozoan engulfment of verotoxigenic, necrotoxigenic Escherichia coli and Campylobacter jejuni on their subsequent resistance to food processing operations.	4	01/10/04	28/07/09	4.8	Yes
0269	Developing management strategies to improve the welfare, health and performance of dairy herd replacements.	5	01/02/04	23/06/11	7.4	Due 2014
0290	An investigation into factors affecting voluntary feed intake in pigs.	5	01/07/04	05/07/10	6.0	Yes
0303	Hydrological charactersisation of a typical drained grassland soil.	3	01/04/04	16/07/12	8.3	Due 2015
0304	Strategies for reducing lameness in Northern Ireland dairy herds.	5	01/04/04	23/06/11	7.2	Due 2015
0310	Surface applied soil conditioners and soil water relations - influence on P loss from grassland	3	01/04/04	31/03/10	6.0	Due 2013
0311	The existence and extent of bypass flow conduits in NI soils	3	01/04/04	23/08/12	8.4	Due 2015
0313	Influence of slurry management upon soil biomass, biodiversity and carbon and mineral cycling.	3	01/01/05	02/06/10	5.4	Yes
0338	The application of novel processing technologies for the preservation of foods.	3	01/04/06	05/10/10	4.5	Due 2013
0350	An intensive genetic study of Atlantic salmon populations of the N.Ireland system, including assessment of population contribution to mixed stock fisheries.	2	01/09/03	14/09/10	7.0	Due 2013
0351	Interactions between the phosphorus content of cattle manure and losses of phosphorus in surface runoff following manure applications to grassland.	3	01/11/05	23/09/08	2.9	Yes
0383	Management and nutrition of calves during the neonatal period	3	01/02/04	21/06/07	3.4	Yes
0384	The effect of compensatory growth during the rearing period on performance of dairy heifers.	3	01/10/03	19/08/08	4.9	Yes
0391	Factors affecting pig performance	3	17/03/08	16/06/11	3.2	Yes
0402	Low input forages for ruminant production systems.	5	01/03/05	16/06/11	6.3	Due 2014
0427	Developing novel supplementation strategies for dairy cows to improve nutrient efficiency and animal health and welfare.	3	29/05/06	11/06/10	4.0	Yes
0440	Alternatives to antibiotic growth promoters for broilers	3	04/06/07	06/10/10	3.3	Due 2014
0454	Forest impacts on upland lakes	3	29/10/07	10/07/09	1.7	Yes
0458	Improving heifer rearing regimes on farms in Northern Ireland	3	21/05/07	14/06/11	4.1	Yes
0516	Efficient and safe use of nutrients in animal manures	3	11/06/07	15/06/11	4.0	Due 2014
0517	The effects of curtailing P fertiliser inputs on the P status of soils and P losses to surface runoff and land drainage water.	3	01/04/06	07/07/10	4.3	Due 2013
0530	Impact of clover sward on milk fat composition and properties	2	04/09/06	25/05/10	3.7	Due 2014
0542	A comparison of three contrasting systems of milk production for spring calving dairy cows	4	13/10/08	09/07/13	4.7	Due 2015
0544	Measurement of grass growth & utilisation & herd performance to enable the development & implementation of decision support systems to optimise performance in different regions of NI	5	07/04/08	08/08/12	4.3	Due 2015
0549	Maximising returns from beef progeny sourced from the dairy herd	4	04/09/06	16/06/11	4.8	Yes
0604	High pressure processing of foods to improve quality and safety	3	16/07/07	13/08/12	5.1	Due 2015
0612	Irish Sea ecosystems health: delivering the science to underpin an ecosystem approach to sustainable management	5	31/03/08	12/09/12	4.4	Due 2016
0615	Measures to improve nitrogen efficiency in Northern Ireland	3	04/06/07	23/08/12	5.2	Due 2015
0617	Monitoring soil quality in Northern Ireland	3	04/06/07	13/06/12	5.0	Due 2015
0618	Monitoring the effectiveness of the nitrates action programme for Northern Ireland	3	04/06/07	25/11/13	6.5	Due 2016
0620	The effect of increasing levels of carbon dioxide in the atmosphere on carbon and nitrogen dynamics in temperate grassland soils	3	21/01/08	29/08/12	4.6	Due 2016
0622	Low input forages for beef production	3	25/02/08	16/06/11	3.3	Due 2014
0625	On-farm methods to improve pig meat quality	3	24/03/08	20/08/12	4.4	Due 2015
0626	Recruitment process & stock dynamics of Irish Sea fin-fish populations	5	07/04/08	01/08/13	5.3	Due 2016
0649	Anaerobic Digestion	3	03/09/07	02/04/12	4.6	Due 2015
0655	Evaluation of a constructed wetland treatment of farmyard dirty water	3	29/09/08	22/06/11	2.7	Due 2014

0351	Interactions between the phosphorus content of cattle manure and losses of phosphorus in surface runoff following manure applications to grassland.	3	01/11/05	23/09/08	2.9	Yes
0383	Management and nutrition of calves during the neonatal period	3	01/02/04	21/06/07	3.4	Yes
0384	The effect of compensatory growth during the rearing period on performance of dairy heifers.	3	01/10/03	19/08/08	4.9	Yes
0391	Factors affecting pig performance	3	17/03/08	16/06/11	3.2	Yes
0402	Low input forages for ruminant production systems.	5	01/03/05	16/06/11	6.3	Due 2014
0427	Developing novel supplementation strategies for dairy cows to improve nutrient efficiency and animal health and welfare.	3	29/05/06	11/06/10	4.0	Yes
0440	Alternatives to antibiotic growth promoters for broilers	3	04/06/07	06/10/10	3.3	Due 2014
0454	Forest impacts on upland lakes	3	29/10/07	10/07/09	1.7	Yes
0458	Improving heifer rearing regimes on farms in Northern Ireland	3	21/05/07	14/06/11	4.1	Yes
0516	Efficient and safe use of nutrients in animal manures	3	11/06/07	15/06/11	4.0	Due 2014
0517	The effects of curtailing P fertiliser inputs on the P status of soils and P losses to surface runoff and land drainage water.	3	01/04/06	07/07/10	4.3	Due 2013
0530	Impact of clover sward on milk fat composition and properties	2	04/09/06	25/05/10	3.7	Due 2014
0542	A comparison of three contrasting systems of milk production for spring calving dairy cows	4	13/10/08	09/07/13	4.7	Due 2015
0544	Measurement of grass growth & utilisation & herd performance to enable the development & implementation of decision support systems to optimise performance in different regions of NI	5	07/04/08	08/08/12	4.3	Due 2015
0549	Maximising returns from beef progeny sourced from the dairy herd	4	04/09/06	16/06/11	4.8	Yes
0604	High pressure processing of foods to improve quality and safety	3	16/07/07	13/08/12	5.1	Due 2015
0612	Irish Sea ecosystems health: delivering the science to underpin an ecosystem approach to sustainable management	5	31/03/08	12/09/12	4.4	Due 2016
0615	Measures to improve nitrogen efficiency in Northern Ireland	3	04/06/07	23/08/12	5.2	Due 2015
0617	Monitoring soil quality in Northern Ireland	3	04/06/07	13/06/12	5.0	Due 2015
0618	Monitoring the effectiveness of the nitrates action programme for Northern Ireland	3	04/06/07	25/11/13	6.5	Due 2016
0620	The effect of increasing levels of carbon dioxide in the atmosphere on carbon and nitrogen dynamics in temperate grassland soils	3	21/01/08	29/08/12	4.6	Due 2016
0622	Low input forages for beef production	3	25/02/08	16/06/11	3.3	Due 2014
0625	On-farm methods to improve pig meat quality	3	24/03/08	20/08/12	4.4	Due 2015
0626	Recruitment process & stock dynamics of Irish Sea fin-fish populations	5	07/04/08	01/08/13	5.3	Due 2016
0640	Anaerobic Digestion	3	03/09/07	03/04/13	4.6	Due 2015

0393	Optimising control of potato late blight with effective use of fungicides and cultivars for conventional and reduced input systems.	5	01/04/04	15/06/12	8.2	Due 2015
0417	An integrated approach to the control of Megaselia halterata during mushroom cultivatiomn	3	21/05/07	23/05/11	4.0	Due 2014
0419	Development of a management information system for grass/white clover swards (CloverCheck) for use in low input grassland production	3	21/05/07	26/05/11	4.0	Due 2014
0445	Adaptation of a herbage growth model to predict herbage and legume content in swards containing grass or red clover	3	21/05/07	26/05/11	4.0	Due 2014
0501	New molecular tools for rapid detection of viral pathogens of threat to plant health & NI agri-food sector	3	05/05/08	20/05/11	3.0	Due 2014
0510	Evaluation of Armagh Orchard Trust Apple Gene Bank for potential cultivars suitable for organic apple production	4	25/06/07	03/07/12	5.0	Due 2015
0511	Evaluation of tunnel spraying on Bramley apples grown in a hedge system for potential reduction of agrochemicals	4	18/06/07	11/08/11	4.1	Due 2014
0514	Management tools for agri-environment schemes	3	29/05/06	08/06/11	5.0	Due 2014
0523	Enhancing legume performance: molecular genetics of high efficiency nitrogen fixing legume symbiosis	3	13/10/08	02/07/13	4.7	Due 2016
0601	Improvements in nutrient utilisation, feeding value & climate change impact of forage grasses - development of rapid tools to assess herbage quality	5	28/04/08	09/09/13	5.4	Due 2016
0629	Optimising management of N nutrition in winter wheat in relation to RB 209	4	23/04/07	07/08/13	6.3	Due 2016
0642	Weed management in organic arable & horticultural crops	3	07/04/08	26/04/10	2.1	Yes
0702	Use of Short Rotation Coppice (SRC) Willow for the bioremediation of farm wastewater	7	14/05/07	02/12/13	6.6	Due 2016
0729	Monitoring arthropod-vectors of bluetongue & other animal disease	3	17/03/08	22/06/12	4.3	Due 2015
0407	Application of high-resolution M. Bovis strain typing to pathogenesis and control of bovine TB	3	01/02/06	12/03/13	7.1	Due 2014
0539	Diagnosis of emerging bacterial pathogens of zoonotic significance	3	07/04/08	27/05/11	3.1	Due 2014
0747	Development & application of a panel of molecular diagnostic assays for the detection of bluetongue virus & other insect vector-borne virus diseases	3	11/02/08	12/09/11	3.6	Due 2014
9904	Epidemiological Study of Salmonella Infections in Farm Animals	3	01/06/00	28/05/04	4.0	Yes
9921	An Economic Study of the Northern Ireland Land Market.	3	01/03/00	20/05/03	3.2	Yes
0009	Investigation into the pathogen / host relationship in the development of lesions in Mycoplasma bovis calf pneumonia.	3	01/04/00	18/06/07	7.2	Yes
0011	The influence of Low Voltage Electrical Stimulation (LVES) on red meat quality.	4	01/07/00	03/08/07	7.1	Yes

0020	Importance of raw meat composition for the flavour of cooked beef	3	01/04/01	25/07/07	6.3	Yes
0021	Factors affecting the sensory quality of potatoes	3	01/09/01	01/07/09	7.8	Yes
0030	Investigation of the incidence and persistence of Mycobacterium avium susp. paratuberculosis (MAP) in food and its possible role in Crohns disease.	4	01/04/00	22/07/04	4.3	Yes
0037	An investigation of some factors influencing herd response to standard lipid supplemented diets designed to optimise milk fat composition	3	01/02/00	16/06/04	4.4	Yes
0046	An investigation of quorum sensing and nutritional triggers of extracellular enzymes by psychrotrophs of milk origin.	3	01/07/00	16/06/04	4.0	Yes
0068	Nutrient balances on grazed grassland.	3	01/03/01	20/07/04	3.4	Yes
0081	The Nature, Causes and Management of Spatial Variability in Forage Grass Production.	3	01/09/00	11/06/04	3.8	Yes
0082	Measurement, Modelling and Management of Nutrient Fluxes in Grass-based Agriculture.	4	01/12/00	27/06/05	4.6	Yes
0085	Lough Melvin lake and catchment study	3	01/07/01	08/06/04	2.9	Yes
0088	Role of orchard hygiene in the potential reduction of fungicide use for control of apple scab (Venturia inaequalis).	5	01/03/01	12/05/05	4.2	Yes
0096	The economic implications of agricultural policy and market reforms in transition economies	4	01/02/01	25/09/07	6.6	Yes
0117	A comparison of poultry meat Campylobacter spp. with those isolated from human disease.	3	01/08/02	26/07/07	5.0	Yes
0128	Microbiology of Agaricus mushroom casing	3	01/04/02	13/06/08	6.2	Yes
0138	Improving the genetic potential of hill ewes through crossbreeding	5	01/02/03	19/05/10	7.3	Yes
0145	The development of protocols for the microbiological assessment of red meat carcasses, in the context of HACCP.	2	01/06/02	15/06/06	4.0	Yes
0160	Nutrient profiling of potatoes growing in hydroponics	3	01/04/03	29/04/05	2.1	Yes
0214	Investigation and quantification of the effects of environmental factors on grass growth and development.	3	01/03/96	23/06/08	12.3	Yes
0218	Production and evaluation of advanced molecular and non-molecular reagents and techniques for diagnosis of exotic virus diseases	3	01/05/02	07/08/08	6.3	Yes
0220	Early pathogenesis and control of porcine circovirus disease	3	01/05/02	15/08/08	6.3	Yes
0250	A Socio-Economic Investigation of Farmer Retirement and Farm Succession in Northern Ireland	2	01/04/03	05/07/06	3.3	Yes
0256	Developing easy-care systems of lowland sheep production	3	01/10/03	20/02/08	4.4	Due
0265	Astrovirus-associated enteritis and growth retardation in Northern Ireland poultry	3	01/05/03	08/08/08	5.3	Yes
0289	Defining the nutritive value of cereals for pigs and poultry	4	01/01/05	12/06/09	4.4	Yes
0315	Modelling and monitoring the impact of potential NVZ designations on surface water quality and farm management practices.	3	01/10/03	17/05/06	2.6	Yes
0317	Soil quality indicators for sustainable agriculture and the aquatic environment in Northern Ireland	3	01/09/03	17/05/06	2.7	Yes
0332	Management of diseases and weeds of cereal crops grown under organic conditions	4	01/05/04	17/04/07	3.0	Yes
0335	Control of invasive weeds of grassland in environmentally sensitive areas	4	01/06/04	31/05/07	3.0	Yes
0339	Improving the detection and control of fungal and bacterial pathogens of potato tubers	3	01/04/04	10/09/08	4.4	Yes
0351	Interactions between the phosphorus content of cattle manure and losses of phosphorus in surface runoff following manure applications to grassland	3	01/11/05	23/09/08	2.9	Yes
0369	Disease resistance markers in forage grasses.	4	01/09/03	03/06/09	5.8	Due 2013
0371	The use of high hydrostatic pressure for the preservation of foods	3	01/06/04	08/06/07	3.0	Yes
0372	To develop robust visible and near infrared calibrations for assessing fibre and yarn quality.	3	01/04/04	10/09/08	4.4	Yes
0384	The effect of compensatory growth during the rearing period on performance of dairy heifers	3	01/10/03	19/08/08	4.9	Yes
0405	Improving the nitrogen use efficiency of fertiliser urea	3	01/04/03	21/06/07	4.2	Yes
0418	Evaluation of Smart Fresh (1-MCP) as a growth regulator for enhancing the quality of Bramley apples in long term storage	4	01/01/05	14/10/08	3.8	Yes
0431	The Sensitivity of Benthic Habitats in NW Irish and Malin Shelf	3	01/03/05	31/03/09	4.1	Yes
0454	Forest impacts on upland lakes	3	29/10/07	10/07/09	1.7	Yes
03100	Ecological impacts of Zebra Mussels in NI waterways	3	01/07/04	11/08/05	1.1	Yes
03104	The identification, status and potential damage of root-knot nematodes Meloidogyne spp. in Northern Ireland	3	01/07/04	25/09/08	4.2	Yes
03107	Diagnostic scheme for the identification of European potato cyst nematode (PCN) populations	3	01/07/04	27/05/08	3.9	Yes
9637	Mycobacterium bovis antigens in bovine tuberculosis.	3	01/04/96	01/01/01	4.8	Yes

Annex 9A: Please provide a breakdown of the cost that had been incurred by each project at the time of termination. Witnesses submitted that value was retained by the public sector as research from these projects was diverted into other subsequent bodies of work. Please elaborate on how learning was captured from these projects, which of the 52 projects fed into other projects, how the Department measures the value of this work and the progress and lessons learned from the Post Project Evaluations of those projects.

1. The cost breakdown is provided at Annex 9B.

2. How was learning captured from the 52 projects?

The learning was captured in a number of ways. Firstly, information and results were fed back to DARD Policy Leads through both formal reporting and through oneto-one interaction. The latter included scientific advice and input to decision making, and when required, scientific advice in relation to emergency situations. The knowhow generated through research helped to build a substantial knowledge base within AFBI that has also been used for follow-on research. Peer reviewed scientific publications share important scientific information and help AFBI to attract national and international research funding.

The outputs from these projects were transferred to the local industry through technology transfer events which are delivered in association with CAFRE. Technology transfer articles are also published in the local farming press.

3. Which of the 52 projects fed into other projects?

In 40 cases the research element had already finished and the project leader was asked to write up the project and bring it to a conclusion. In 11 cases, when reviewed against current policy objectives, the projects were considered to be less pressing than those coming forward under the Evidence and Innovation (E&I) process and so they were brought to an early conclusion. Given that the E&I Strategy was the start of the process to ensure that research and development was policy initiated and in keeping with DARD's strategic aims and priorities, it is not surprising that projects assessed against this new framework were considered of less priority. One project was stopped because of insufficient progress. However, the projects that stopped had significant value and indeed some were refocused and included in the E&I programme. Examples of such projects include:

- Application of high resolution M bovis strain tying to pathogenesis and control of bovine TB. While this specific project was brought to an early conclusion, TB research was of ongoing importance to DARD and the Department has continued to commission TB projects within the E&I Programme.
- Monitoring arthrop-vectors of bluetongue and other animal diseases. This project was brought to a conclusion but similar work was commissioned within the E&I programme. This work was important in providing evidence in relation to the vector free period when Bluetongue was detected on a farm in Northern Ireland.

4. How does DARD measure the value of this work?

In addition to considering monetary value / return, the value of the work can also be measured in relation to its support for policy development and innovation and its contribution to the provision of an emergency response capacity. By way of example, the following projects were formally stopped as part of the review process in 2012 and their value is summarised below:

Supporting Policy

- Efficient and safe use of nutrients in animal manures - AFBI research demonstrated that, due to local management and feed, dairy cows in NI produced 9% less manure than cows

in England. This was used to negotiate a higher stocking rate of dairy cattle for NI than was allowed for England. Result is that NI dairy farms can produce 9% more milk per ha, equating to a potential benefit estimated at £6.24m between 2006 and 2012. Research cost was £650k.

- Recruitment process and stock dynamics of Irish Sea fin-fish populations and DARD project 0612: Irish Sea ecosystem health: delivering the science to underpin an ecosystem approach to sustainable management. Data gathered by AFBI's marine fish stock assessments allow negotiation of best outcomes for NI fishing sector in EU Fisheries Negotiations. For example, in 2013, EU proposed cutting the NI TAC (total allowable catch) for nephrops by 12%. AFBI data helped reverse the cut and deliver a net 6% increase in TAC, worth more than £1.5m pa. Research cost £340k pa.

Supporting Innovation

- Development of near infrared reflectance spectroscopy (NIRS) calibrations to predict the in vivo digestibility of grass. AFBI led research developed new systems for predicting the feeding value of silage. Now used across UK/Ireland. Estimated benefits to NI of £1.25m pa. Research cost £511k. Further research with UK partners developed the UK Feed into Milk Rationing System now adopted across UK can improve efficiency by 10%. Assuming 20% adoption across NI gives a return of £3.35m pa. Research cost £360k.
- Improving heifer rearing regimes on farms in Northern Ireland. Funded by DARD & AgriSearch. Developed blueprint for heifer rearing that can save 1p per litre of milk produced. Assuming adopted by 5% of producers (recent survey suggests this is modest), saving to industry of £990k pa. Research cost £320k.

Emergency Response

- Monitoring arthrop-vectors of blue tongue and other animal diseases and
- Development and application of panel of molecular diagnostic assays for the detection of blue tounge virus and other insect vector-borne diseases. AFBI was able to show that BTV positive animals detected at post import testing within NI had not infected the local midge population and thus ensured that NI's BTV free status was maintained. The work undertaken by AFBI demonstrated transplacental spread of this diseases for the first time and informed the EU policy on control measures.

5. Progress and lessons learned from PPEs

A total of 14 PPEs have been completed from the 52 projects stopped in 2012. The remainder are scheduled for completion but have not yet fallen due. Whilst section 4 above highlights examples of the impact delivered from a selection of these projects, the points below summarise additional lessons learnt from the PPEs completed to date. Those lessons have been primarily in relation to research management and the importance of the dissemination of research results.

- There was a tendency to underestimate the resources required for projects in terms of staff time, consumables, maintenance etc. This made completing the project within the initial budget very difficult.
- The number of outputs tended to be underestimated. Most projects over delivered e.g. in number of referred publications, Technology Transfer events etc.
- On several occasions, the results from research provided information that impacted upon the work of other government agencies, for example, evidence of a decline in water quality which had severe implications on fish stocks. This highlighted the importance of engaging with other government bodies and stakeholders such as DOE and industry so that they could act on results.

Annex 9B – Costs (£) incurred on terminated projects at point of cessation

PMB 1 -

#	Title	Cost
0011	The influence of Low Voltage Electrical Stimulation (LVES) on red meat quality	160,304
0020	Importance of raw meat composition for the flavour of cooked beef	481,285
0021	Factors affecting the sensory quality of potatoes	17,164
0099	Development of near infrared reflectance spectroscopy (NIRS) calibrations to predict the in vivo digestibility of grass	305,242
0134	Epidemiology and control of apple canker caused by Nectria galligena	144,094
0289	Defining the nutritive value of cereals for pigs and poultry	1,246,481
0384	The effect of compensatory growth during the rearing period on performance of dairy heifers	101,392
0391	Factors affecting pig performance	594,637
0417	An integrated approach to the control of Megasella halterata during mushroom cultivation	407,506
0419	Development of a management information system for grass/white clover swards (CloverCheck) for use in low input grassland production	326,631
0445	Adaptation of a herbage growth model to predict herbage growth and legume content in swards containing grass and white or red clover	40,398
0458	Improving heifer rearing regimes on farms in Northern Ireland	340,660
0530	Impact of clover sward on milk fat composition and properties	367,781
0542	A comparison of three contrasting systems of milk production for spring calving dairy cows	249,944
0549	Maximising returns from beef progeny sourced from the dairy herd	766,869
604	High pressure processing of foods to improve quality and safety	1,114,766
0615	Measures to improve nitrogen use efficiency in Northern Ireland	448,362
0622	Low input forages for beef production	179,347
0716	Development of a phenotypic database for the Northern Ireland beef industry	133,105
0721	Interactive effects of palletised lime and fertiliser N on sward productivity	45,738
0809	Developing breeding strategies for sustainable sheep production systems in Northern Ireland	584,040
9920	To assess the potential of the Norwegian Dairy Cattle breed (NRF) as an alternative to Holstein Friesian breed for NI	395,528

1

PMB 2

#	Title	Cost
0101	The formation of social relationships in pigs:implications for housing and management practices	357,455
0808	Evaluation of the factors influencing rates of adoption of sheep research in NI	299

2

PMB 3

#	Title	Cost
0162	Forest Insect Pests - Management and Quarantine Diagnostics	57,630
0269	Developing management strategies to improve the welfare, health and performance of dairy herd replacements	0
0290	An investigation into factors affecting voluntary feed intake in pigs.	0
0304	Strategies for reducing lameness in Northern Ireland dairy herds	293,544
0383	Management and nutrition of calves during the neonatal period	232,992
0393	Optimising control of potato late blight with effective use of fungicides and cultivars for conventional and reduced input systems	790,318
0407	Application of high-resolution M. bovis strain typing to pathogenesis and control of bovine TB	1,172,054
0440	Alternatives to antibiotic growth promoters for broilers	625,955
0501	New molecular tools for rapid detection of viral pathogens of threat to Plant Health and NI agri-food sector	311,280
0510	Evaluation of Armagh Orchard Trust Apple Gene Bank for potential cultivars suitable of organic apple production in Northern Ireland (I. Establishment Phase)	197,815
0511	Evaluation of tunnel spraying on Bramley trees grown in a hedge system for potential reduction of agrochemicals	123,379
0539	Diagnosis of Emerging Bacterial Pathogens of Zoonotic Significance	218,360
0714	Effectiveness of different footbath solutions in the treatment of digital dermatitis in dairy cows	77,172
0717	Developing breeding and management strategies to reduce lameness in the Northern Ireland sheep industry	121,088
0729	Monitoring arthrop-vectors of bluetongue and other animal diseases	588,619
0747	Development and application of panel of molecular diagnostic assays for the detection of bluetongue virus and other insect vector-borne diseases	371,524

PMB 4

#	Title	Cost
0158	Interactions of willow varities grown in mixtures contributing to sustainability	1,106,082
0282	Sustainability of trees in woodland and farmland ecosystems	452,957
0303	Hydrological characterisation of a typical drained grassland soil	304,861
0310	Surface applied soil conditioners and soil water relations - influence on P loss from grassland	123,294
0311	The existence and extent of bypass flow conduits in NI soils	308,809
0514	Management tools for agri-environment schemes	699,439
0516	Efficient and safe use of nutrients in animal manures	259,565
0620	The effect of increasing levels of CO2 in the atmosphere on carbon and nitrogen dynamics in temperate grassland soils	61,566
0649	Anaerobic Digestion	296,294
0655	Evaluation of a constructed wetland for treatment of farmyard dirty water	137,142
0700	Nutritional strategies to reduce methane and nitrogen emissions of dairy cows	310,111
0708	Harvesting and utilisation of forest brash as biomass material	111,787

DARD

Review of Support Arrangements and Mechanisms

REPORT

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Consultancy Services

DARD

Review of Support Arrangements and Mechanisms

REPORT

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EXECUTIVE SUMMARY

1.0 EXECUTIVE SUMMARY

1.1 This report was commissioned by the Department of Agriculture and Rural Development (DARD), with a view to undertaking an assessment of the value and relevance of the support mechanisms, including the internal departmental arrangements for those supports, currently being provided by the Department to the potato sector in Northern Ireland. It was undertaken in accordance with the Terms of Reference reproduced in Appendix 1.

1.2 The combined output of ware and seed potatoes in Northern Ireland has declined steadily over more than a century - to the point where it is now a very small proportion of the European Union total (which increased as a result of the accession of Poland, Hungary and other smaller producers) and the future sustainability of both the seed and the ware sectors is becoming progressively and rapidly more questionable. In recent years, the number of potato farmers in Northern Ireland has decreased (as it has in several other European countries), with no indication of any change in that trend. The overall sector's output is now heavily dependent on the 5%-10% of biggest farmers, who, between them, produce between 45% and 60% of total output; at present, the biggest 1% of farmers (ten farmers) produce 16% of Northern Ireland's total output of potatoes and the total value of the sector's output in 2003 was £22.6 million (within 4% of the mean value of £23.5 million over the past six years).

1.2.1 By comparison, Scotland's overall output has remained relatively steady, though its seed production has shown indications of a slight decline, despite the fact that most of the multiplication of the Republic of Ireland's new varieties is now undertaken there. Similarly in the Republic of Ireland, while the number of potato farmers is decreasing at a rate broadly comparable to that in Northern Ireland, overall production was, until recently, increasing slightly; however, it has now started to decline, partly because of the growing of Irish varieties in Scotland, but also largely because of encouragement from the Irish Farmers Association and Teagasc's Advisory Service, both of whom have been advocating rationalisation in order to avoid price-cutting and, thereby, secure the sustainability of the sector.

1.3 Northern Ireland has a high, disease-free, health status for its potatoes, but there is little evidence that such a theoretically important and valuable advantage has been exploited in securing overseas sales, or even in protecting the domestic market; logically, that should be a major asset in selling potatoes - especially seed potatoes - into foreign markets. Instead, Northern Ireland has been losing its former strong position in its export markets, whilst Scotland has been maintaining, or increasing, its sales in those same markets.

1.4 One issue which clearly impacts on the potato sector in Northern Ireland is the extensive use of 'free' varieties i.e. those varieties on which royalties are no longer payable to the breeders. While the cultivation of such varieties reduces short-term costs to the producers, it normally results in lower yields (about 50% lower, or even less, of that for protected varieties) and it also implies that much of the output being produced in Northern Ireland is from 'out-dated' varieties, which are, frequently, inappropriate to changing market demands.

1.5 The potato sector in Northern Ireland is currently dominated by relatively small producers; 70% of growers farm less than five hectares, at an average of 1.51 hectares per farmer; most of these are not dependent on potato growing for their livelihoods. All the indications are that, in the future, units will have to be bigger and more specialised, if they are to be viable, and it is clear that that process has already started. Therefore, it can be predicted with confidence that, in the near future, any potato farmer with significantly less than fifty hectares under cultivation is unlikely to sustain a viable potato-farming operation.

1.6 Because of the 'commodity' nature of its output, with major fluctuations in selling prices, potato farming is a risky business, demanding very effective cost control. Pressure, especially from Britain, where prices are significantly lower, will dictate that Northern Ireland's potato farmers will have to find ways of reducing their costs, by benchmarking them against 'best practice' growers and by finding and implementing new solutions to both established and emerging problems, if they are to compete effectively and reduce their exposure to the risk of losses, or, for some, to financial disaster.

1.7 Internationally, potato farming is becoming more mobile. Already the Republic of Ireland, through one of its main potato organisations, is multiplying its home-bred varieties in Scotland and doing so very effectively and successfully; the yields being achieved there are between two and four times those being achieved in Ireland, depending on the variety. Other major companies in the potato sector, including some with investments in Northern Ireland, are also multiplying their seed in several countries and have created vast networks of growers in those countries.

1.8 Potato selling and marketing is governed, in large part, by European Union regulations and directives, though there are no E.U. quality standards specifically applicable to potatoes. There are, however, specific regulations designed to protect against so-called 'quarantine diseases' and indigenous governments are required to install appropriate inspection procedures to identify any occurrence of such viruses and pathogens.

1.9 In Northern Ireland, DARD's Quality Assurance Branch is responsible for the implementation of plant health and seed certification legislation with scientific support from Applied Plant Science Division (APSD); its certification procedures are acknowledged internationally as being of a particularly high standard. Through its facility at Newforge Lane, APSD is satisfied that no symptoms of any quarantine disease have been found in Northern Ireland.

1.10 The crossing and breeding of new varieties is undertaken by another unit, currently within APSD, at the Northern Ireland Horticulture and Plant Breeding Station (NIHPBS) at Loughgall. Its breeding programme involves a combination of commercial contracts with a variety of local and international interests involving a market focus, and a strategic breeding programme for the prevention / control of diseases and the inculcation of new characteristics into the final potato product. Trials on all potentially viable varieties are conducted at the Northern Ireland Testing Station (NITS) at Crossnacreevy.

1.11 A broad consultation process was conducted with a wide range of interests, including growers, merchants, packers, processors, representative bodies and

DARD staff. During the consultations, the following principal issues were raised:

- Northern Ireland's advantages of good soil, suitable climate, high health and disease-free status, and long experience in the sector, should be enough to create a successful potato industry, but it continues to lose market share in both its ware and its seed sectors; the lack of new varieties and the use of non-certified seed have eroded its credibility in its former markets.
- This sector's development has suffered from an inadequate focus on market needs and the overall supply chain, little investment in marketing infrastructure, a low level of vertical linkages and a shortage of skills in marketing; consequently, aspects such as quality, service, after-sales support (especially for its seed, which requires more such support than the ware sector) and innovation have never received adequate attention or investment from the farmers themselves; realistically, these issues can be resolved only by direct interface between the farmers and their customers (and, ideally, with consumers of their products – though that is likely to be more difficult), rather than by relying on intermediaries who have not fulfilled this role successfully in the past and are unlikely to do so in the future. And, there is a need for more, stronger contractual arrangements between those who grow seed and ware growers.
- Poor husbandry has a hugely negative impact on this industry's performance; there has been a failure to address some fundamental agronomic issues, including inadequate fallowing, the use of small ware and several generations of seed, the lack of soil sampling and of adequate blight protocols, and the failure to segregate seed from ware, to benchmark costs, to apply the necessary phytosanitary protocols and to remove 'rogue' varieties from the crops during growth.
- The maintenance of its high health and disease-free status and the continuing cultivation of new varieties are crucial to the future of this sector; that high health status must apply to the Island as a whole and any new varieties should come from market-driven breeding rather than agronomically-driven crossing.

- The inadequacy of the infrastructural support available has affected the performance of this sector; that infrastructure includes: post harvesting and cold storage facilities, grading and weighing facilities, washing and packing facilities etc. as well as non-physical supports such as benchmark data, marketing support, models of best practice etc.; comparison with the Republic of Ireland indicates that the potato sector in Northern Ireland has secured less-than-adequate investment in these areas; at the same time, there is clear evidence that some of the supports, which are available, have not been used by growers – especially the non-physical supports.
- The high level of fragmentation in the sector and the failure to co-operate in solving problems in the way in which Dutch farmers do, have militated against the progress of potato farming in Northern Ireland; this has been augmented by dependence on merchants who sell on a 'commodity' basis, with no contractual relationships with the growers.
- There has been a failure to harness the expertise which exists in Northern Ireland in crossing and breeding to produce new varieties and the emphasis on agronomy, at the expense of changes in market preferences for types of potato, has not been helpful; the multiplication of Northern-Ireland-bred varieties in Scotland, Holland etc. is a source of annoyance to growers.
- There has been a continuing decline in potato consumption, with a consequent need to increase the range of value-added potato products, to maximise cost-competitiveness and to co-operate at all levels in the sector.
- Any potential for growth in Northern Ireland's potato sector is in the seed sector and opportunities to service nearby markets are being missed.

1.12 A number of issues emanated from the combination of a literature survey and the consultations, together with the subsequent analyses. Four issues were clearly of particular significance, viz.:

> The need to protect Northern Ireland's disease-free status and that involves ensuring that the Republic also remains free from potato-based diseases.

> The need to have on-going access to new varieties.

> The need for improved agronomy.

> The need for better marketing of Northern Ireland's potato output.

They, together with the options available in respect of each issue, were analysed into three groups: those which are essentially strategic; those which are statutory; and those which are largely, or entirely, discretionary.

1.12.1 In terms of the strategic dimensions to potato farming, three main aspects were identified, as follows:

(i) The Need for New Varieties: This is currently one of the main determinants of Departmental expenditure on this sector. In strategic terms, this was deemed to be critical to the sector's future and a total of six options (including retention of the *status quo*) were identified and analysed; the six were reduced to the following three, realistically feasible alternatives:

- a phased reduction of public funding for the potato breeding programme;
- the funding by DARD of 'strategic components' only, with 'commercial breeding' being funded through contractual agreements; and
- allowing Northern Ireland to become purely a location for the propagation of varieties bred elsewhere.

(ii) Links with Other Potato-growing Countries: Four options were identified and, following analysis, they were reduced to three viz. the establishment of formal links with the Republic of Ireland, or with a mainland-European country, or both.

(iii) Whether to Focus DARD's Support on a Smaller Number of Bigger Operators: Bigger operators were identified as being more amenable to implementing better agronomy and marketing protocols and as having a bigger stake in the future success of the sector.

Specific recommendations in relation to each of these three dimensions are provided below.

1.12.2 In relation to the various statutory activities, it was accepted that the only real options related to their scale and cost. The recommended changes in respect of these elements are set out below.

1.12.3 Similarly, the costs of research and other non-statutory activities provided at Newforge were considered, with the conclusions indicated below.

1.13 The sixteen recommendations arising from the conclusions to the analyses of the potentially feasible options are as follows:

Recommendation 1: ***The NIHPBS at Loughgall (through Environmental Policy Branch) should negotiate commercially-focussed contracts with a number of organisations (instead of a single main contract) and should divide the overall quantum of its crossing and breeding work over those contracts, adjusting 'reduction rates' so that a realistically feasible number of varieties is produced for potential commercial multiplication under each contract, by the seventh or eighth year after initial crossing.***

Recommendation 2: ***In negotiating contracts with potential commercial partners, NIHPBS (through Environmental Policy Branch) should ensure that most of its breeding work will be focussed on the British, Irish and European markets.***

Recommendation 3: ***As part of its contract negotiations with any potential partner, NIHPBS (through Environmental Policy Branch) should try to ensure that such a partner has sufficient networks and resources to exploit fully the potential of any new variety and to support it with the necessary marketing investment; it should also try to ensure that the possibility of multiplication in Northern Ireland was not being precluded by the commercial partner, even if any particular variety was to be made available to a select number of trusted growers only.***

Recommendation 4: ***DARD should continue to support an element of strategic breeding at Loughgall, to be undertaken to DARD's specifications, following agreement with NIHPBS, but DARD's contribution to any strategic component of Loughgall's potato-breeding activities should reduce***

progressively over time, starting at 80% of the cost of Loughgall's potato-breeding programme in 2006, and reducing by 10% per annum over the following five years; if by the end of 2010, the programme is not generating enough commercial revenue to cover at least 45% of its costs, the programme's performance and future, and the contributions (both monetary and non-monetary) of the individual commercial partners should be reviewed afresh by DARD.

Recommendation 5: ***DARD should pursue with the Department of Food and Agriculture in the Republic, the potential for mutual co-operation and economies of operation in the areas of inspection, certification, research, marketing and promotion, variety development and cross-border trade, for both seed and ware, in the potato sector.***

Recommendation 6: ***DARD should pursue with the Department of Food and Agriculture the potential for co-operation and joint operations between An Bord Bia and relevant agencies in Northern Ireland (INI etc.) in creating an Island-wide approach to the promotion and marketing of potatoes and their related down-stream, value-added products, in both local and international markets.***

Recommendation 7: ***The Northern Ireland potato sector should, in conjunction with DARD, develop marketing and distribution partnerships with major European players (especially European companies, with which it negotiates breeding contracts) who could secure sales for Northern Ireland seed potatoes in parts of Europe and outside Europe, under such an arrangement that some propagation would occur in Northern Ireland, with carefully selected and trusted growers, and that commission on varieties bred in Northern Ireland would be returned to the breeder in Northern Ireland.***

Recommendation 8: ***DARD should concentrate its resources and its support for the potato sector on:***

- ***the one hundred (or so) farmers who currently plant at least forty hectares of potatoes annually, or who could be persuaded to increase their propagation to that level,***

- ***the top quartile of seed producers, and***
- ***any strategically-important specialist operators,***

whilst maintaining, among all growers, the inspection, certification and marketing standards devolved to it by European Union directives and national legislation.

Recommendation 9: ***DARD should now undertake a zero-based analysis of the current levy scheme, with a view to abolishing it entirely, or to establishing a new levy system for the farmers who continue to receive support under whatever new dispensation is implemented, following consideration of this report.***

Recommendation 10: ***In light of the continuing decrease in the sector, Quality Assurance Branch should reduce the staffing cohort devoted to the potato sector by 20% of its current level (i.e. to eight person-years) by the end of 2007, whilst maintaining the standards it currently applies to its inspection and certification activities.***

Recommendation 11: ***DARD should review, from zero-base, with Newforge the need for, and cost of, the services currently being provided from there, with a view to effecting economies which would reflect the changed level of activity in the sector, whilst taking due cognisance of the statutory need to protect Northern Ireland's health status in relation to potato farming.***

Recommendation 12: ***DARD, through its staff who are in direct contact with potato growers (especially those at CAFRE's Greenmount Campus and those in Supply Chain Management), should encourage increased use of the Department's expertise in agronomy, bench-marking, supply chain management, marketing and technology transfer, by the cohort of growers on which it proposes to concentrate its support, through making courses and advice available to those growers; it should also promote the need for growers to reduce their costs to levels which will make them competitive with growers elsewhere; and DARD should set five-year performance targets for these activities, so that failure to achieve reasonably feasible improvements will result in reductions in the resources allocated to those activities.***

Recommendation 13: ***DARD, through its contacts with educational and research bodies, should promote and support the concept of research into how the shelf-life of potatoes and potato-based products could be extended.***

Recommendation 14: ***DARD should prepare plans to ensure that any potentially successful new varieties emanating from the strategic breeding programme, which it supports, will be complemented by adequate marketing, even if that were to involve the sale of some specific varieties to private sector businesses with the requisite marketing skills and financial resources.***

Recommendation 15: ***DARD's strategy for the marketing of Northern Ireland's potato output and for the marketing of any down-stream products from potatoes, should involve co-operation with the sector in the Republic of Ireland, and the implementation of such a strategy should be facilitated and supported through appropriate cross-border entities.***

Recommendation 16: ***Farm Policy Branch should immediately undertake an assessment of the organisational implications of appointing a person to co-ordinate the delivery of its statutory responsibilities to the potato sector and its overall support for that sector, and, in the absence of seriously negative implications, should make such an appointment.***

1.14 While these recommendations may not be exactly what potato growers, or those who currently market Northern Ireland's potato output, would prefer, they represent what is deemed to be the best short and medium term approach to making this a viable sector, with some potential for selective expansion in the near future.

INTRODUCTION AND BACKGROUND

2.0 INTRODUCTION AND BACKGROUND

2.1 The Department of Agriculture and Rural Development (DARD) currently provides support to the potato sector in Northern Ireland (some of which is indirect) and, in the process, incurs costs under the following six headings:

- policy development, co-ordination and implementation, and technical advice on plant health, research, development, marketing and promotion;
- management of potato breeding contractual arrangements (under Environmental Policy Branch);
- delivery of various services including education, business development advice, technology transfer, statutory plant health, seed certification etc. to producers, processors (on product development, factory design, labelling and packaging etc.) and to other elements of the supply chain, as well as to funders (including those supporting processing and marketing initiatives);
- science services, including research, testing, diagnosis of pests and diseases and the provision of such services to growers;
- research into, and breeding of, new varieties;
- the co-ordination of statistical and quantitative data and related analyses.

2.1.1 An organisation chart, summarising the reporting relationships and roles within DARD, is provided in Appendix 2 to this report, but the following is an abbreviated indication of the core role(s) of some of the more important sub-sections of that Department, as they relate to potato farming:

> ***Farm Policy Branch*** (FPB) has overall responsibility for the development, implementation and evaluation of policy, relating to the production of potatoes both seed and ware. (Note: It is responsible for policy in relation to other sectors of farming as well.)

> ***Quality Assurance Branch*** (QAB) has responsibility for the implementation of national and European Union policies, principally in the areas of inspection, certification and sampling. (A more detailed analysis of its roles and responsibilities is provided in Appendix 3 and that Appendix indicates that this facility's services and activities are not restricted to the potato sector, nor are they discretionary, in the main.)

> ***Applied Plant Science Division*** (APSD) provides a range of advice, sample analyses and other essential diagnostic services to the potato sector (and to other sectors of farming too); it encompasses the activities at;

- Newforge Lane (Newforge), where most of the Department's statutory testing and scientific advice is provided – much of its role is mandatory under European Union regulations (c/f paragraphs 2.17.2 and 2.17.3);
- Loughgall (the Northern Ireland Horticulture and Plant Breeding Station – NIHPBS), where the crossing for, and breeding of, new seed, germplasm and varieties, are undertaken; this includes the introduction of new (sometimes 'wild') species, the use/crossing of parental lines which have specific attributes, the development of varieties with specific immunities and the selection of new varieties of potatoes for commercial exploitation, or for strategic breeding; it also crosses for, and breeds new grasses, mushrooms etc.;
- Crossnacreevy (the Northern Ireland Plant Testing Station – NIHPTS), where the trialling of new varieties (including of crops other than potatoes) is undertaken (c/f paragraph 2.22); and
- Agricultural Economics Division, which collates and publishes data on the levels and values of agricultural outputs and costs across all sub-sectors of farming, as well as other relevant statistics (some of which are gathered by other units within DARD).

> ***Supply Chain Development Branch*** provides advice on markets and marketing, customer service, networking support and contacts, as well as providing significant support on a wide range of 'supply chain' activities, for both exporters and those involved in supplying the domestic markets, and for both ware and seed producers.

> ***College of Agriculture, Food and Rural Enterprise*** (CAFRE), mainly through its Greenmount campus, provides potato farmers with training, benchmarking, facilitation, support and commercial education, on aspects such as the adoption and transfer of new technology, on growing and agronomy, and on the optimisation of use of productive assets etc.; it serves all arable crops, using three

advisors, and concentrates on those who are most amenable to any necessary, or appropriate, change.

- > ***Environmental Policy Branch*** (EPB) is responsible for the finalisation of any contractual elements of breeding arrangements with private sector potato merchants, growers, packers or other companies (and it is similarly responsible for such contracts for other sectors of farming).
- > ***Food Policy Branch*** (FPB) has responsibility for food marketing policy and liaison with Invest Northern Ireland.

2.1.2 Most of the Department's expenditure in support of the potato sector is personnel related and pre-assignment estimates of the current annual figure ranged from £1.1 million to £1.4 million. This assignment relates to assessing the effects of that expenditure, to examining the return from it, in either social or economic terms, and to identifying the strategic implications of both current and future expenditure.

2.2 The potato sector generates gross revenues to the Northern Ireland economy of over £20 million *per annum* on average; between 1998 and 2003, the highest revenue in any year was £33 million (in 1999), whilst, in 2000, it generated only £17.3 million. Between 2001 and 2003, the figure was generally close to £22 million, with ware potatoes (i.e. those which are consumed) accounting for between 80% and 87% of total revenue. In addition, further value is added by processors, but this could equally be added using imported potatoes; therefore, it is not directly attributable to farming *per se*.

2.2.1 As is emphasised later in this report, Northern Ireland once held a very strong position in the world market for seed potatoes, exporting mainly to Britain, but also to a variety of Southern European and North African countries, especially to those on both sides of the Mediterranean Sea, and to the Spanish Islands in the Atlantic. For a variety of reasons – mainly the use of 'inappropriate' seed, little choice of varieties, deterioration during transportation and poor marketing - those markets have been lost to Irish suppliers and have never been replaced; that has impacted negatively on the overall potato sector here.

2.2.2 With the reduction in the overall area being planted (see below), the export of ware has also reduced - to the point where ware production is now geared almost exclusively towards the domestic market.

THE CURRENT POSITION AND MAIN TRENDS IN NORTHERN IRELAND

2.3 The growing of potatoes in Northern Ireland, as reflected in the land-area devoted to that activity, has been in decline for more than a century and a half, as the following summarised figures (in Table 2.1) demonstrate; the pre-1921 figures are for the six counties of what is now Northern Ireland:

TABLE 2.1
AREA DEVOTED TO GROWING POTATOES IN NORTHERN IRELAND

Year	1853	1903	1953	1993	2003	*2004 (est)*
Area Devoted to Potatoes ('000 ha)	84	70	56	9.2	6.0	*5.5*

Source: DARD (The Agricultural Census in Northern Ireland – Results for June 2003)

The table shows that the area currently being planted is less than 10% of what was devoted to potato production fifty years ago and only 6.5% of the area planted one hundred and fifty years ago.

2.3.1 While the amount of land devoted to potato growing stabilised in the late 1980's and early 1990's (it actually increased in some of those years), the overall trend for the past fifteen years has continued downward, and the value of that production has fluctuated significantly over more recent years. Table 2.2 provides data on the changing area devoted to growing potatoes, with comparisons for the value of the output achieved.

TABLE 2.2
AREAS DEVOTED TO POTATO-GROWING AND VALUES PRODUCED ANNUALLY (for Selected Years)

Year	1989	1991	1992	1993	1995	1997	1998	1999	2000	2001	2002	2003
Area ('000 ha)	10.4	10.9	11.1	9.2	9.0	7.8	7.5	7.5	6.8	6.7	6.7	6.0
Output ('000 tonnes)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	279	320	294	264	238	218
Value (£ M)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	25.4	33.0	17.3	21.2	21.5	22.6

Source: DARD (The Agricultural Census in Northern Ireland – Results for June 2003)

2.3.1.1 The most recent estimate for 2004 (*from DARD*) suggests a further decline in both the area used for the cultivation of potatoes and in the revenue generated; the total area devoted to potato production was down to less than 5,500 hectares (half the area farmed in either 1991 or 1992), of which an estimated 875 hectares (much less than half the area used in any of the years 1994-1996) were devoted to seed production and 4,586 hectares were for ware production. In relative terms, production of ware potatoes has proved more resilient than production of seed. The 2004 figures also suggest a very dramatic decline in the revenue generated by Northern Ireland's potato sector, because of the significant reduction in the average price per tonne, across Europe. Furthermore, the area planted in seed, in 2005, is expected to be about 20% less than the 2004 figure; this will give the lowest proportion for the area devoted to seed, as a percentage of total potato growing, since records began.

2.3.2 Not only is the aggregate area under potatoes decreasing, but so too is the number of potato farmers - from 1007 in 2002, to 977 in 2003 (a reduction of 3% in one year) down to an estimated 953 in 2004 (a further reduction of 2.5% in a single year); of the 2004 total, only 9% (84 growers) produced seed potatoes exclusively, whereas 82% produced ware only and another 9% (87 farmers) produced both. Of the ware growers, about one in every fourteen is involved in some form of integrated supply chain, mainly through growing on contract for either a packer or a processor; the balance of almost 800 are growing potatoes on a purely speculative basis.

2.3.2.1 However, the rate of decline in farmer numbers is slowing down: in 1980, there were almost 8,000 potato growers in Northern Ireland; that had reduced by about 75%, to less than 2,000, within fifteen years (i.e. by 1995) and the past nine years have witnessed a further reduction of about 50%. Whilst the overall number of farmers in Northern Ireland has also been reducing over recent decades, the general decline has been significantly less rapid than that applicable to potato farming.

2.3.2.2 In recent years, the average area devoted to potatoes by each farmer has been falling - from 6.7 hectares in 2002, to 6.2 hectares in 2003 (a reduction of

7.5% in a single year) and down to 5.7 hectares in 2004 - though the longer term trend (i.e. over the previous twenty-five years) had seen a slight increase in the average area being cultivated for this crop, as smaller producers exited the business. (*Source: DARD: Statistical Review of Northern Ireland Agriculture 2003*).

2.3.2.3 The most rapid decline in the number of potato farmers over the past two decades has occurred among those who had been farming less than one hectare – from over 4,800 to less than 300 – whereas the proportion of farmers planting more than fifteen hectares quadrupled, albeit from a small base, but the reduction in the absolute number has been less than one-third, in a period in which the overall reduction exceeded 85%. On that basis, there is an almost inexorable trend of increasing scale of operations among the cohort of farmers who continue to produce potatoes. Nevertheless, a continuation of reductions of the order identified above would have dramatic implications for the future of this sector in Northern Ireland; it is highly probable that the aggregate area devoted to potato growing would reduce to less than 4000 hectares, and possibly to between 3,000 and 3,500 hectares, within ten years. Based on examples from other sectors, trends of this order are classic symptoms of an industry, or sector, in terminal decline.

2.3.3 Output of potatoes (as with any other crop) is determined by a combination of the area under cultivation and the yield per hectare; potato yields are seriously affected by weather conditions at certain crucial periods of the growing season, and are therefore prone to fluctuations. Over the past six years (1998-2003 inclusive), the yield from potato crops in Northern Ireland has averaged somewhat less than forty tonnes per hectare (39.2 t.p.h.), with a range from a low of 35.4 tonnes per hectare (in 2002) to a high of 43.4 tonnes per hectare (in 2000).

2.3.3.1 While, in relative terms, these do not represent huge fluctuations (i.e. an average of just under 40 tonnes ± 10%), the overall result is a declining sector, with fluctuating profitability, which will continue to decline, in the absence of significant increases in either yields or the average price per tonne. It has

traditionally been accepted (and many Northern Ireland farmers still believe) that most of the costs of potato production are 'fixed'. That is only partly true and there is now an increasing competitive imperative to reduce costs, by adopting new solutions and improved growing protocols, if Northern Ireland's potato farmers are to withstand the consolidation, which has been, and still is, occurring in supermarkets' supply base.

2.3.4 Therefore, given that prices are not expected to rise, the realistic expectation has to be that the value of the output of potatoes in Northern Ireland will continue to decline for the foreseeable future – unless local producers can create and exploit some unique advantage, such as its high health status, which clearly has not been exploited to maximum effect heretofore; alternatively, there could be better prospects for success, by adding greater value to the potatoes grown in Northern Ireland through further processing – though the market for added-value potato products is particularly competitive at present. In reality, therefore, there is a high likelihood that the profitability of growing potatoes may decline to the point where many more current producers will leave the sector.

2.4 Although there were almost one thousand producers of potatoes in Northern Ireland, in June 2003 *(DARD: The Agricultural Census in Northern Ireland – Results for June 2003)*, the majority allocated very little land to this activity. Almost 30% had less than one hectare under cultivation, whilst just over 70% of potato growers (692 growers) had less than five hectares under cultivation, at an average of 1.51 hectares per grower. By comparison, the 163 farmers (16.7% of the total) who cultivated more than ten hectares, accounted for 67% of the area devoted to potatoes and the 62 farmers (6.3 % of the total) with over twenty hectares devoted to potatoes, accounted for 43.7% of the total and averaged almost 43 hectares per grower; clearly, this latter group comprises some very serious growers, the top ten of whom grew an average of nearly one hundred hectares each in 2003 and accounted for one-sixth of the total area devoted to potatoes.

2.5 The geographic distribution of potato farmers is also heavily skewed, due, in part at least, to differences in soil types across Northern Ireland - 70% of potato farming is undertaken in 'non-Less-Favoured-Areas' i.e. in areas where land is of a better quality. Consequently, the counties to the South and South-West of Northern Ireland contain relatively few potato farmers and account for only a small proportion of the land devoted to this activity. For example, the combined total for counties Armagh, Tyrone and Fermanagh is 183 growers (19.2% of the total), very few of whom grow more than ten hectares, and, in total, they account for only 9% of the total area devoted to growing this crop, in Northern Ireland. Even in the other three counties, potato growing tends to occur in tightly defined areas, with Down (mainly South Down) accounting for 37% of both the farmers and the land area involved in growing this crop.

2.6 One source of potential problems for the commercialisation of a product like potatoes is the capacity of producers to identify changes in consumer tastes and to re-act positively and quickly to such changes i.e. to see themselves as part of a co-ordinated and integrated supply chain, with a strongly market-based focus, instead of identifying themselves as simply growers of a commodity. The following table (Table 2.3, overleaf), which provides a summary of the areas of land devoted to the growing of certified seed of the 'top eleven' varieties in 2004 (i.e. those to which more than twenty hectares were devoted), analysed in accordance with relevant E.U. seed classifications (with Northern Ireland classifications in parenthesis), indirectly points to some of the issues, which need to be addressed – specifically, the extent to which new varieties are being planted.

2.6.1 Some of the varieties in Table 2.3 (e.g. Cara, Cultra, Dundrod, Fianna, Navan, Paramount, Premiere and Sante, as well as some others, which are produced in much smaller quantities) are grown by only a single producer, including some who have been (or still are) involved in developing new varieties or who have secured the rights to grow specific varieties. None of the varieties in the table are 'Loughgall' varieties, although Dundrod was bred in Northern Ireland.

TABLE 2.3 CLASSIFICATION OF TOP ELEVEN VARIETIES GROWN IN 2004 (in hectares)				
VARIETY	**GRADE 1** *(VTSC)*	**GRADE 2** *(Super Elite and Elite)*	**GRADE 3** *(Class A)*	**TOTAL**
Desiree	1.1	240.4	5.7	247.2
Kerr's Pink	8.2	125.8	3.4	137.4
British Queen (Non-Immune)	4.2	67.8	-	72.0
Dunbar Standard	2.0	43.7	-	45.7
Nicola	1.0	30.1	-	31.1
Arran Banner	0.4	29.7	0.8	30.9
Dundrod	0.9	27.3	-	28.2
Cara	-	18.7	8.7	27.4
Up-to-Date (Non-Immune)	0.8	15.9	9.1	25.8
Maris Piper	0*	21.2	2.7	23.9
Pentland Dell	0.6	20.3	2.3	23.2
TOTAL	19.2	640.9	32.7	692.8

*** Less Than 0.05 hectare**

Source: DARD – Northern Ireland register of Pre-Basic and Basic Seed Potato Crops 2004

2.6.1.1 It is widely believed, within the industry, that sales of Navan (a protected variety, which is the most successful of Loughgall's current varieties, even though it competes directly with Rooster in the Republic) far exceed what could be grown from the certified seed being planted officially; that suggests that, in the case of this variety, farmers are making considerable use of small ware – probably for more than one generation. Support for the theory that some farmers continue to use small ware, after the one year official limit, is provided by the dramatic growth in the planting of certified seed of Maris Piper (a variety in considerable demand by both packers and processors, even though its 'shelf-life' is relatively short in the absence of cold storage), when that variety became a 'free' variety.

2.6.2 Based on Table 2.3, some of the biggest areas of land were devoted to the growing of varieties, which have been in circulation for several decades (e.g. Kerr's Pinks, which have been grown in Ireland for about eighty years); while some of these varieties continue to be popular in rural communities in Ireland, there is no guarantee that they are popular in the wider market – in fact, it is clear that the main consumer markets (and, by definition, the related intermediary markets) are no longer demanding these varieties. This reflects

a serious lack of congruence between what is being grown in Northern Ireland and what the main consumer markets currently demand. Listening to customer feedback on what they want, having the channels through which to receive such feedback and reacting positively to such feedback are now critical dimensions of marketing consumer products, but many potato growers in Northern Ireland have no mechanisms for doing this.

2.6.2.1 It is unlikely to be pure coincidence that the top three varieties in Table 2.3 (which between them accounted for 52.3% of the land devoted to the production of seed potatoes in 2003), as well as a number of the other eight, are now 'free' varieties i.e. they no longer involve payment to breeders for the 'right' to grow those varieties. This emphasis on cost-saving in respect of seed, possibly at the expense of what the market prefers to buy, or of yields from the seed planted, is likely to be short-sighted and that was confirmed by the potato packers (see comments in Section 3).

2.6.2.2 A study conducted in the Republic, at the Department of Agriculture and Food's 'TOPS' Centre, and reported in that Department's 'Expenditure Review Initiative' of 2002/2003, demonstrated the scale of the differentials in output from using certified seed from 'controlled' varieties, as compared with the corresponding figures from 'free' varieties (when certified seed was also used). While the study is not scientifically robust (even though the sample size was quite large – approximately 20,000 tonnes), in that it was based on two 'controlled' varieties (Rooster and Cara) and seven 'free' varieties and included no imported varieties, it showed that, for pre-basic material, the 'propagating efficiency' of 'controlled' varieties was between two and four times that for 'free' varieties, with the differentials being greater (in relative terms) when growing seed potatoes than it was when growing ware.

2.7 Analysis of this sector's future potential is complicated by the different trends in both output levels and price in its two main sub-sectors i.e. ware potatoes (for consumption) and seed potatoes (for planting). Overall, the aggregate output and its value reflect the reduced area of land devoted to potato production, and each of the sub-sectors has shown a significant decline in both

the longer term and the recent past. In 2003, of the (approximately) six thousand hectares of land devoted to the cultivation of potatoes, only 874 hectares (about 15%) were used for growing 'certified' seed potatoes, though it has to be recognised that some other potatoes were used as seed on farms, without any certification (and the proportion planted for seed is even lower in 2005 – see paragraph 2.3.1.1 above) .

2.7.1 Table 2.4 provides data on the different categories of potato produced over the past six years (seed, ware and stock-feed) and on the aggregate sales revenue achieved at producer level for those categories of production; the figures exclude in-store losses, where those are relevant.

TABLE 2.4

OUTPUT AND VALUE OF POTATO PRODUCTION BY CATEGORY

	1998	1999	2000	2001	2002	2003
Output of Ware ('000 tonnes)	**201.7**	**203.3**	**229.4**	**187.8**	**208.2**	**168.4**
Value of Ware Produced (£ M)	***23.1***	***24.8***	***17.1***	***18.5***	***20.6***	***18.2***
Output of Seed ('000 tonnes)	**44.4**	**37.8**	**31.2**	**31.2**	**37.1**	**28.3**
Value of Seed Produced (£ M)	***4.5***	***6.3***	***2.1***	***2.7***	***5.8***	***3.6***
Output of Stock-feed ('000 tonnes)	**30.8**	**29.7**	**33.7**	**29.2**	**30.5**	**25.6**
Value of Stockfeed Produced (£ M)	***0.3***	***0.3***	***0.3***	***0.3***	***0.3***	***0.3***
TOTAL OUTPUT ('000 tonnes)	**276.9**	**270.7**	**294.2**	**248.2**	**275.8**	**222.3**
TOTAL VALUE (£ M)	***25.4***	***33.0***	***17.3***	***21.2***	***21.5***	***22.6***

Source: DARD (Statistical Review of Northern Ireland Agriculture - 2003)

2.7.2 The figures in Table 2.4 demonstrate three main aspects of what has been happening in this sector. Firstly, there is the (relatively) steady decline in output of seed potatoes – a 36% reduction between 1998 and 2003 (with a further reduction in 2004, though the final figure has not yet been confirmed); those figures can be compared with the 150,000-200,000 tonnes, which were produced annually during the 1950's. That has, in turn, produced huge declines in the quantities being exported.

2.7.2.1 For example, during the 1950's, about 80,000 tonnes of seed *per annum*, were being sold into Britain alone, with nearly as much again being exported to

other countries; by 2003, sales to Britain had reduced to 850 tonnes (almost entirely supplied by one producer), with the British market being supplied primarily from Scotland, together with much smaller amounts from The Netherlands and other countries (Canada and France especially); furthermore, by 2003, other exports had reduced to less than 10,000 tonnes, half of which went to Morocco, with most of the balance, apart from about 1,300 tonnes to the Republic of Ireland, being sold to other countries along the Mediterranean Rim. As a comparison, The Netherlands, in 2003, exported an estimated 650,000-700,000 tonnes, whilst exports of seed from Britain were close to 100,000 tonnes.

2.7.3 Secondly, the decline in the production of ware potatoes has been much less dramatic and less consistent, though relative to the middle of the last century, it is still very significant. Of 2003's production of 168,400 tonnes, about 50,000 tonnes (30%) were used by packers supplying supermarkets, multiples and 'symbols' (as well as a further 15,000 tonnes of imported potatoes), while about 17,000 tonnes (10%) were used by local processors (who also imported about 12,000 tonnes); the balance was sold by merchants, or through farm/roadside shops, or used by 'peelers' and the catering trade, with about 15% being used as animal feed.

2.7.3.1 Indirectly, the level of imports is partially a reflection of the inadequacy of the dedicated storage provision for potatoes in Northern Ireland. Without good quality cold storage, the life of potatoes is shortened and, for some varieties, deterioration in quality can start quite quickly. In addition, this is also a factor in securing and retaining sales of seed potatoes, which must be delivered at very specific times of the year, and have to be stored until that time.

2.7.4 Thirdly, there has been significant volatility in producer prices over recent years, for both main categories of potato. (Stock-feed production has remained relatively constant, as has its value.) In three of the past six years, the average producer price for seed potatoes exceeded that for ware, despite the fact that the production and husbandry requirements for seed production are even more stringent than those for ware produce. There was also a major

difference between the highest average annual price for seed potatoes and the lowest one – from £66.35 in 2000 to £167.26 in 1999, or a price differential of 152% (using the lowest figure - that for 2000 - as the base). By comparison, prices for ware potatoes were significantly more consistent, with the maximum differential (computed on the same basis as for seed) being only 63%; in part, this reflects the fact that local packers and processors buy almost 40% of current total Northern Ireland ware production. However, unlike the packers who buy on contracts with dedicated growers, merchants, through whom most of the seed exports are routed, do not negotiate contracts with growers and this has the indirect effect of restricting the agronomic input of those growers and the quality of the seed product being made available.

2.7.5 On the basis of the above figures, there is a considerable level of financial risk inherent in potato cultivation, in both main segments of the sector; with a high proportion of fixed and largely predictable input costs, the smaller source of that risk derives from fluctuations in the yields achieved, whereas the primary source of risk is the prices received by producers (i.e. it contains a much higher level of variability). By the same token, the greater variations in output prices for seed potatoes add more risk to that sub-sector, than exists in the ware sector. But Northern Ireland's superior health status, if properly exploited, should provide greater protection against price volatility in the seed sector than it is ever likely to achieve in the ware sector.

2.7.5.1 The implications of such risk appear not to have been lost on the farmers themselves; partly as a result of those who exited from the sector (paragraph 2.3.2 above), though they account for only a small proportion of the overall reduction, output of ware potatoes fell by 16.5% over the five years 1998 to 2003 (with the latter year showing a particularly high reduction), whilst production of seed fell more than twice as rapidly – by 36.3% over the same period. Failure to arrest this trend will result in only a skeletal segment for seed potatoes, within a decade – almost certainly less than 20,000 tonnes *per annum*, producing between £2.0 and £2.5 million, and even less in any year when prices are particularly low (with the consequent possibility that the decline could be even more rapid). While ware production will continue to be

higher, it could fall to around 120,000 tonnes *per annum*, or less, within a decade, with aggregate revenue falling to about £13.5 million on average. One clear result of this would be a significant increase in the level of imports of ware potatoes, given local demand for this product – especially that from those who pack potatoes for the retail trade and that from local processors.

2.8 It is difficult to quantify precisely what constitutes the 'critical mass' for these two segments, but the projected figures would clearly have major implications for both segments' capacity to invest in maintaining health standards, in marketing their output, in securing economies of production and, ultimately, in remaining economically and financially sustainable; in all probability, current output is unlikely to exceed the critical mass by much, if at all – in which circumstance, it must be necessary to re-assess the scale and cost of whatever support structures are being provided.

2.8.1 It is clear that, in a European context, Northern Ireland is a very small producer of potatoes; effectively, it is unlikely to be in a position to compete on a 'commodity' basis with the bigger producers in other parts of Europe. It suffers from predictable problems associated with a surfeit of 'small-scale' operations and a lack of specialisation among producers. But more importantly (as identified later in this report), it suffers from the absence of clear, vertical links between consumers and growers and between ware producers and seed producers. The result has been a huge reduction in seed production and the loss of export markets.

2.8.1.1 In Northern Ireland, most seed potatoes are sold using a 'fixed price system', which frequently results in losses to either the buyer or the seller, as market prices fluctuate. By comparison, 60% of Scottish seed production and virtually all seed production in The Netherlands, is sold through a 'pooling system; in Holland, that is complemented by an independent (government based) certification scheme; the pre-agreed specifications determine whether the potatoes are suitable for seed, and the standards are applied on a 'per variety' basis. Precisely the same standards are used for grading seed for export markets and all exported seed is marketed under the same brand/label abroad,

as is used in the domestic market. The organiser of the 'pool' then becomes responsible for all sales and marketing and for the division of the proceeds from whatever amount is sold, in each market.

2.8.1.2 It is not quite as easy to monitor standards for ware; there are no government specifications for ware potatoes and different packing houses apply different specifications for the produce they buy (and pay different prices too). Accordingly, a pooling system would not and, by and large, does not work as well in the ware sector. As a result, packers such as Wilson's Country have to 'bar code' every box, in order to maintain a record of the identity of the producer and to ensure that what is delivered by each individual farmer is consistent with the specifications agreed in advance; but that involves considerable investment in both buildings and I.T. systems on the part of the packer.

2.8.1.3 In most places where the 'pooling' model is used for seed potatoes, it is accompanied by the payment of an annual subscription for membership of the 'pool' and a guaranteed share of the proceeds of whatever is sold.

2.8.1.4 The payment to any individual seed-potato farmer is a function of the quantity of seed supplied by that farmer relative to the aggregate proceeds realised from the potatoes sold; on that basis, each farmer, who produces seed potatoes to the pre-agreed specification, is guaranteed that he/she will receive a reasonable share of the proceeds of the pool and will not be forced to under-cut other suppliers in order to generate some income (be it large or small), however low the price may be; that protects the prices paid to farmers, to some extent, at least.

2.8.1.5 Under the system normally used in Northern Ireland, many farmers are primarily concerned with reducing losses, where making a profit becomes an unrealistic aspiration. Therefore, Northern Ireland's potato farmers will either have to adopt a very imaginative approach to cost-efficiency in their production and in the marketing of their output, or adopt some form of 'pooling' system for their seed produce, if the seed sector is to remain viable.

THE POSITION IN EUROPEAN TERMS

2.9 Northern Ireland's potato output is small in European Union terms, accounting for approximately 0.5% of the total production within the E.U., before the accession of the ten new states in 2004 i.e. about forty-five million tonnes (including both ware and seed). Following the accession of several low-cost producer countries in 2004, Northern Ireland's output has now become an even lower percentage of the European Union's potato output – estimated at about 0.3%. However, none of those countries has the same high 'health status' as Northern Ireland, in terms of potato cultivation.

2.9.1 In reality, the quality of potato produced in most of the European countries newly accepted into the Union, is considerably inferior to that produced in Northern Ireland and much of that production is usable only as stock-feed, or for the production of starch-based products. For example, the biggest of the additional producers, Poland, on its own, had about 700,000 hectares under potato cultivation in 2003 (about 70% of the total land devoted to potatoes in the fifteen E.U. states, prior to the 2004 accessions), producing about fourteen million tonnes *per annum* - about one-third of total E.U. output prior to the accession of the ten new states. But much of Poland's output is used as starch and, realistically, it does not compete with Northern Ireland's potato output. Similarly, Hungary is a major potato-producing country, but like Poland, it cannot compete with Northern Ireland in terms of health status, freedom from disease or the quality of its product.

2.9.3 Nevertheless, with the amount of potatoes being produced in Europe and with demand for potato-based products declining, Northern Ireland's potential to influence prices (see paragraphs 2.3.3.1 and 2.3.4 above) is likely to be very low and the probability of price increases for any 'mainstream' agricultural product, in the short-to-medium term, is also very low; at best, it might have some influence over the value of its seed output, given its significantly better health status than most other producing countries, but it will have no effective influence over European prices for ware potatoes.

2.10 The trends outlined in paragraphs 2.2 and 2.3 above are not unique to Northern Ireland, as is demonstrated in the following paragraphs.

2.10.1 For example, East Germany's cultivation of potatoes has reduced from approximately 700,000 hectares prior to unification, to about 60,000 hectares at present; and the area devoted to potato production in the South-West of The Netherlands (traditionally, the main potato growing area of that country) is reducing by 10% *per annum* - though some of that production is being relocated to areas with lighter soils in the South-East of that country.

2.10.2 There are some marked differences between the potato sector in The Netherlands and that in Northern Ireland. Firstly, a government licence is required to farm any land in The Netherlands and the overall framework for the industry is highly regulated, by comparison with the relatively easy access to farming in Ireland. And secondly, the Dutch concentrate on growing 'tied' varieties (and paying the related royalties) whilst Northern Ireland growers show a clear preference for 'free' varieties. The result is that the Dutch tend to be much more closely aligned to market needs, with a much more coherent supply chain, involving better channels of communication, more benchmarking, better yields, higher levels of co-operation and a clearer market focus. (See also paragraph 3.7.2 below).

2.11 Equally, there are places in which the trend of reduced potato output is not being replicated: for example, in Scotland, where yields are broadly similar to those in Northern Ireland, the area devoted to the production of potatoes has remained virtually constant over recent years, though there have been some minor adjustments in the proportions devoted to seed as against ware, with the latter increasing slightly over the past decade and the former reducing by nearly 15% over the same period (though it is still nearly ten times the Northern Ireland figure).

2.11.1 However, Scotland (which was not a major potato exporter fifty years ago, whereas Northern Ireland was), exported 67,000 tonnes of seed potatoes to 'third world' markets in 2002, as well as supplying the bulk of the English market. Many of those third world markets were previously supplied by Irish

Potato Marketing Ltd (IPM), a Donegal-owned company, which re-located its growing operations to Scotland in the early 1990s. Data provided by the Department of Agriculture and Food, when combined with data from the Scottish Agricultural Science Agency, indicate that more than one-quarter of the seed potatoes exported from Scotland to third world countries in 2002 was from varieties bred in Ireland (at Oakpark), to which IPM holds the exclusive rights, and in respect of which it receives Potato Breeder's Royalties. Additional data from Teagasc indicate that about 70% of the costs of the potato breeding programme currently being operated at Oakpark are recovered from IPM in the form of royalties etc. - €543,000 out of total costs of €776,000. Unfortunately, Loughgall cannot recoup its costs in the same way (see paragraph 4.3.2.5 *et seq.* below).

2.12 On the other hand, over the past eight years, both the number of potato growers and the area under cultivation in the Republic of Ireland have been declining at approximately the same rate as in Northern Ireland, despite the fact that the price of potatoes in the Republic has been consistently higher than that in Northern Ireland (or elsewhere in Europe either); in 2002, prices in the Republic were twice those in Northern Ireland and between two and a half and three times those in Great Britain.

2.12.1 The following table (Table 2.5) provides a summary of the area devoted to potatoes in the Republic over the past five years as well as of the number of farmers involved.

TABLE 2.5

POTATO PRODUCTION AND NUMBER OF GROWERS IN THE REPUBLIC OF IRELAND (2000-2004)

YEAR	2000	2001	2002	2003	2004
AREA (ha)	13,173	13,480	13,431	13,725	12,604
NUMBER OF FARMERS	956	905	832	801	732

Source: Bord Bia - National Potato Census 2004

2.12.2 Clearly from the above data, both the area devoted to potatoes and the number of farmers involved in that sector, in the Republic, have decreased since 2000 – the former by a relatively modest 4.3% and the latter, on a steady and

significant basis, by 23.4%, or a compound reduction of about 6.5% *per annum*. At this point, potatoes account for approximately 4% of the Republic's total tillage area, compared to 6% when the Common Agricultural Policy was reformed in 1992; and its output of potatoes, at 500,000 tonnes, represents approximately 1% of E.U. output and had an ex-farm value of €96 million (£67 million) in 2002.

2.12.3 Interestingly however, largely for reasons indicated below (paragraph 2.15.1), production of seed potatoes in the Republic is very low; only about 1500 hectares are planted there (a reduction of 50% over a decade), producing about 10,000 tonnes of certified seed (a reduction of 40% over ten years) – less than that certified in Northern Ireland and much less than Scotland's 288,000 tonnes in 2002. As a result, exports of seed potatoes from the Republic have fallen dramatically – from 9,000 tonnes in 1996 to about 4,000 tonnes in 2002, and Ireland now imports about one-quarter of its total seed requirement of about 35,000 tonnes. (Clearly, from these figures, the Republic also experiences use of either small ware or second- or later- generation seed,).

2.12.3.1 Traditionally, productivity in the growing of seed potatoes has been low in the Republic compared to international levels. In 2002, the average output of seed potatoes per hectare in The Republic was less than seven tonnes for Kerr's Pinks compared to 15.7 tonnes for Rooster and national averages of twenty and twenty-five tonnes in Scotland and The Netherlands respectively.

2.12.4 The Republic of Ireland also imports a considerable amount of both processed potatoes (estimated at 71,000 tonnes in 2002, at a cost of €76 million, equivalent to Stg.£53 million) and about 44,000 tonnes of ware potatoes for the fresh chip market. But it also exports processed potatoes – about 1,500 tonnes in 2002, compared with 9,000 tonnes a decade earlier.

2.12.5 Much of the reason for this combination of imports and exports is the varieties grown for the ware market. Four varieties account for three-quarters of the Republic's ware market – Rooster (which has 32% of the market at present), Kerr's Pink, British Queen and Record. Other varieties are grown for

specialist markets e.g. chips and speciality products, but clearly, there are gaps in the variety base and these provide the basis for the imports.

2.12.6 One other major difference between the Republic and Northern Ireland is the much higher investment in storage and infrastructural facilities in the Republic over the decade 1993–2002. The Republic now has modern storage capacity for over 360,000 tonnes, including 117,000 tonnes of refrigerated capacity, mainly owned and controlled by bigger growers.

2.13 As the following table (Table 2.6) shows, and as might be implied from the differential between the figures for the reduction in the area farmed and the number of farmers, the decline in farmer numbers has occurred mainly among the 'smaller' farmers, especially among those planting less than five hectares, though decline has occurred in all categories of less than fifty hectares.

TABLE 2.6

CHANGES IN POTATO FARMER NUMBERS BETWEEN 2000 AND 2004, IN DIFFERENT SIZES OF HOLDINGS (Republic of Ireland)

Area Planted	< 5 Hectares	5-20 Hectares	20-50 Hectares	> 50 Hectares	TOTAL
Farmers in 2000	554	242	102	58	956
Farmers in 2004	368	214	87	63	732
Change Over Four Years	(33.6%)	(11.6%)	(14.7%)	+8.6%	(23.4%)

Source: Bord Bia- National Potato Census 2004.

2.13.1 Notwithstanding the number of negative figures in the last line of the above table, the single most significant figure is the growth in the number of 'large' farmers i.e. those planting more than fifty hectares. The effect of this 'increase in scale' is reinforced by the following statistics, for 2004, in the Republic

- The Largest 150 Growers (20.5% of the total) Farmed 76% of the Total Area Devoted to Potatoes;
- The Remaining 582 Growers (79.5%) Farmed 24% of the Total Area Devoted to Potatoes.

2.13.2 Prior to 1996, both the area devoted to growing potatoes in the Republic and the output of potatoes had been increasing, peaking in 1996 at 24,300 hectares

under cultivation, producing 733,300 tonnes. By 2002, the area devoted to potatoes had reduced by 36.7% and the output of potatoes had fallen by 29.3%, compared with the 1996 figures. To some extent, that trend has been encouraged by the Irish Farmers Association and Teagasc's Advisory Service, both of whom have been advocating a reduction in the area being planted with potatoes, because of the impact of extra production on prices and, ultimately, on the sustainability of potato farming.

2.13.3 In consultations with Teagasc at Oakpark (Co. Carlow), three significant conclusions were clearly indicated viz. that:

- while the number of growers is reducing, the remaining growers are getting progressively bigger;
- the one hundred biggest producers determine the success of the sector and are likely to be the primary target for whatever support will be available in the Republic; and
- the number of potato farmers is likely to reduce further as a result of the new CAP regime in Europe (the Single Farm Payment, which is 'de-coupled' from production) and the price of conacre for potatoes will decrease (as has already been happening).

2.14 Similar comments and analyses apply to Britain, as the following quotation demonstrates; the January 2005 edition of ***'Potato Review'*** has a sub-heading to one of its main articles, indicating that: *"Every recent study of the U.K. potato industry has reported that the business is concentrating into fewer and fewer hands."* The article itself (which endorses the value of grower groups, complemented by specialist marketing aimed at premium markets and the careful selection of soil, with long rotations) suggests that the implication must be that growing potatoes is a job for 'professional' growers and that smaller producers will be consigned to niche markets; it goes on to imply that some smaller producers may not be as committed to quality production as would be desirable.

2.15 The following table (Table 2.7) provides some indication of how the trends in growing potatoes have varied over selected European countries.

TABLE 2.7 AREA DEVOTED TO POTATO PRODUCTION IN SELECTED LOCATIONS ('000 ha)						
YEAR	E.U (15)	N.IRELAND	U.K	REPUBLIC OF IRELAND	SCOTLAND	THE NETHERLANDS
1992	1,297	11.1	180.1	22.0	28.3	185.8
1994	1,103	8.7	163.6	21.4	26.7	171.0
1996	1,125	8.8	177.4	24.3	29.6	185.0
1998	1,004	7.5	164.1	18.5	29.0	126.5
2000	991	6.8	166.0	13.5	29.8	176.0
2002	950	6.7	159.0	13.4	30.2	160.5
CHANGE (1996-2002)	-26.8%	-39.4%	-11.7%	-39.1%	+6.7%	-13.6%

2.15.1 Clearly, of the countries in the above table, Northern Ireland and the Republic have shown the most rapid decline in the area devoted to the cultivation of potatoes over that decade, despite having the highest health status, as a result of being free from many of the viruses and diseases which affect other producing countries; in particular, Ireland is free of 'brown rot' and 'ring rot'. In broad terms, the rate of decline across the island of Ireland was about one and a half times that for the entire European Union, about three times that for The Netherlands and nearly three and a half times the rate for Britain. The overall trends reflect the decline in the consumption of potatoes and their replacement by rice and pasta in the diet of European consumers.

2.15.2 By comparison, the area used to grow this crop increased in Scotland. Part of the explanation for this latter trend lies in the fact that the growth and export of seed potatoes from the Republic have decreased significantly, because production of 'protected' varieties has transferred from Donegal (which was the main area for growing seed in the past and was concentrated in relatively small 'family farms', the number of which has been declining) to Scotland, which can, more easily, serve the United Kingdom and Mediterranean markets. At present, at least 90% of 'Irish' seed propagation (excluding Rooster, which is grown mainly in Ireland and accounts for about 40% of total production) is undertaken in Scotland.

2.15.3 Until recently, when much of IPM's production was transferred to Scotland, the overall output in Ireland had been increasing slightly. The statistics also indicate a relatively consistent trend of increasing yields in the Republic, though there are annual fluctuations in output – mainly as a result of weather conditions.

2.15.3.1 Just as in Northern Ireland, a minority of producers grow the bulk of the sector's output in the Republic. A recent press release (17th February 2005) by the Junior Minister in the Department of Agriculture and Food, Brendan Smith, (as he was announcing grant-aid for fifteen storage, grading, packing and washing facilities) indicated that 150 growers produce 76% of Ireland's national potato output; significantly, the statement went on to say that proposed changes in the seed certification system were designed to bring *"...commercial focus to seed production and...*(provide) *an efficient, cost-effective service, while, at the same time, ensuring the protection of* (Ireland's) *high grade seed status*". (See paragraph 2.4, which indicates that, in Northern Ireland, 6.3% of farmers planted 43.7% of the area devoted to potatoes in 2003 and 16.7% accounted for 67% of the total; these figures are broadly similar to those for the Republic.)

THE LEGISLATIVE POSITION

2.16 The legal position in relation to the growing and marketing of potatoes is governed by a combination of domestic legislation, or national regulations, and legislation from Europe, with the major European requirements and regulations being reflected in the domestic legislation e.g.

- ◊ The Plant Health Order (Northern Ireland) 1993 (as amended) incorporates EU Council Directives in relation to Plant Health;
- ◊ The Seed Potatoes Regulations (Northern Ireland) 2001 (as amended) incorporates the requirements of 2002/56/EC in respect of seed potatoes;
- ◊ The Marketing of Potatoes Regulations (Northern Ireland) 1989 sets out standards for the marketing of ware potatoes outside the E.U.

But there are no explicit European Union quality standards for potatoes *per se* – European Union standards apply only to the marketing and sale of potatoes.

2.16.1 Therefore, Plant Health Controls in respect of potatoes (in common with all other plant health controls) are ultimately governed by Union-wide regulations, which are designed to protect against the introduction and spread of harmful organisms into Northern Ireland; specifically, they are designed to protect against:

- Ring Rot (Council Directive 93/85/EEC which requires the undertaking of annual surveys for the causative organism);
- Brown Rot (Council Directive 98/57/EC of July 1998, which includes a provision that annual surveys for Brown Rot – *Ralstonia Solenacearum* - be carried out);
- Potato Cyst Nematode or Eelworm (Council Directive 69/465/EEC which requires that plant material moving within the European Union is free from potato cyst eelworms); and
- Wart Disease (Council Directive 69/464/EEC).

2.16.2 In addition, there are specific Regulations and Directives relating to the 'marketing' (broadly defined) of potatoes. For example, Directive 2000/13/EC relates to the labelling, presentation and advertising of foodstuffs generally, whereas Directive 2002/56/EC sets specific terms for marketing, labelling and distribution of seed potatoes.

2.16.3 Northern Ireland, together with the Republic of Ireland, Scotland, Cumbria and Northumberland in the North of England, and parts of Germany and Finland, is deemed a high-grade seed area, under Commission Decision 93/231/EEC. This means that only 'Basic Grade' potatoes can be marketed or certified in Northern Ireland, and not the lower certified grades of seed potatoes. Northern Ireland also has protected-zone status in respect of potatoes, because it is free from Colorado Beetle and Beet Necrotic Yellow Vein Virus (Rhizomania). Protected-zone status is awarded to an area within the European Union in which surveys demonstrate that harmful or noxious organisms are not established and, in such areas, the surveys conducted for each relevant organism have to be more thorough than must be conducted elsewhere, except in those locations where the disease is clearly present.

Northern Ireland has not adequately exploited its status under either of these regimes in its marketing of its seed potato products.

2.16.4 For many potato producers in Northern Ireland, who operate quality assurance schemes, or produce under contract for packers or processors, the phytosanitary protocols are dictated as much by the relevant packer or processor as by any statutory regime; nevertheless, they must comply with all domestic statutory regulations as well as with European Union requirements.

2.17 European Union Member States are obliged to operate an effective plant health control system and to enforce the legislation set out in all relevant E.U. directives. Failure to do so will inevitably lead to action, by the Commission, against that state.

2.17.1 In Northern Ireland, compliance with E.U. directives, in relation to the potato sector, is operated by two separate, but complementary DARD entities - Applied Plant Science Division and Quality Assurance Branch. These bodies work together to ensure that potatoes marketed as seed potatoes are free from disease, pests and pathogens – especially from so-called 'quarantine' diseases such as Brown Rot and Ring Rot. The staff at Newforge are satisfied that Northern Ireland undertakes all the required surveys and it has found neither infections, nor any symptoms of the relevant diseases in any Northern Ireland potato crops, nor has there been any indication from any customer that such infections or diseases were found in potatoes, which originated in Northern Ireland. Visual inspections are supplemented by laboratory tests and those include tests for Eelworm. The system in Northern Ireland parallels that in the Republic.

2.17.2 In addition, Applied Plant Science Division at Newforge provides a range of advisory services and 'trouble shooting' supports for the industry. They range from blight control services (which have probably been its biggest 'success story' to date), through diagnostic services for diseases, assisting the industry when problems arise and advice to farmer groups, to the development of systems to ensure that only potatoes, which are rot-free, are exported. (For

example, it has assisted in the development of 'hot-boxing' for potatoes destined for overseas markets, especially for hotter climates).

2.17.3 To increase its effectiveness in these areas, APSD undertakes research into crop diseases generally and into those related to potatoes specifically, and uses the findings by transferring the newly developed knowledge and technology to growers in order to help them to improve their performance. It has, for example, designated laboratories for researching and testing for blight, PCN and other diseases.

2.18 DARD's Quality Assurance Branch (QAB) has responsibility for the implementation of E.U. plant health, seed certification and potato marketing legislation, with scientific support from APSD. In effect, it is a kind of 'enforcement body' for both European Union and Domestic Regulations, with two particularly important areas of responsibility viz. potato plant health and seed potato certification (c/f Appendix 3).

2.18.1 In accordance with European Union requirements, inspection has to be done at source i.e. responsibility lies with the domestic government in the state in which the crop is produced. Over recent years, E.U.-designated 'quarantine diseases' (ring rot, brown rot etc.) have spread across Europe, increasing the potential for bringing the pathogens that cause these diseases into Northern Ireland through imported potatoes (whether seed or ware). To prevent the entry of such pathogens into Northern Ireland, QAB randomly inspects and tests imports of potatoes from a variety of source countries including (but not restricted to) Egypt, Poland, Germany, permitted Third World countries, Britain and other European countries.

2.18.2 QAB also has a statutory responsibility to undertake this role under the Plant Health Order (Northern Ireland) 1993 and subsequent amendments, which include:

- The Potatoes Originating in Germany (Notification) Order (Northern Ireland) 2002
- The Potatoes Originating in Egypt Order (Northern Ireland) 2004

- The Potatoes Originating in Poland (Notification) Order (Northern Ireland) 2004.

2.18.3 Another strand to that role involves a broad combination of activities, as follows:

> mandatory inspection of locally grown potatoes for Potato Cyst Nematode (P.C.N.);

> inspection of land which has been identified as having been infested with P.C.N., to ensure that potato crops are not grown there;

> ensuring that only immune varieties are grown on land scheduled for Wart Disease; as well as,

> sampling both local production and imported seed for Ring Rot and Brown Rot.

Each year, 25% of ware farms are inspected for compliance with planting regulations and, during growth, for Ring Rot, Brown Rot and Colorado Beetle.

2.18.4 Under the 'Marketing of Potatoes Act 1964', as amended, QAB ensures that all ware potatoes sealed for shipment meet the requirements of the importing country.

2.18.5 In addition, QAB has a statutory responsibility to undertake phytosanitary certifications and seed certifications, as well as for sealing bags of certified seed. It also has responsibility for checking conditions of storage, ensuring the segregation of seed from ware, and segregation by variety and grade of seed, as well as for providing statistics on yields for seed control purposes and for the maintenance of nuclear stocks (which is not a statutory requirement). In addition, it is responsible for ensuring that burning-down dates are properly observed and for monitoring the de-scheduling of wart-infested land.

2.18.6 A comprehensive analysis of the roles and responsibilities of QAB is provided in Appendix 3 to this report.

2.19 The current statutory regime is both onerous and detailed and necessitates considerable support in terms of manpower, specific expertise and research and analytical capacity.

2.20 While it does not have a statutory role, the Department's facility at CAFRE's Greenmount campus provides considerable support to the sector, in the development of the sector's human resources through education and in the improvement of business and commercial skills, the application of marketing principles and of the value of adopting technology and technology transfer, as well as on certain growing and agronomic skills. It is the main provider of bench-marking information, though too many growers are not yet aware of the need to bench-mark, nor of its value in practice.

2.20.1 As well as providing a better understanding of supply chain management, Supply Chain Development Branch is the main provider of supply chain knowledge and training (which it has provided to a significant number of growers, with a high level of customer satisfaction), but again, many farmers have not yet realised the importance of these concepts to their operations.

BREEDING AND VARIETIES

2.21 The breeding of new potato varieties in Northern Ireland is carried out at Loughgall – at the Plant Breeding Station. The overall potato programme is designed to produce new varieties, seeds and germplasm. There are essentially two strands to the potato breeding activities at Loughgall: firstly, there is the production of new varieties of both ware and seed potatoes and that activity is operated, in part, by specific partnership contracts with a number of different interest groups who fund an agreed level of costs, mainly on long term contracts; currently, these fund about 9% of the total cost of Loughgall's potato-breeding activities. In theory at least, this activity should be market-driven, since the partners are paying for the knowledge and expertise created; they determine what characteristics are sought and what sort of parent materials are used, and they would generally be expected to have a commercial focus, including understanding the characteristics most in demand at any time.

2.21.1 Secondly there is a 'strategic breeding' programme, which focuses on the production of parental (or nuclear) breeding material with enhanced disease

resistance and other attributes. This involves structured cross-breeding (often using 'wild' breeds as 'parents') to enhance resistance to Potato Cyst Nematode, Blight and Blackleg and/or to produce material which meets the (often changing) needs of processors and packers, or is capable of being exported to, and multiplied in, other climates – especially in countries along the Mediterranean Rim. The resultant resistant strains can then be introduced into the core breeding-programme and private breeders are informed that such strains are available for cross-breeding by any breeder(s) who wants to use them. One of the outputs from this programme is a 'bank' of parental (nuclear) seed varieties, with individually specified characteristics - not just resistance to specific diseases, but other attributes too e.g. certain dry-matter content, or specific novel features, which are not prevalent in the existing varieties etc.; those stocks are currently being held at Donemana, Co. Tyrone.

2.21.1.1 The Department has to have a 'strategic' interest in this aspect of Loughgall's work and it should establish some form of liaison with NIHPBS to ensure that the direction of such strategic work is consistent with Departmental policy, as it develops over time.

2.21.2 The process of bringing new cross-bred varieties to commercialisation takes about ten years and reduces an initial selection of up to 50,000 cross-breeds to single-figure numbers – often, to as few as one or two varieties, none of which may ultimately prove to be commercially successful. There is a very large subjective element in the early stages of the overall reduction programme, because the numbers are so big, but it is difficult to see how this can be changed, unless the commercial partners take a much bigger involvement in the process, or define the parameters for this process much more tightly.

2.21.3 A critical and potentially expensive element in that breeding process is securing 'National Listing', which ultimately leads to international listing for those cross-breeds deemed to be worth the necessary further investment; that normally occurs about eight or nine years after the initial crossing and is sought only for breeds, which appear to have significant commercial potential. Only then is commercialisation of a new variety realistically feasible. Table

2.8 (overleaf) provides a summary of the current status of Loughgall-bred varieties. The figures relate to current usage in Northern Ireland and Scotland only, but those quantities could be extrapolated to take cognisance of international markets, if Northern Ireland varieties had been well marketed. The figures suggest that, in the event of good marketing of Northern Ireland's seed potatoes, the rights, which have heretofore accrued to Cygnet PB, could have contributed considerably to the funding of Loughgall's operating costs over recent years.

2.21.4 There is a concern, within the sector, that Northern Ireland's potato growers do not benefit from the activities at Loughgall. That view stems, in part, from the fact that some of its contracts are with companies, which ultimately own the rights to the new varieties (under the terms of the contracts), but which have not enough trust in local growers to make the new varieties available to them. For others, the entire programme is seen as too remote from 'the market', though that view would not be accepted by the staff, who claim that their contract partners maintain a strong market focus in practice.

2.21.4.1 In reality, the current perception of Loughgall is also affected by the fact that some of its work on developing new breeds, which will be resistant to particular diseases, viruses and pathogens, is geared towards export markets rather than the domestic market – though current malpractices in the domestic market may have forced it to adopt that focus. However, it is also fair to say that it takes cognisance of the potential for improvements in plant characteristics, which would have agronomic implications.

2.21.5 The ultimate objective, or aspiration, of the Loughgall potato-breeding programme is that the commercial activities there would be funded entirely by royalties received in respect of the new varieties and from fees receivable from the contract partner(s).

TABLE 2.8

STATUS OF NIHPBS VARIETIES as of JULY 2005

VARIETY	YEAR NATIONAL LISTED	BREEDER'S RIGHTS?	CURRENT STATUS	SEED AREA N.IRELAND 2005 (ha)	SEED AREA SCOTLAND 2005 (ha)
Carlingford	1982	Yes	Rights to Cygnet PB		71.8
Nieta	1986	Yes	Rights to Cygnet PB		9.0
Navan	1987	Yes	Rights to Cygnet PB	13.4	23.0
Sperrin	1988	No	Withdrawn		
Toledo	1988	No	Withdrawn		
Rubicon	1991	No	Withdrawn		
Roscor	1999	No	Withdrawn		
Carrick	1999	No	Withdrawn		
Pomeroy	2001	Yes	Commercialised (Agrolon Contract)	0.7	0.4
Discovery	No	Yes	Withdrawn		
Milagro	No	Yes	Not Commercialised		
Sunset	2003	Yes	Commercialised (Agrolon Contract)	1.0	0.1
Estralla	2006	2005	In Spanish Nat. List; Due U.K. Nat. List in 2005; (Agrolon Contract)	0.1	0.1
Jala	2006	2005	2005 Crop In U.K. Nat. List (Agrolon Contract)	0.1	0.1
L4729/1	2007	2007	First Commercial Crop Due July 2007		
L4603/2	2007	2007	First Commercial Crop Due July 2007		

2.21.5.1 However, it is not anticipated that the costs of the strategic breeding programme would necessarily be recoverable from the sector (unless levies were to be introduced to cover these costs, and that would probably change the emphasis of Loughgall's work significantly). At present, the costs associated with the potato breeding programme at Loughgall are estimated by the Department at approximately £275,000 (± £3,000) per annum over the three years 2001-2003; of this, about £24,000 (8.73%) is recovered through the contracts with the private sector, but it is anticipated that this proportion could and will be increased in future contract negotiations.

2.22 Trials on cross-bred potatoes, with the potential to become saleable new varieties, are conducted at the Northern Ireland Plant Testing Station at Crossnacreevy. These trials are designed not just to ensure the credentials of the new varieties, but also to assess potentially favourable characteristics, including colour variations, resistance-to-disease characteristics, yield performances and the shape/configuration of the final product (what is referred to in the Republic as "Value for Cultivation and Use", or VCU). In its recent "Expenditure Review Initiative" on the potato sector, the Republic's Department of Agriculture and Food indicated that, in its view, there exists scope for co-operation between the two jurisdictions in evaluating the most suitable varieties for the whole island.

2.23 Evaluation of the propagating efficiency of 'controlled' or 'protected' varieties (i.e. those on which royalties are payable) as against that of 'free' varieties, conducted in the Republic in 2002, using a total of over 23,000 tonnes of Irish Potato Marketing's varieties, including pre-basic seed, certified seed and ware, produced the somewhat startling conclusion that, overall, protected varieties produced twice as much output as did the free varieties; and for certified seed, the productivity of the protected varieties was almost four times that of the free varieties (c/f Paragraph 2.6.2.2 above) Clearly, in productivity and propagating-efficiency terms, there is a high cost attached to growing free varieties, but that lesson has not yet been learned by some farmers in Northern Ireland.

2.24 DARD's core role in seed production in Northern Ireland is restricted to the provision of pre-tested mother tubers or germplasm, which are ultimately propagated by private growers (in some cases, after the nuclear stock has spent time in storage at the facility at Donemana) and DARD then inspects the resultant output and, if appropriate, certifies the grown seed as being true to name and type. Similarly in Scotland, the virus-free germplasm is supplied to private operators, including breeders from the East Craigs Research Station and, again, the final output is subject to inspection and, possibly, to certification. In the same way, in The Netherlands, clonal multiplication is undertaken by specialist producers who create most of the early generation material; an agency within the Ministry of Agriculture and a number of specialist breeding companies produce mini-tubers, which form the basis of much of the rest of the new seed production.

2.24.1 In the Republic of Ireland, however, the Teagasc controlled centre at Oakpark in Carlow (the Republic's equivalent of Loughgall) holds a supply of virus-free germplasm. All pre-basic material is produced directly by the state, unlike in Northern Ireland, where such production is mainly on a contract basis. It is estimated that the Pre-basic 2 seed is then sold for around 5% of what it cost to produce it i.e. the public sector operates at a loss in respect of this activity (though enough revenue is earned from royalties subsequently, to fund most of the costs of this facility).

2.24.2 Scotland, Northern Ireland and the Republic use similar classification systems for seed potatoes and all three hold similar disease-free status.

2.25 The current combination of plant health regimes, plant breeding activities and structured trialling for potatoes in a high-health-status, disease-free, operating environment provides a platform, which should be hugely beneficial to the potato sector in Northern Ireland. Unfortunately, it has not, so far, been exploited to its full potential. When combined with the inspection and certification processes, it should also guarantee that any potatoes ultimately grown from approved varieties are 'true to name' and conform to prescribed health standards.

SUMMARY

2.26 In summary, the potato sector in Northern Ireland faces huge competitive pressures from the bigger European producers. If it is to survive as a viable sector, it will have to develop a role for itself, by becoming more market-focussed and improving its production systems, and by anticipating changes in customers' preferences more quickly. The process of consolidation, or rationalisation, which has been in progress for a long time, but has accelerated in recent decades, is likely to continue and the entire potato sector needs a co-ordinated, realistic and effective strategy for its survival.

THE CONSULTATIONS

3.0 THE CONSULTATIONS

3.1 Appendix 4 contains a list of the persons and organisations consulted during this assignment; they include producers, merchants, packers, processors, representative bodies and a selection of the staff of DARD as well as a representative of Teagasc. The following paragraphs provide a selection of the more important issues raised during these consultations; only issues for which there was some corroborative evidence (whether from other consultees or from the literature surveyed during the research) are listed.

3.2 **Northern Ireland Has Major Advantages Upon Which to Develop a Successful Potato Sector, Yet It Has Been Losing, and Continues to Lose, Market Share:** The majority of consultees were cognisant of the advantages that Northern Ireland enjoys over most other potato-producing countries and some were at a loss to understand why, against that background, it had lost so much of its market share in both its seed and its ware markets. Virtually every consultee recognised strengths and competitive advantages in the following areas:

- good soil, with little or no soil-borne diseases;
- a good, cool, moist climate, with adequate rainfall, westerly winds and temperatures that, generally, do not promote the spread of disease pathogens; for example, aphid populations do not thrive in such conditions and the spread of viruses is reduced;
- high health status and disease-free status, with good hygiene records;
- a long track record in potato farming, with very experienced farmers

In addition, several consultees, including some (but not all) involved in supplying washed and packed potatoes to supermarkets, considered that the NIHPBS at Loughgall was one of Northern Ireland's strengths in this sector.

3.2.1 Most interviewees recognised that Northern Ireland was not competing effectively in terms of ***varieties***, because growers were not using new varieties in their product range, nor introducing new varieties to their customers. The result is that Northern Ireland's potato output contains much too high a

proportion of old and sometimes 'tired' varieties. Specifically in the overseas markets for seed potatoes, there have been virtually no new Northern Ireland varieties recently, whereas the Dutch and the French are introducing new varieties on a regular and consistent basis, replacing older varieties with new and improved 'controlled' varieties and marketing them aggressively, thereby generating both 'consumer interest' and royalties, and increasing the profitability of their operations.

3.2.1.1 Three reasons were advanced for this failure to meet customers' expectations of new varieties: firstly, new varieties are not being made available to Northern Ireland growers, because those who own the Plant Breeder's Rights do not trust the local farmers to pay the relevant royalties i.e. there is a huge level of mistrust of Northern Ireland growers generally and that mistrust extends within the sector itself, though there now appears to be a greater willingness to co-operate and integrate, and to 'play by the rules', than may have existed heretofore. It was specifically indicated that the necessary trust cannot be re-built through a structure which cedes control of the marketing of potatoes to merchants or agents – it can be re-built only through direct contact between the growers and their customers.

3.2.1.2 Secondly, the use of small ware as seed was raised by several interviewees, though again farmers appear to have learned that such practices are counter-productive and will no longer be accepted (and those practices are not confined to Northern Ireland either; the use of small ware was, apparently, one minor factor, among a range of factors, in IPM's decision to multiply Irish-bred varieties in Scotland).

3.2.1.3 Thirdly and crucially, there was a very strong view that Northern Ireland's potato growers see themselves as operating virtually independently of the rest of the supply chain and as if each one was in direct competition with each other. Consequently, they take their decisions purely as farmers, with little reference to the wider commercial implications of the overall supply chain, of which they are but one link. Invidiously perhaps, but nevertheless forcefully, comparisons were drawn with the potato sector in The Netherlands, where it

has a 'virtually co-ordinated' marketing system, through which strong brand identities are built (including regional brands) and where they are supported by the public sector; in addition, processors in The Netherlands are seen by farmers as part of their supply chain and, when it becomes necessary, they are supported (and sometimes protected) by the farmers in difficult market conditions, such as exist at present. That is the main reason that Dutch processors can currently sell frozen chips at the equivalent of 11p per pound – some of them are buying their potatoes at approximately the equivalent of Stg.£25 per tonne and possibly less.

3.2.2 A further factor applicable particularly to serving export markets with good quality seed is the inadequacy of Northern Ireland's storage and materials handling facilities for potatoes; that is considered below (paragraph 3.6) under 'infrastructure'.

3.2.3 It was also alleged (with some evidence to support it) that competitors from outside Ireland are claiming, in overseas markets, that Ireland's disease-free status is spurious and cannot be proved. The gist of the allegation appears to be that, since not all imports are inspected at the point of entry, there can be no basis for claiming absolute disease-free status. However, the evidence from the Plant Health Division at Newforge Lane clearly contradicts this assertion; unfortunately, there is no evidence that the allegations are being refuted effectively in the market place.

3.2.3.1 Furthermore, E.U. Comparative Trial Data indicates that Irish seed compares very favourably in terms of disease status and varietal purity, with that from any other Northern European Country (*Official Report of the EC Comparative Trail for Seed Potatoes 2002*) and Northern Ireland's certified seed is generally seen as being of equal quality to that from the Republic.

3.2.4 The two most commonly identified competitors were Scotland and The Netherlands. Much of Scotland's seed exports are varieties which were bred in Ireland but multiplied in Scotland, where seed potato farms are much bigger than those in the Republic and where the health status is broadly similar to that

in Northern Ireland; Scotland has a much better reputation for both consistent quality and better service and after-sales support than does Northern Ireland. By comparison, The Netherlands has not nearly as high a health status as Northern Ireland, and still manages to supply seed to England, the Republic of Ireland, much of Continental Europe and large parts of the rest of the world. Their scale and their structures, which are based on a small number of large and financially strong 'co-operative' entities, give them certain advantages, but their real advantages lie in their more aggressive approach to marketing and their integrated breeding structure, which facilitates both 'hobby breeders' and major international organisations.

3.2.5 The overall thrust of the responses was that the failure to harness the advantages, which clearly still exist, has seriously damaged both the performance and the prospects for this sector and that, in any viable strategy for potato farming in Northern Ireland, these issues will have to be addressed.

3.3 The Development of the Potato Sector in Northern Ireland Has Been Hampered by a Deficit in Marketing Skills and Inadequate Investment in Marketing: This was another constant theme throughout the consultations – that this segment of the agricultural industry has suffered badly from a serious lack of marketing expertise, as a result of which it has failed to capitalise on the advantages it has had and continues to have. The main consequence has been a consistent decline in output and in export sales, when its core strengths would suggest that it should be well capable of retaining its market position in all its markets.

3.3.1 The most serious criticism of the traditional marketing approach of potato farmers is that it is ***not market-focussed*** and that potato farmers do not recognise that the only real supply chain, of which they are part, stretches from the potato field to the consumers' table, and includes packers, processors, supermarkets and other retailers, as well as housewives and other buyers of grocery products. Potato farmers have considerable expertise in the growing of potatoes – but their strengths are mainly technical; they have little expertise in business and little contact with those who consume their product

or the supermarkets which sell it, and there is no channel of communication through which the market's needs and its future demands are being channelled back to the producer. The reality is that the main conduit between most potato farmers and their ultimate market is the merchants who sell both seed and ware on their behalf. That has proved, and continues to prove, a very imperfect channel for information flows, with the result that not only are potato farmers remote from the market in terms of direct contact, but they are even more remote in terms of their attitudes towards consumers' changing preferences and their understanding of the market's needs.

3.3.2 In such a scenario, criteria such as service, quality and quality assurance, after-sales support (of which very little appears to be provided by Northern Ireland growers), presentation, innovation and market intelligence, cease to have the same degree of immediacy and relevance as would apply to other producers of a consumer product. Instead of competing on cost, potato farmers need to emphasise quality and skin finish, good agronomy, service (i.e. timely delivery of good products, appropriately packed and labelled, and on a 'year-round' basis), presentation, hygiene, the absence of injurious diseases, after-sales support and the development of sound relationships with their customers. For those who grow on contract for packers or processors, many of these aspects are provided by the packers and processors, and the farmers are required to produce within clearly defined and very transparent parameters; but for those who sell through other intermediaries, the absence of market intelligence and information is a crucial constraint on their potential for long-term success and survival. The whole issue of supply chain management and 'transparency from seed to consumer' needs to be addressed constructively, quickly and positively.

3.3.3 A further factor militating against a properly integrated supply chain is the failure of seed producers and ware producers to come together to identify what varieties of seed are needed, what shortages exist annually and how their different activities could better complement each other (though about one in every eleven potato farmers grows both seed and ware). For example, one interviewee listed the varieties he would want to buy as Navan, Markies,

Premiere and Maris Piper, which contrasts with what he is being offered (mainly Kerr's Pinks). Any such coming together of seed and ware producers would need to be complemented by a good agronomy service, however that was provided.

3.3.4 There is also a need to promote potatoes as a locally-produced food, in just the same way as local economic development agencies in Wales and in parts of England and Scotland have done successfully. Regional brands have proved to be very strong in Britain; there is no reason why they could not be equally strong in Northern Ireland.

3.3.4.1 The current potato levy does not generate enough money to finance the creation of a regional brand and there is a widely-held view that the costs of collection must be as great as the entire revenue being generated. At present, potato farmers in Northern Ireland are paying far less in levy than farmers who are members of the British Potato Council (which does not operate in Northern Ireland). Recent research suggests that, despite some criticisms, the B.P.C. is reasonably effective in promoting the interests of British potato farmers, whereas these consultations indicate that, in Northern Ireland, the levy is perceived as being largely a waste of money. There is, therefore, a need to re-assess the operation of the levy system, how it is spent and its value to the sector.

3.3.5 One of the results of the inadequacy of the market information system is that when seed was exported to North Africa (especially to Morocco), before hot-boxing was introduced, much of it had deteriorated badly, yet farmers were unaware of some of the problems involved; that damaged the reputation of Northern Ireland producers in those markets, and while the merchants still sell into those markets, they have to compete on a 'commodity' basis with consequent strong price competition, rather than as a preferred supplier who could use service, health status, quality, after-sales support and close networks as factors in securing premium prices for what should be accepted as a premium product.

3.3.6 Another consequence of inadequate investment in marketing is that overseas companies (e.g. McCains, Green Isle, Bird's Eye, Heinz, with its 'healthy eating' meals etc.) have taken huge shares of the Irish market for potato products, whilst local companies have been losing market share consistently and rapidly

3.4 **The Overall Standard of Husbandry in the Potato Sector in Northern Ireland Is Not as High as It Should Be:** While most producers neither accepted nor rejected this view (though clearly it was not accepted unanimously by the growers), it was expressed forcefully by other elements within the sector – especially by the packers and processors. There was a clear view that ***agronomy standards*** were low, that potato farming was not viewed as being a highly professional activity and that, even for those who have others growing under contract for them, it is not easy to inculcate best international practices and standards into potato farming in Northern Ireland. That view was also expressed in informal discussions with interested parties from outside Northern Ireland.

3.4.1 Among the aspects about which particular concern was expressed were the following:

- failure to allow fields to lie fallow for long enough and with sufficient frequency to ensure that they are capable of producing good crops with good finish (i.e. without scabs) and no disease; to a large extent, this failure is driven by economics and the price of conacre land, but there are examples of potato farmers planting land one year in every four or five, against a theoretically optimal rotation of one in seven;
- the planting of potatoes for several generations from the initial certified seed, thereby losing control of both the quality of, and the yield from, the crops;
- the use of small ware as seed, with similar results to those in the preceding point;
- failure to do adequate soil sampling, thereby risking the bio-security of the produce;

- failure to identify and remove 'rogue' varieties before digging, thereby portraying a poor image to customers;
- failure to observe appropriate blight protocols and to monitor for, identity and act against, various other aphids, in time;
- failure to observe standard dates for various elements of the overall potato cultivation process, including spraying dates and 'burn down' dates;
- failure to benchmark production and marketing costs against key competitors, and to analyse costs with the aim of maximising efficiency and minimising waste and losses;
- failure to segregate ware and seed, both in growing and in storage;
- failure to apply all necessary phytosanitary protocols, thereby increasing the potential for disease.

It is clear from the consultations with those who interface directly with the market, that however industrious and however technically competent the majority of the farmers may be, they do not have the expertise and the detailed knowledge of potato agronomy to meet the demands of today's customers and of the intermediary organisations which link the grower to the customer.

3.4.2 For those farmers who grow on contract for packers or processors, considerable agronomic support is provided by the packer's/processor's agronomists, so that the necessary protocols are largely observed and better quality output is produced. However, apart altogether from the European Union's regulations, consumer markets now demand both full transparency and 'perfect' products. Against those market demands, the packers claim that **the single biggest problem relating to Northern Ireland potato farming is the seed being used** and the issues referred to in paragraphs 3.2.1 and 3.2.4 above; of all the agronomic issues raised, the quality of the seed being planted appears to be, by far, the most important.

3.4.2.1 There was a very clear message from those who have direct contact with customers: **there is a major need for improved agronomy and for improved seed**. English and Scottish growers change their seed regularly (normally annually); too many potato farmers in Northern Ireland re-use from

their ware crops – allegedly for as many as four or five seasons. Potatoes, as a crop, which propagates vegetatively, are prone to the accumulation of pests and diseases, and this inevitably produces some degree of degeneration of the tubers. That results in poor skin-finish (with scabs being a particularly common feature, though soil and lack of water also contribute to this) and loss of credibility with consumers. The result is that while a first sale may be made, repeat sales are lost. That has been a contributory factor in Northern Ireland's loss of its former 'bag trade' in Britain, though poor service (including *"...two bags of good potatoes, followed by a bag of bad ones.."*, as one interviewee put it) has also been a major factor. More than one interviewee indicated that, in their view, the Department has not been tough enough with those farmers who use inferior seed and that this needs to change.

3.4.3 Those who are growing on contract also benefit in another way; they are supplied with good quality seed by the packer, who buys in bulk from Scotland and passes on the benefit to the producer; and the same applies to fertiliser, which can also be acquired more cheaply by a packer who buys in bulk.

3.5 There Are Two Main Pre-Requisites for a Viable Future for the Potato Sector in Northern Ireland: The two factors involved are the maintenance of the existing ***high health and disease-free status***, and the on-going ***breeding and cultivation of new varieties***.

3.5.1 Unless it can retain its current high health status and unless the Republic can retain its high health status too (because their virus-free standings are linked by the common land boundary), there will not be a viable potato sector in Northern Ireland; the sector is currently so small that any further reduction, as would be inevitable if it lost its disease-free status, would result in non-viability, other than for a small number of farmers who would either grow on contract for packers, with guaranteed prices, or who would create a niche through local sales on a 'farm-gate' or roadside basis. But that would reduce this sector to an extremely small economic factor in the context of Northern Ireland's Gross Domestic Product.

3.5.1.1 One identified potential threat (it has not yet resulted in the spread of any disease) to Northern Ireland's disease-free status, is the use of imported 'field-grown' pre-basic and elite seed. Plant health experts identified the possibility of Ring Rot moving back with such stocks, since it lives in the potato itself rather than in the soil (where it lives for only a short period). Using mini-tubers would reduce this 'potential' risk.

3.5.2 It is recognised that places like Prince Edward Island (and even The Netherlands) have lived with some diseases from which Northern Ireland is still free (e.g. Ring Rot) and survived in the potato business. But the marketing consequences of a loss of its disease-free status would be disastrous for the image of Northern Ireland, which is already poor in overseas markets, for both seed and ware potatoes.

3.5.3 Secondly, the packers indicated unequivocally that the regular infusion of new varieties or the development of existing varieties to meet changing tastes and fashions (in terms of the appearance, colour, skin finish etc. of potatoes) will be essential to retaining Northern Ireland growers as suppliers to the major multiples. Currently, with one notable exception, all the major multiples are buying Irish potatoes for sale in their Irish stores, despite the fact that potato prices are higher in Northern Ireland than in Britain (by up to 90%) and higher in the Republic than in the North (by up to 55%). (Note: The Republic is now the most expensive country in Europe for pre-packed potatoes).

3.5.4 The perceived view of the position of Loughgall as a support to the supply chain was ambiguous. On the one hand, there was a view that it was too far removed from the market to be in a position to focus on producing varieties that are likely to meet the market's needs; on the other hand, there was an equally strong view that, without new varieties coming on to the National List regularly, Northern Ireland's capacity to meet changing market demands would be much too low. Ideally, any new variety should be capable of serving dual purposes – as table potatoes and as material for factories producing frozen chips or other similar processed products. Loughgall is not seen as having this focus at present, but some of the packers and merchants still see it

as crucial to the development of the sector (and those who support it are very trenchant in their view), while others do not.

3.5.4.1 In reality, this sector has neither commercialised new varieties properly, nor benchmarked its systems against best international practices, with a view to identifying competitive advantages to its stakeholders, especially in the seed business. The new varieties should have created some valuable marketing advantages; instead, crossing and breeding of new varieties tended to concentrate on agronomy, rather than on explicit market preferences and the specifications of the different market outlets. In the process, whatever advantages could have been gained were not exploited.

3.5.5 While the maintenance of the disease-free status of Irish Potatoes, right across the entire Island, was identified as the highest priority, the regular introduction of new varieties is seen as one of the main ways in which Northern Ireland could hope to recover its lost export markets.

3.6 The Supporting Infrastructure for the Potato Sector in Northern Ireland Is Comparatively Weak. Supporting infrastructure includes post-harvesting curing and cold storage facilities, grading and weighing facilities, boxes, washing and packing facilities, as well as non-physical supports such as benchmark data, peer group assessments, models of best practice and marketing support; while both CAFRE (through its Greenmount Campus) and the Departmental staff member with responsibility for 'supply chain management' have consistently been prepared to provide most of the ***non-physical support*** required, farmers have not identified these aspects as real needs and have not used the supports available.

3.6.1 Some people from each of the three main intermediary segments - producers, merchants and packers – were of the view that, in terms of ***physical supports***, especially cold storage and good quality ambient storage, Northern Ireland lags very far behind the Republic, which has used the European Funding Programme, FEOGA, to assist in building-up this part of its infrastructure. There is still a large proportion of Northern Ireland's potato output being

stored in sheds and, at best, such produce is usable only until Christmas in any year.

3.6.2 As indicated earlier in this report, the Republic has cold storage capacity for 360,000 tonnes of potatoes, whilst Northern Ireland is seriously lacking in both dedicated cold storage and refrigerated storage, grading equipment, boxes and weighing equipment, as well as in facilities for processing and marketing. Most of the investment in the Republic is on-farm and was grant-aided, though grant-aid for such purposes has now ceased. However, the previous grant-aid system has already facilitated the creation of a highly modern infrastructure for the potato sector, with nearly 90% of farmers having access to good quality storage and about 30% having access to ambient, or refrigerated, stores. In respect of this type of investment, the potato farming sector in Northern Ireland suffers by comparison with the Republic.

3.6.3 As a consequence of this lack of investment, there are some Irish-bred seed varieties, which are not available to Northern Ireland farmers because they cannot store them in appropriate conditions - there are several varieties of potatoes whose life as quality products is relatively short in the absence of cold storage; it also affects the seed trade, especially that in overseas markets. Lack of investment in appropriate infrastructure de-limits the options available to Northern Ireland farmers in both the seed and the ware sectors – not just relative to other comparable countries, but in absolute terms too.

3.7 **The Potato Sector in Northern Ireland Suffers as a Result of a High Level of Fragmentation and Poor Integration:** The huge diversity in scale of operation, with many farmers producing very little and a few producing the majority of the sector's output, the strong ethos of independent operations, the absence of any integrated or coherent approach to marketing and the high level of dependence on merchants who sell potatoes as a commodity and have no contracts with growers, have combined to prevent the sort of collaboration needed to address the competitive challenges facing this industry. There has, to date, been no effective, collective and realistically feasible plan to ensure the viability of this sector of agriculture.

3.7.1 Confrontation rather than co-operation has been the hallmark of this business, to date. The fact that most of the problems facing the sector are common to all producers has not led them to co-operate in finding solutions. Instead, they continue to sell through merchants who are content to compete with one another on price, whereas the entire sector should be coming together to improve cost management and to compete on quality and service, using Northern Ireland's disease-free status as a marketing asset, and investing equity in the creation of a successful regional brand (or a number of such brands for different potato-based products). This approach reflects a failure of leadership among the different interests in the early and middle links of the supply chain. Given Northern Ireland's remoteness from some potential markets, such a lack of integration was always going to be expensive for this industry in market terms – and so it has proved.

3.7.2 There are some major differences between Northern Ireland and The Netherlands, in how their respective potato sectors operate: by and large, the Dutch are willing to co-operate in order to solve a problem, when one arises; for example, Dutch farmers recently reduced the prices at which they sold their potatoes to local processors, who were suffering economic and financial problems, in order to keep the processing sector viable – that would be highly unlikely in Northern Ireland where the necessary trust between growers and processors does not exist, and where there is much lower reliance on the contractual relationships and transparency, which contribute to – indeed are necessary in - building trust. There is also more sharing of machinery, in this sector, in The Netherlands (though that carries an increased potential for the transfer of soil-based diseases) and more use of common storage, thereby reducing investment requirements and increasing the productivity of that investment; and, as the example above shows, there is more co-ordination with the processing sector. In Northern Ireland there appears to be no more emphasis on the competition created by those in other countries, than there is on local, inter-farm competition.

3.7.3 In addition, this industry operates under other crucial limiting factors, which are exacerbated by its fragmentation; they include:

- the structure of the land base, which comprises mostly of small fields, few of which are flat, in contrast to major potato growing countries in Europe, such as Poland, Hungary and The Netherlands, as well as parts of France;
- the lack of trust between growers and merchants; the merchants have historically failed to communicate market information back to the growers, have sold produce at rock bottom prices when market conditions were difficult and have refused to sign contracts with the growers; that has upset many growers, but the combination of poor feedback and low prices has also affected the performance of the entire sector; and
- the use of poor quality seed (which is a recurring theme from many of those consulted).

The result is that whilst Northern Ireland should be competitive in the potato sector, because it should have lower costs as a result of its relative freedom from disease, it does not have as good control over, or as good quality of, tubers as it should. That limits its potential - greatly.

3.8 **Northern Ireland Should Use Its Expertise in Crossing and Breeding Potatoes to Secure the Region's Position as Suppliers of Good Varieties to Local Processors and of Quality Products to the Multiples:** There are two aspects to this proposal: firstly Loughgall should concentrate on producing new ***varieties which are aimed specifically at meeting developing market trends*** in terms of texture, dry matter content, colour, shape, size etc.; and secondly the packers and the farmers themselves should work with the multiples and the processors respectively, to ensure that the breeders are informed of the specific types and characteristics of the potatoes which they will need to supply to those businesses. It was argued that, in particular, the latter link is largely missing from the current supply chain, and one processor claimed that he just cannot get the varieties he needs.

3.8.1 If the breeding process is to a valuable element of the overall supply-chain for the potato sector, those responsible for it must be advised by their commercial partners of the trends affecting the demand for potato products and of what the intermediary customers and the final consumers both want from their

suppliers. Currently, new product launches for potato-based, consumer foods, in international markets, are reflecting:

- the need for convenience, ease of preparation and snacking;
- the demand for products which are healthy, safe, natural and contribute to personal well-being; and
- the necessity to have products which are tasty, novel, nutritious and attractively presented.

Such product ideas are invariably market-driven; they rarely come from experimentation, or laboratory-based research. And these demands are constantly evolving. That places huge pressure on programmes such as potato breeding, which extend over nearly a decade, whilst the market may change two or three times within that period. Yet without the capacity to produce new products geared towards meeting evolving market demands, growers in Northern Ireland will become even further removed from the realities of the market-place.

3.8.2 Implicit in the general thrust of these responses is the view that Northern Ireland growers should always have access to any varieties bred in Northern Ireland. Dutch and British breeders will not sell their new varieties into Northern Ireland because of problems in collecting the royalties; in that way, the sins of the past continue to plague the options available to even the most compliant of current growers. Therefore, the argument goes, expansion of the range of varieties being supplied by Northern Ireland growers to the supermarkets, depends entirely on having access to Loughgall's new varieties; but it was clear that Loughgall's commercial partners, who are paying part of the costs of the breeding programme, are not convinced that Northern Ireland is the best place in which to propagate new varieties, or collect breeders' rights.

3.8.3 A corollary of many of the views on this topic is that, even when new varieties are bred successfully on a contract between Loughgall and a private business, which may be foreign-owned, there is a feeling that such varieties should be multiplied in Northern Ireland, instead of in Scotland, The Netherlands, Spain

or Britain. Obviously, those who are already in a contractual relationship with Loughgall or who have aspirations to negotiate such a contract, do not necessarily accept this view either.

3.8.4 Effectively, what these comments underline is the fact that Loughgall has all the expertise needed to be successful at breeding new varieties, but that its commercial partners must determine its focus, which has to become more commercial and market-oriented; alternatively, DARD will have to determine that NIHPBS's focus should be on strategic breeding and fund it.

3.9 The Overall Consumption of Potatoes Is Declining, Locally and Internationally: *Per capita* consumption of potatoes in Ireland has reduced by almost 65% over the past sixty years. That implies that there is (and has been) a huge need to develop value-added potato products and to invest in marketing (which itself can add value). But the investment needed to develop a viable processing plant for value-added potato products is very large and, therefore, can only be justified by a large market. Northern Ireland is too small for such an investment and, in the Republic, a study determined that the entire island of Ireland was too small for such a project to be viable. On that basis, the Island's only potato processor will have to be very efficient and to identify a niche through which it can avoid some of the competitive pressures being exerted by the big multi-national players, who currently dominate this industry. However, if a new processing plant is unlikely to prove viable, every effort needs to be made to protect the established plant, if it is to have any chance of being viable.

3.9.1 According to some people involved in the packing trade, the bigger supermarkets are now selling a reducing proportion of overall potato sales, in part at least, because they sell on appearance rather than on eating quality and, in rural areas, consumers are going to country shops and farm gate, or roadside, traders for potatoes, which meet their taste preferences (e.g. for Kerr's Pinks, in the case of some rural areas) . Some country stores are now selling much more potatoes than any supermarket store in Northern Ireland and their sales are increasing, but they cannot attract customers from the

higher-population, urban areas. In many cases, potatoes are being sold unwashed through these rural outlets and that replicates a trend in North America, where an increasing proportion of potato sales are unwashed.

3.9.2 A number of interviewees suggested that potatoes are no longer seen as a convenience food, at a time when ready-prepared food is being demanded by consumers. Pre-cooked and vacuum-packed chips sell well, but their shelf-life is short, although they could provide a market for the non-premium potatoes, which currently go to the 'peeling trade' (i.e. they are sold into the catering trade – for schools, hospitals, cafes, restaurants and some hotels etc.). However, the increasing labour cost associated with the peeling and the disposal of the skins and peelings, is making this business much less profitable too (for some, it is no longer profitable). There is a need for research into how to extend the shelf-life of potatoes and potato-based products.

3.9.3 Therefore, in order to survive, this sector needs to be very competitive in cost terms, to have good cost control systems, to have access to accurate benchmarking information on costs (which it does not have at present, but which could be sourced through CAFRE's Greenmount Campus) and to invest in marketing, which it does not currently do. But it also needs to find other ways of using potatoes as convenience food, which meets current market needs for healthy, tasty, natural, oven-ready products, with high nutritional value and which do not lead to obesity or heart problems.

3.10 Any Substantial Growth Potential, in the Potato Industry in Northern Ireland, Is in the Seed Sector: With declining consumption nationally, the market for ware potatoes in Ireland is declining and Northern Ireland has, effectively, lost any export markets it once had for ware. Therefore, if this industry is to grow, it will have to generate its growth through exporting seed.

3.10.1 At present, Irish farmers (including those along the border) are importing seed potatoes from Scotland, where those in the border counties alone buy an estimated three thousand tonnes out of a total of between 9,000 and 15,000 tonnes being imported by the Republic as a whole. Clearly, there is a missed

opportunity for Northern Ireland's seed growers here, though Scotland has access to, and is multiplying, Irish-bred varieties, most of which are not available to growers in Northern Ireland.

3.10.2 Equally fundamentally, the huge market in England for seed is not being serviced by Northern Ireland growers, who have failed to develop the networks needed to penetrate a market, which demands consistently high quality, good service and prompt delivery. This market has been ceded almost entirely to Scottish and Dutch growers, essentially without any attempt by Irish growers to regain a share of it. Clearly, the merchants have been ignoring this market in favour of more distant markets which are more expensive to service and, probably, less conscious of quality and the need for regular changes in the varieties available. But with good quality products, delivered on time and supported by advice and grower expertise, the British market should be a source of more profitable sales.

3.10.3 Only one local grower has succeeded in selling seed potatoes into the English market, in recent years. That grower has invested effort and knowledge in developing this market and is convinced that, with good varieties and good salesmanship (which effectively involves building a network of both personal and professional relationships), and with a willingness to invest in promoting Northern Ireland seed in the British Market, as the Dutch did, by putting samples of their new varieties into English growers, free, Northern Ireland growers could regain some share of the British seed market. However, given the scale of operations of most potato farmers in Britain, any Northern Ireland grower would need to be in a position to offer at least five thousand tonnes *per annum,* if he hoped to succeed in that market. That indicates the scale of what needs to be done to achieve success, but the indications are that, with the right approach, it is possible.

3.11 A number of other issues were raised; most of them are covered later in this report, when the options are identified and analysed. However, those above reflect the main macro issues affecting the sector.

THE OPTIONS AND THEIR ANALYSES

4.0 THE OPTIONS AND THEIR ANALYSES

4.1 A large proportion of the work, which DARD does in relation to the potato sector, together with the related costs, is based on the statutory obligations of all states in the European Union and/or is dictated by national legislation. As long as the growing and marketing of potatoes continues in Northern Ireland, these activities and their costs are not discretionary, irrespective of whether the sector grows or continues to decline. In respect of such costs, the only issues are their level and the extent to which they can be reduced if activity falls; the entire plant health, inspection, sampling and certification activities fall into this category.

4.1.1 Some other activities are entirely discretionary; a proportion of these are either necessary or highly desirable, if Northern Ireland is to continue to have a viable potato industry; others are theoretically discretionary, but may have implications for the future of what was perceived, in the past, in Northern Ireland, as being a strategically important part of the local economy.

4.1.2 In the following analysis, these different categories of cost are treated as separate groups and, therefore, totally different approaches are adopted to determining the best configuration of activities and costs for this sector. But conclusions on the future of this (or any other) sector cannot be dictated by the cost implications alone; there are also strategic implications which must have an over-riding influence on policy towards this type of farming, and they are considered first.

THE STRATEGIC IMPLICATIONS

4.2 Central to any analysis of the available options is the reality that in terms of gross output, or contribution to the economy, the potato sector contributes a total of just over £20 million *per annum* in four out of every five years (for various reasons, there is the occasional 'good' year), that just over 15% of that total comes from the seed sector and that, in real terms, the value of that output has long been in steady decline, with the seed sector having been in

particularly serious decline over recent decades. On the other hand, in the event of a serious deterioration in the health status of some other potato producing countries, Northern Ireland's high health status and disease free environment for growing potatoes could (and almost certainly would) create an opportunity for significant growth and become extremely valuable. In addition, withdrawal of certain specific supports would mean that Northern Ireland would become a net importer of potatoes, while the quality of its soil and its material, its phytosanitary standards and, especially, its climatic advantages would suggest that it should be a successful – possibly even a growing - exporter of this crop.

4.3 It is clear from the consultations summarised earlier that one of the few areas of unanimity in this sector is the acceptance of the need for new varieties, for both the seed and the ware sub-sectors – that the absence of new varieties has damaged and continues to damage the ware sector, but that it has had an even more detrimental effect on the seed business, both domestically and in export markets. Any damage created by excessive dependence on old varieties has been compounded by a combination of operational factors and failings on the part of the producers, including:

- the absence of a market focus and of adequate emphasis on an integrated approach to supply chain management, largely as a result of the loss of contact with customers and of failed systems for securing feedback from the market;
- poor customer service and inadequate consciousness of customers' needs;
- poor agronomy and growing protocols;
- inappropriate systems for the delivery of seed to customers (especially overseas customers) resulting in a combination of seed which has deteriorated badly by the time it arrives with the proposed growers and non-payment by those customers.

While DARD has provided some support in an attempt to address some of these problems (but very little aimed at solving the agronomy issues), the problems have persisted and markets have been lost.

4.3.1 By and large, the new varieties, which have secured national listing, have been bred at the NIHPBS, at Loughgall, and the breeding programme there has been complemented by trials undertaken at Crossnacreevy (where other varieties, from other National List Trials in a variety of geographic areas throughout Europe, and other crops are also trialled). While, costs are therefore incurred at both of these locations, with the bulk of the costs are related to the activities at Loughgall.

4.3.2 A number of strategic issues arise in relation to these activities; they include the following:

(i) Is the domestic market, or the export market, or both, the primary focus of the overall breeding programme i.e. the crossing, the production of seedlings, the evaluation of the tubers, the trials, the applications for listing and the decision to commercialise (or not)?

(ii) Would new varieties be produced in the absence of Loughgall and what options exist for the development of new varieties, if Loughgall is closed?

(iii) Has Loughgall been successful in producing new varieties, and if it has, why is it not self-financing?

(iv) Given the reduced size of this sector and its steady decline, is investing in the development of new varieties worthwhile at all?

Some of these are inherently strategic and cannot be answered on a purely financial cost-benefit basis; they require a more strategic view of the overall future of this sector; those issues are addressed below.

4.3.2.1 Most potato producers – and the majority of potato farmers are ware producers – expressed a strong view that the entire potato breeding programme should be geared towards producing varieties which could, and would, be multiplied and propagated in Northern Ireland and to which Northern Ireland growers would have access; the packers and processors echoed the view that Northern Ireland's potato farmers should benefit from the breeding of new varieties – in fact, they saw it as essential to the entire future of their sector. That was contradicted by some of the seed producers and the merchants, both of whom

felt quite strongly that seed potatoes was one of the few products in which Northern Ireland had significant inherent advantages and that this export potential should be exploited fully and effectively, thereby creating exports and wealth in a farming sector, which currently needs it. Both arguments have validity. On balance, however, the majority of interviewees from the operational side of the sector saw the current breeding programme as being geared primarily towards export markets.

4.3.2.2 However, it is clear that the mistrust indicated earlier in this report (paragraph 3.2.1.1) is a major issue for those who would, otherwise, be prepared to invest in the breeding of new varieties; their argument is that they would have to invest not just money, but also about ten years' concentrated effort, in creating a new saleable variety, and that, to justify that investment, they would need:

(i) full recognition of, and payment for, Breeder's Rights; and

(ii) no abuse of the new variety by either the planting of small ware from the output of the initial certified seed, or otherwise creating a second generation for which no royalties would be paid.

Several of those who indicated a willingness to invest in the development of new varieties, expressed little confidence that those two conditions would be met in practice.

4.3.2.3 Northern Ireland's potato merchants hold a very clear view that the main focus of any variety-breeding programme should be the potential overseas markets, though they accept the need to run trials on the suitability of new varieties for the domestic market. They emphasised the need to target the breeding programme and to assess new varieties for yield, resistance to viruses, aphids, pathogens and diseases, colours required by customers, skin finish and shape, but also for their suitability for multiplying under different climatic conditions. They see particular opportunities in some of the countries on the North African side of the Mediterranean Rim.

4.3.2.4 Should the potato breeding activities of the NIHPBS at Loughgall cease, for whatever reason, there is no doubt that the numbers of varieties being accepted for National Listing on the Common Catalogue of Northern Ireland's potential

export markets each year would reduce substantially. No individual potato farmer could afford to undertake a breeding programme and there is no indication that farmers would consider funding one on a co-operative basis. While there are some hobby breeders, some varieties are being developed by Northern Ireland's only mini-tuber grower and there is a developing relationship between a consortium of Northern Ireland merchants (PPNI) and the New Zealand Institute for Crop and Food Research Ltd, the reality is that the likelihood of a continuing stream of new varieties for trialling, or the regular introduction of new varieties from Northern Ireland onto the National List, would be very low, without Loughgall. Any programme designed to develop new varieties for either the domestic market or for export markets, will ultimately need Loughgall, or an equivalent facility.

4.3.2.5 The issue of Loughgall's economic success or failure reflects two implications; firstly, there is a view (strongly held in some areas) that too little investment has been made in marketing whatever Loughgall produced; that has been a major failing and it has not been the fault of the staff at Loughgall. And secondly, its financial performance reflects, in large part, the decision of a former U.K. Government to hypothecate all royalties and breeders' rights to a National Seeds Development Office (N.S.D.O.), which was later effectively privatised through a sale to PBIC (Cambridge) owned by Unilever, which formed a joint venture with Agrolon, a Spanish potato company, and subsequent royalties went to that joint venture (or its successor Cygnet PB). Before the transfer to the N.S.D.O., these varieties were grown under 'Open General Licences', with the royalties being paid on the hectares grown; after it, they were grown under a restricted licence, whereby the owner refused some people permission to grow the variety and effectively created a quasi-monopoly under which profit was created, not through royalty payments, but by increasing the price. That produced an illegal trade in these varieties, with small ware being used as seed and second generation produce creating potential hazards, including susceptibility to the spread of disease and deterioration in tuber quality.

4.3.2.6 It is impossible to quantify (other than through Unilever) how much might have been earned in royalties from varieties bred at Loughgall, but what is on public record is that the Republic's comparable facility at Oakpark has been able to fund about 70% of the costs of its breeding programme from such royalties. In recent years, Loughgall has been successful in breeding a considerable number of new varieties, which were accepted for the National List and from which significant royalties would have accrued to NIHPBS under a different legislative framework. At present, Loughgall is producing new varieties for the National List, more regularly than is happening in The Netherlands, which is one of the world's major potato producers.

4.4 Effectively, the result of this analysis is that Loughgall has to be central to any formal, structured and effective potato-breeding programme. The issue then becomes whether its existence can be justified by the performance of the sector. With an annual value for seed potatoes grown in Northern Ireland ranging, over the past six years, of between £2.1 million (in 2000) and £6.3 million (in 1999) the direct cost of the potato breeding programme (excluding the cost of trialling etc.) represents between 4% and 12% of the value of the output; clearly the latter percentage is much too high, though the average is much less than that (approximately 6%)

4.4.1 Therefore, in strategic terms, the following arguments can be made. Firstly any Loughgall-based programme for the potato sector has to take account of both the domestic and the overseas markets; new ware varieties are crucially important to the sector's capacity to meet the needs of local packers, who respond to the demands of the supermarkets and the preferences of consumers. Equally, any attempt to penetrate overseas markets will require new varieties which meets the requirements specified above by the merchants i.e. colour, disease resistance, good yields, dry matter content, tolerance of the relevant climates etc. On these bases, the domestic market is the more important, but the overseas markets are also important and could, if better managed and serviced, produce growth in export revenues for Northern Ireland.

4.4.2 Secondly, the issue of recovery of all, or part, of the costs expended needs to be considered. There is an argument that part of the breeding programme is strategic i.e. that part which relates to the control, prevention or amelioration of disease within potato crops grown in Northern Ireland and to the region's health status in relation to potato production. In practice, in recent years, Loughgall has been operating breeding contracts with a number of private sector interests (including international potato producing companies, packers, merchants and marketing companies); it is obvious that the full cost of these activities is not being recovered by DARD, whilst the costs of any strategic breeding is being fully funded by DARD.

4.4.3 Thirdly, in respect of much of its activities, the breeding undertaken in Northern Ireland generally has been driven by agronomic considerations rather than by market considerations. By virtue of the input of its commercial partners, Loughgall has adopted a reasonably strong market focus for much of its activities (especially in respect of creating appropriate ware products for the local market); however, some of its private partners have emphasised their overseas markets and Loughgall has been caught between an emphasis on agronomically-driven breeding for local ware producers and market-focused breeding for overseas companies. In the absence of Loughall, the necessary market focus would probably be totally lost – temporarily at least - but potentially for long enough for the sector to reduce to a level where only those growing on contracts and others involved in 'farm gate' or 'roadside' sales would survive.

4.4.4 Finally, all the evidence gathered during this assignment suggests that, with, or without, a breeding programme, at Loughgall or elsewhere, new varieties with the potential to be successful will actually succeed only under the following three conditions:

(i) a completely new approach to the marketing of potatoes, especially of seed potatoes; that new approach would have to be market-focussed and involve:

- greater awareness of the needs of the market and of customers' preferences in terms of colour, skin finish, appearance, size and quality;
- a much higher level of after-sales support, in the case of seed potatoes;
- far more attention to prompt delivery and the level of overall service to the customer; and
- more direct contact between producers and the multiples (in the case of ware) or the potential growers (in the case of seed).

(ii) much higher agronomic standards, producing better and more consistent quality products, with no 'rogue' products in any produce which is supplied to the next link in the supply chain, and with fully transparent systems to prove the sources of all inputs.

(iii) better integration at producer level (which will be difficult, given the sense of independence within the farming sector generally) to reduce the level of fragmentation, competition and price-cutting, to increase co-operation in addressing market expectations, to strengthen the financial and market bases of many of the customers, and to improve the quality of Northern Ireland's product generally.

Without changes in these areas, the value to 'Northern Ireland plc' of any investment in a potato-breeding programme will be very significantly reduced.

4.5 Against that background, there are five obvious strategic options, apart from the 'Do Nothing' option, from DARD's perspective; they are as follows:

(a) Withdraw all direct financial support for the potato breeding programme and close down that part of the operations at Loughgall;

(b) Withdraw direct financial support for the potato breeding programme, but allow Loughgall to continue to operate, without any payment to DARD for use of the facilities, provided it can recover its direct costs through contracts with the various parties with which it currently has agreements and with any other entities with which it can negotiate additional contracts;

(c) 'Privatise' the potato breeding programme, with, or without, the other activities currently being undertaken at NIHPBS.

(d) Fund some strategic aspects of the potato-breeding programme, with the balance of the costs being funded through various contracts with growers, merchants or marketing companies, but reduce the strategic funding over time so that, eventually, Loughgall would have to become self-financing.

(e) Promote Northern Ireland as a good location for the multiplication and propagation of potatoes on contract from international companies, which would source the varieties and set the agronomic parameters, without Loughgall.

There are some limited variations on these five main options, but they involve mostly additional detail, which could be negotiated later, rather than any strategic differences. In addition, there is the 'Do Nothing' option, which, in this case, would involve continuing to support the potato-breeding programme as is happening at present. The following paragraphs provide summarised analyses of these options.

4.5.1 **Close the Potato Breeding Programme:** Given the low level of seed potato sales in recent years relative to the cost of the potato breeding programme, there is clear merit in considering this option; it would save money, without serious damage to Northern Ireland's current agricultural output; it would, therefore, free up resources to be invested elsewhere; and it would avoid a situation whereby the newly created AFBI would be taking over an entity requiring on-going support and absorbing significant management time and effort.

4.5.1.1 On the other hand, the feedback from consultees indicated that, without the on-going introduction of new varieties, there can be no long term future for Northern Ireland's potato industry. Local packers will either be replaced by English suppliers, who already supply the major multiples in Britain anyway, or possibly by European suppliers in the case of a small number of retailers, or they will have to import potatoes for packing. Given that potatoes are cheaper in Britain than in either Northern Ireland or the Republic, this would create

few, if any, problems for the supermarkets, but it would wipe out most of the local potato industry. The only possible long term activity in this sector would then be that some farmers would get growing contracts with packers, or processors or merchants, probably in The Netherlands, but possibly elsewhere as well; others would grow potatoes from seed, however they could source it, and sell through roadside or farm gate outlets; but that would mean a very small potato industry in Northern Ireland, with virtually no seed sector.

4.5.1.2 In addition, all early generation material would have to be imported from either Scotland or the Republic, either as mini-tubers or as seed potatoes. That could leave the entire potato sector open to the arrival of various diseases, which would damage Northern Ireland's high health status and, in all probability, cause a complete collapse of the export trade for seed. Ideally, Northern Ireland should be self-sufficient in seed potatoes.

4.5.1.3 However intuitively attractive total closure of the potato breeding programme might be, it would have the effect of totally undermining the economic sustainability of the entire NIHPBS facility at Loughgall, including the grass-breeding and mushroom-based activities. There are economies of operation between the different activities at Loughgall and withdrawing one of the major activities would, undoubtedly, erode the viability of the others, making their 'full costs' higher and requiring additional contributions from DARD to retain them; alternatively, up to eighty jobs could ultimately be lost there. Treating the potato activities on a marginal cost basis, would suggest that they could be retained and that increased contributions from the commercial partners would make their continued existence justifiable.

4.5.1.4 On balance, given its long term effects on whatever future potential this industry might have, this does not seem to be a particularly good option, notwithstanding the theoretical savings (which would probably exceed the actual cash savings) which would result.

4.5.2 **Withdraw Direct Funding for the Potato Breeding Programme:** The idea of making Loughgall's Potato Breeding Programme self-financing is,

intuitively, very appealing; it would probably require some time to promote and negotiate the contracts needed to reach break-even or better, and it would save DARD most of the costs currently associated with the programme (some costs are property-related and it would take a much longer period before they would be entirely covered by revenue from contracts).

4.5.2.1 The downside of this option is that, firstly, there is no guarantee that enough potato growers would be willing to enter into contracts with NIHPBS to make it feasible; and, secondly, in the attempt to breed to meet the needs of specific partners, strategic breeding, including identifying breeds which would be resistant to various aphids, pathogens, viruses and diseases, could be de-emphasised and devalued, leading ultimately to increases in viruses and diseases, and damaging both the disease-free status of Northern Ireland's potato growing and the profile of Northern Ireland potatoes.

4.5.2.2 Nevertheless, this option should not be discounted, though it might require some time before it would become genuinely feasible and there would be a need for DARD to guard against any reduction in resistance to disease among potatoes, in any interim period.

4.5.3 **Privatise the Potato Breeding Programme:** Any private sector entity considering taking over potato breeding in Northern Ireland would face exactly the same problems as were outlined in paragraph 4.5.2 above; in reality, privatisation is one of the variations on that option. While it would result in savings to DARD, it could prove financially non-viable and could collapse; alternatively, it could result in the consequences suggested in paragraph 4.5.1.3. Furthermore, a private sector entity might have significantly less regard for disease prevention than DARD might prefer.

4.5.3.1 Therefore, this option should really be treated as one variation on the previous option and should be considered entirely in that light.

4.5.4 **Fund Strategic Breeding Only:** This option has many obvious advantages in that it would ensure the continuation of the strategic elements of potato breeding, whilst leaving the commercial aspects to be funded through

contracts and the participation of the industry, from farmers through packers and merchants, to those involved in marketing and selling; it would reduce the cost to DARD and that reduction could be phased over time.

4.5.4.1 The main problem with this option is that the remaining costs (i.e. those not funded by the strategic breeding programme) might not be fully covered by revenue generated from contracts and, as a result, the overall programme could collapse financially, with the results indicated earlier for the entire facility at Loughgall.

4.5.4.2 This option deserves to be retained for consideration by DARD as part of its strategic evaluation of its future support for the sector.

4.5.5 **Allow Northern Ireland to Become a Centre for the Multiplication of Potatoes on Contract Only:** Effectively, this is analogous to what the Republic, through IPM, has being doing in Scotland in recent years, except in the opposite direction. Northern Ireland's unique health status and its disease-free status make it an ideal place in which to grow potatoes, even if the seed was bred and the initial multiplication conducted elsewhere. So provided disease-free seed could be sourced from somewhere like the Republic of Ireland, or Scotland, or The Netherlands, it could be propagated efficiently in Northern Ireland, thereby securing the future of the industry, even if part of the profitability was to be retained in another state. Such an option would necessitate a vast improvement in the agronomic protocols currently being operated in much of the sector in Northern Ireland; but it would be technically feasible, it would retain jobs and it would not require a locally-based breeding programme. Furthermore, it would involve a guarantee that all output would have a market at an acceptable price.

4.5.5.1 This is unlikely to be entirely acceptable to local growers; it carriers an increased risk of the transmission of diseases, from which Northern Ireland is currently free, into the industry here; this option would almost certainly not provide adequately for the 70% of current growers who plant less than five hectares (at an average of 1.51 hectares in 2003 – see paragraph 2.4); and it

would almost certainly result in much greater financial pressures on the remaining activities at Loughgall, than apply at present.

4.5.5.2 This is technically a feasible option. It would not meet with wide acceptance within the industry, but it has to be retained as a fall-back option, should the Department decide not to continue supporting a strategically-based potato breeding programme at Loughgall.

4.5.6 **Continue the Existing Arrangements:** Current expenditure on the potato-breeding programme at Loughgall (excluding subsequent trialling at Crossnacreevy, where Loughgall-sourced varieties represent only a relatively small proportion of total activity) represented 6% of the average annual value of seed output over the past six years. Unless output can be increased, which effectively implies that export markets would have to be developed, this level could not be justified; it is investment, which has not been producing comparable benefits for local potato farmers – though the farmers themselves must take most of the blame for that. Nevertheless, without significant changes in several other parts of the industry, the margins are not high enough to justify this level of expenditure. And to date, only a small proportion of the overall benefit from this expenditure has filtered back into the industry in Northern Ireland – though that could be rectified in the drafting of new contracts - but it could (and probably would) also result in some parties to these contracts withdrawing from Northern Ireland.

4.5.6.1 Overall, this option, unless it became part of a major investment in improving production and marketing processes in the entire sector (and that would imply a major increase in DARD's funding for the potato sector) is unlikely to achieve any useful objectives other than slowing the rate of decline of the sector. Realistically, the funding of the overall potato sector needs to be rationalised, and that applies most pertinently to the funding involved in breeding new varieties.

4.6 The overall result of this analysis is that DARD has to take a strategic view of which of three realistic options it should implement; they are:

- a phased reduction of funding for a potato-breeding programme;
- funding only the strategic components of a potato breeding programme;
- allowing Northern Ireland to become a location for the propagation of varieties bred elsewhere.

All the evidence collected during this assignment indicates that, in the absence of a structured breeding programme and investment in marketing and supporting any new varieties produced, there is very little potential for exports of either seed or ware. It also suggests that the 'national good' dictates that Northern Ireland should be in position to fill any vacuum created by a major outbreak of potato disease in Continental Europe (or even in Scotland), notwithstanding that this might not produce the best short-term return on investment.

4.7 A second strategic dimension, which requires consideration by DARD, is the overall size of the sector in Northern Ireland, relative to those in Britain and the Republic. By any standards, Northern Ireland's potato sector is now small and, in European terms, it is minuscule; it could probably benefit from close strategic links with another, preferably bigger, entity, if it is to benefit from any form of economies of scale, whether in marketing, promotion, lobbying, identification and implementation of best practice, benchmarking etc.

4.7.1 Realistically, there are, at present, four options open to the sector, in this respect; it could continue to operate independently, as at present (the *status quo* option); it could develop stronger links with the Republic of Ireland's potato growers; it could develop links with potato growers in Britain; or it could develop strategic links, or partnerships, with potato growers in some European country, of which Spain or The Netherlands are the most obvious candidates, given their strengths and the level of their prior links with Northern Ireland.

4.7.2 Establishing strong links with Britain would give the industry in Northern Ireland considerable muscle in terms of promotion, marketing and lobbying (which is currently undertaken by the British Potato Council – the BPC); it could also give better access to English growers for the Irish seed producers

and it could generate some benefits in terms of benchmarking and economies of scale, with proper and accurate exchanges of information.

4.7.2.1 However, it would also have some potential disadvantages; it would be linking with one of its main competitors in the seed market – Scotland – which could have both positive and negative implications; it would almost certainly involve joining the BPC, which would charge a much higher levy than is being paid by Northern Ireland producers at present; the scale of operations of Northern Ireland's potato farmers is such that benchmarking data from the much bigger British producers would be of questionable value to most of them - other than perhaps 6-10 of them; and the value of Northern Ireland's output would be so small relative to that in Britain, that Northern Ireland would not be capable of exerting any influence on British potato policy. Nevertheless, most of Britain (excluding Scotland and the Cumbria / Northumberland area) does not hold the same health or virus-free status accorded to Northern Ireland or the Republic, and that should be a significant competitive advantage, from Northern Ireland's perspective.

4.7.2.2 Ultimately, there are as many disadvantages as advantages from a formal organisational link with British potato producers, especially as the BPC has indicated no interest in establishing a presence in Northern Ireland (in fact, it appears resistant to such a relationship). There could, however, be very considerable value to individual farmers, or groups of farmers, from establishing individual relationships with selected English growers, especially for those involved in producing seed potatoes in Northern Ireland.

4.7.3 Establishing relationships with a European country would have some merits; for a start, it would involve linking into a much bigger network with greater marketing expertise and higher standards of agronomy; it could lead to a European producer using Northern Ireland as one of its bases for growing potatoes in an area with high health status and freedom from most of the more injurious potato viruses and diseases; and the main parameters of such a relationship are already established through the Agrico–Glens of Antrim

partnership, which has had positive effects on the performances of the farmers who are involved in supplying, or growing for that business.

4.7.3.1 However, it could lead to a situation in which control of the sector would effectively pass out of the hands of local producers and where Northern Ireland would become primarily a location for breeding new varieties, which would be propagated elsewhere.

4.7.3.2 Nevertheless, it should be possible to negotiate a deal, whereby Northern Ireland's protected status would be used in propagating some of the new varieties being introduced to the international markets. On that basis, such relationships should be encouraged.

4.7.4 Developing stronger links with the Republic of Ireland, with which Northern Ireland shares a land frontier, is clearly a possibility. At present, new varieties bred in the Republic are being multiplied in Scotland; some of that business could be diverted to Northern Ireland, provided the issues of trust, small ware, multi-generation seed etc. were resolved. With almost one thousand potato farmers in Northern Ireland, it is unlikely that those involved in the potato sector in any other jurisdiction would accept the trustworthiness of all growers in Northern Ireland; but if the relationships were to be restricted to the top fifty, or even one hundred, growers, the probability of a mutually satisfactory working relationship would be increased. At present, there is no strategic, cross-border relationship in the potato sectors on the Island of Ireland (as one of the most influential people in the industry pointed out during the consultations).

4.7.4.1 A relationship between the sectors North and South of the Border could produce some economies in areas such as the monitoring of plant health (even taking cognisance of the responsibilities of the individual governments under European Union legislation and directives), inspections, certification, disease research, marketing and promotion, minituber research and development, variety testing and plant breeding. Of these, the benefits in the areas of marketing and promotion, breeding and disease research could be very

significant. Therefore, this option could be recommended by DARD for consideration and advancement by the relevant statutory agencies, North and South of the border, especially the various agencies involved in agriculture (particularly potato-farming) on both sides of the border.

4.7.5 Finally, the issue of maintaining the *status quo* i.e. continuing to have the potato sector in Northern Ireland operate entirely independently of other economies, has little to recommend it, other than the fact that resistance to change is endemic in most traditional businesses. The reality is that the potato sector in Northern Ireland is in the process of dying, with that process being decelerated by the activities of the main packers, who have succeeded in improving agronomy standards, reducing market uncertainty and lowering the risk for their growers. But continuing to farm potatoes, in the way in which it has been happening heretofore, will have hugely negative effects on the sector.

4.8 Realistically, therefore, there are three strategic options open to DARD in relation to attempting to achieve scale benefits by linking with bigger producers viz. to establish formal relationships with a country in Mainland Europe (e.g. The Netherlands or Spain), or with the Republic of Ireland, or both.

4.9 One further strategic dimension needs to be addressed i.e. whether DARD should focus its activities and its expenditure more narrowly, given the proportion of potato farmers who are farming very small areas of land. Many small farmers can plant only very small areas with potatoes because of the need to fallow the land in the interests of plant health and hygiene, or because most of their land is being used for other types of farming. The issue for DARD is whether it should consider potato farming as a unitary sector, or devote whatever discretionary resources it has to those with the most potential to make a real difference, and/or to those in specialist areas which have the potential to contribute significantly to the progress of the sector (e.g. to mini-tuber cultivation).

4.9.1 There is little doubt that the farming organisations would wish to protect, in so far as that is possible, the livelihoods of all farmers. But in a situation where 30% of potato growers have less than one hectare under cultivation and 70% plant less than five hectares at an average of 1.51 hectares each, it is clear that not all potato farmers depend on this activity for their livelihoods. As one interviewee put it quite graphically, there are *"..too many small potato producers with big milk herds...!"*. When this is coupled with the number of farmers who do not get their soil tested regularly and who do not change their seed annually, there is a large cohort of potato farmers whose real contribution to the sector's development and progress is minimal.

4.9.1.1 However, there are many bigger farmers whose livelihoods are entirely dependent on potato growing; sixty two of these grow more than twenty hectares each at an average of forty-three hectares per grower and the top ten accounted for one-sixth of total output in 2003. From these figures, it is clear that there are about fifty farmers who are crucial to the future of this sector, with perhaps another fifty with the potential to make a serious contribution, if they could be encouraged and assisted in expanding their scale of operations. The choice is whether to concentrate on these bigger farmers or to leave the entire sector as it is at present and spread support more thinly; the latter option will involve a considerable proportion of effort and support being invested in several farmers who will have left the sector within the next five years, whatever happens in terms of government policy. The experience in the Republic has been that it has proved easier to persuade the bigger, more serious producers to comply with agronomic, health and marketing protocols, and that is likely to be true in Northern Ireland as well.

4.10 These strategic choices must precede the selection of options in relation to the various headings under which DARD expends its resources in support of the potato sector. The next section of this report contains conclusions with recommendations in relation to each of those areas.

STATUTORY ACTIVITIES

4.11 Implementation of the main statutory activities is carried out by Quality Assurance Branch (QAB) and Applied Plant Science Division (APSD); however, both of these entities have remits which extend beyond potatoes. It is noted that these statutory activities are likely to transfer to the proposed Agri-Food and Bio-sciences Institute (AFBI) with effect from April 2006. Their main potato-related activities include:

- Plant Health Inspections (QAB)
- Seed Potato Certification (QAB)
- Implementation of E.U. Plant Health Regulations, Plant Health Directives and Marketing of Seed Potatoes Directives (APSD through Newforge Lane)
- Surveys of Domestic Production and of Potatoes 'Moving in Trade' to Ensure Freedom from Quarantine Diseases (QAB/APSD)

In total, the statutory components of these activities had an annual cost (inclusive of a proportion of the overheads associated with Newforge) of just over £510,000 in 2003/04.

4.11.1 Since all of the above activities are statutory, they must be continued for as long as potato farming continues in Northern Ireland. Based on data provided by QAB, out of a total of thirteen person-years in the inspection and certification side of the Branch, about ten relate directly to potatoes. The only issue in relation to these activities is one of scale – should current staff members be increased, reduced or remain static. Clearly, the option of increasing numbers in these activities would be difficult to defend.

4.11.1.1 In the case of Newforge, much of the work being done there is also statutory, though part of it is non-statutory research. The non-statutory part – advisory services, PCN research, potato disease research and research into potato mini-tuber production - cost about £220,000 (inclusive of some Newforge overheads) in 2003. Again, the options relate to scale and, in this case too, it would be difficult to justify any real increase in the level of expenditure.

POLICY ACTIVITIES (Incorporating Activities at CAFRE's Greenmount Campus, Support in Areas Like Supply-Chain Management and the Collection and Publication of Statistical Data

4.12 Between them, support services provided to the potato sector by QAB and APSD account for more than £1.04 million of the total annual expenditure (currently estimated at approximately £1.1 million); the balance of the Department's total expenditure on this sector, accrues from three sources:

- Policy Branches (including both Farm Policy Branch and Environmental Policy Branch);
- Co-ordination and Publication of Statistical Data; and
- Activities Conducted at CAFRE's Greenmount Campus, as well costs expended on Service and Support to Supply Chain Management Activities.

Individually, none of these is particularly costly and they do not affect the broad thrust of this report.

4.12.1 The co-ordination and publication of statistical data on potatoes is largely integrated into the publication of other data, with the exception of the annual *'Northern Ireland Register of Pre-Basic and Basic Seed Potato Crops'*. Since these are covered by European Union requirements and are necessary in the interests of transparency in relation to QAB's inspection and certification role, they could not easily be reduced. Accordingly, no recommendations for change are made in relation to the collection and publication of statistical data.

4.12.2 Similarly, the potato-related activities at Greenmount (the CAFRE Campus) in relation to education, training and technology adoption / transfer are part of a wider programme of human resource development for the entire agricultural industry. There is neither financial nor strategic advantages to changing these fundamentally; they cost very little in marginal terms; if any case needs to be made for changing them, it would relate primarily to encouraging farmers to make more use of the courses and advice which are being provided. Should this sector start to expand and create exports, it might become necessary to invest more in this area / these areas.

4.12.3 Precisely, the same comments apply to the supply-chain management activities, currently being funded by the Department. In the consultations, these were highly praised, but unfortunately, farmers are making far too little use of them and have not yet recognised the need to become directly involved in applying the principles to their own activities. Again, if opportunities for increased exports of potatoes became feasible, it might be necessary (or, at least, possible) to justify increased expenditure on these areas.

4.12.4 Finally, in relation to Policy Branch, virtually all of the costs are personnel related. Until decisions are made and implemented in relation to the recommendations in this report, it would not be possible to suggest changes in this section of the Department's activities; potatoes represent only a small part of those. However, if the sector continues to decline, the investment of time, effort and resources on policy relating to this crop should ultimately decrease too.

SUMMARY

4.13 The foregoing analysis of the options available to DARD and the wider potato sector in Northern Ireland, resulted in a number of options which were deemed realistically feasible. The next section of this report includes some further analysis of those options, together with a series of recommendations on those and allied areas.

CONCLUSIONS AND RECOMMENDATIONS

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 In assessing the value and relevance of DARD's support for the potato sector, ultimately it becomes necessary to evaluate the advantages and disadvantages of the different options and to recommend an integrated approach to the future of potato production in Northern Ireland. That is what is included in this section.

5.2 Paragraph 4.3 *et seq.* contains an analysis of the strategic issues and options relating to the breeding of new varieties and the role of the Department's facility at Loughgall. The primary conclusions from that analysis are that:

(i) the production of new varieties is crucial to the future of both the ware and the seed sectors in Northern Ireland – especially the long-term future;

(ii) relative to, for example, The Netherlands, with its much bigger potato trade, Loughgall has been very successful in producing new varieties which have been accepted on the National List – in fact, Loughgall has been producing more new varieties, in absolute terms, than are being produced in The Netherlands;

(iii) possibly too much emphasis has been placed on the agronomic and disease-resistance characteristics of new varieties, at the expense of market needs and trends;

(iv) potato breeding should be aimed at both the domestic and export markets, and should be supported by investment in marketing any varieties selected for commercialisation; and

(v) Loughgall's potato breeding would have generated significant revenues, had the royalties / breeder's rights not been hypothecated initially to the National Seeds Development Office and later to PBIC (Cambridge).

However, the Department's net annual expenditure on Loughgall, at £250,000+ (c/f paragraph 2.21.5), was deemed to be high relative to the size of the seed potato sector in Northern Ireland, though it was accepted that extraneous factors (e.g. the mistrust which exists throughout the sector, largely

as a result of farmers finding ways to avoid paying royalties etc.) have affected the extent to which Loughgall's varieties have had national and international success. Furthermore, the fact that many of the varieties bred at Loughgall are owned by companies, which are not prepared to make them available to Northern Ireland growers, has impacted negatively on local perceptions of this facility.

5.2.1 The realistic options available to DARD in respect of Loughgall's operations were reduced in the analysis to the following three:

- a phased reduction of funding for a potato-breeding programme;
- funding only the strategic components of a potato breeding programme;
- allowing Northern Ireland to become a location for the propagation of varieties bred elsewhere.

Total cessation of potato breeding activities would have a very traumatic effect on the sector, including creating massive problems for packers (and possibly for processors too) in the future – though some might not recognise that yet, although they are conscious that they cannot compete on price with English packers; in that event, they will need new varieties, with which to compete. Equally importantly, in the long term, closure of the potato-breeding programme would spell the effective closure of the NIHPBS at Loughgall (in the medium term, if not sooner) as well as the end of a major crop growing sector in Northern Ireland (in the long term), apart from the possibility that some farmers could survive by negotiating growing contracts with overseas potato businesses and a limited number of 'farm gate' or 'roadside' operators might also survive.

5.2.2 The overall conclusion from the various analyses summarised in paragraph 4.5 *et seq.* is that the potato breeding programme must become more commercial and less of a drain on public/Departmental funds; however, there is a continuing need for some strategic breeding too and that will require greater 'hands-on' involvement by DARD in determining levels of expenditure on this element of NIHPBS's activities, and the strategic aims and direction of what is done at Loughgall e.g. breeding for resistance to specific disease or viruses, or

for particular commercial characteristics etc. In addition, if continuing expenditure on the production of new varieties is to be justified in Northern Ireland, there will have to be a more professional and better-funded approach to marketing these new products, both domestically and in export markets.

5.2.3 NIHPBS already has contracts with three organisations for the crossing and breeding of new varieties, though one of these is about to expire. These contracts should be completed; they represent the best chance of survival as viable operations, for some of the entities involved. Furthermore, Loughgall should be negotiating new contracts and generally adopting a more commercial approach to generating revenue from what it is doing. That should include negotiating contracts through which they get fixed payments for work done, plus some commission based on the success of new varieties planted by the commercial partner (MBM, PPNI, Agrico etc.) to whom the 'head' royalties or breeder's rights would be payable. Participation in the distribution of the rights to new 'protected' varieties is crucial to the justification of continued expenditure on potato breeding in Northern Ireland, though there may be some resistance from the commercial partners to this – if so, that will have to be addressed positively.

5.2.4 Accordingly, the recommendations arising from this part of the overall analysis are as follows:

Recommendation 1: **The NIHPBS at Loughgall (through Environmental Policy Branch) should negotiate commercially-focussed contracts with a number of organisations (instead of a single main contract) and should divide the overall quantum of its crossing and breeding work over those contracts, adjusting 'reduction rates' so that a realistically feasible number of varieties is produced for potential commercial multiplication under each contract, by the seventh or eighth year after initial crossing.**

Recommendation 2: **In negotiating contracts with potential commercial partners, NIHPBS (through Environmental Policy Branch) should ensure that most of its breeding work will be focussed on the British, Irish and European markets.**

Recommendation 3: **As part of its contract negotiations with any potential partner, NIHPBS (through Environmental Policy Branch) should try to ensure that such a partner has sufficient networks and resources to exploit fully the potential of any new variety and to support it with the necessary marketing investment; it should also try to ensure that the possibility of multiplication in Northern Ireland was not being precluded by the commercial partner, even if any particular variety was to be made available to a select number of trusted growers only.**

Recommendation 4: **DARD should continue to support an element of strategic breeding at Loughgall, to be undertaken to DARD's specifications, following agreement with NIHPBS, but DARD's contribution to any strategic component of Loughgall's potato-breeding activities should reduce progressively over time, starting at 80% of the cost of Loughgall's potato-breeding programme in 2006 and reducing by 10% *per annum* over the following five years; if by the end of 2010, the programme is not generating enough commercial revenue to cover at least 45% of its costs, the programme's performance and future, and the contributions (both monetary and non-monetary) of the individual commercial partners, should be reviewed afresh by DARD.**

These recommendations, when taken in tandem, imply that, in negotiating future contracts, the 'cost recovery' basis, used heretofore, will have to be revised to include an element of fixed overhead and a margin for profit; alternatively, a bigger share of the breeder's rights will have to be negotiated. (Note: The nature of 'strategic' breeding and the Department's role in specifying the parameters for are outlined in paragraphs 2.21.1 and 2.21.1.1.)

5.2.4.1 As suggested in Recommendation 3 above, it will be important that, in negotiating contracts with commercial partners, some provision is included for at least limited opportunities for growers who are prepared to apply appropriate, state-of-the-art, agronomic protocols, to be given a chance to multiply the new varieties in Northern Ireland, subject to whatever penalties may be agreed for imposition on those who abuse this privilege. That will not satisfy all farmers and there will be some criticism of both Loughgall and

DARD, but those who fail to secure such rights will have to be informed of the reasons why they are excluded from whatever growing group, or scheme, the contractor selects and/or wishes to operate, and of the need to improve their agronomic protocols.

5.2.5 With the continuation of the breeding programme, there will also be a need for an on-going trialling programme. Currently, that is being undertaken at Crossnacreevy, though, ideally, breeding and trialling should be on adjacent sites. However, given that Crossnacreevy is established as Northern Ireland's main centre for trialling for a wide range of crops and for many potato varieties other than those produced at Loughgall, there would be little benefit from disrupting the current position. Therefore, no recommendation for change in this respect is made, though, in common with all other areas where expenditure occurs, costs should be closely monitored there too.

5.3 In terms of formal relationships with other countries, or attempting to create economies of operation and scale through appropriate linkages, the realistic options were reduced in the analyses (paragraphs 4.7 *et seq.* and 4.8) to three: formal links with the Republic of Ireland and links with a European country – probably The Netherlands (or possibly Spain) – or both.

5.3.1 There is potential for benefit through a formal cross-border relationship for the potato sector; it is in the interests of both parties that the other should maintain its virus-free, disease-free health status in respect of the quarantine diseases, that common standards of inspection and certification (in accordance with relevant E.U. directives) should be applied, that any research into disease prevention and control should benefit both, that there should be no duplication of other research activities, that marketing and promotional activities should be complementary rather than oppositional, and that any economies which could be achieved in crossing, breeding and trialling should not be missed. (Note: The certification system in Northern Ireland is seen internationally as being of a higher standard than that in use elsewhere, including in the Republic).

5.3.1.1 The fact that the two areas both export and import potatoes, should produce some opportunities for mutual benefit and such opportunities should be exploited; for example, farmers in the Republic import seed from Scotland, some of which could be bought from Northern Ireland, though not all the Republic's imports could be sourced from the North, because of the unavailability of certain varieties there.

5.3.2 On the basis that it would benefit the broad potato sector in both jurisdictions, the following recommendation is made:

Recommendation 5: **DARD should pursue, with the Department of Food and Agriculture in the Republic, the potential for mutual co-operation and economies of operation in the areas of inspection, certification, research, marketing and promotion, variety development and cross-border trade, for both seed and ware, in the potato sector.**

Recommendation 6: **DARD should pursue, with the Department of Food and Agriculture, the potential for co-operation and joint operations between An Bord Bia and relevant agencies in Northern Ireland (INI etc.) in creating an Island-wide approach to the promotion and marketing of potatoes and their related down-stream, value-added products, in both local and international markets.**

5.3.3 Northern Ireland, or indeed the entire island of Ireland, does not have a major network of agents through whom to sell into overseas markets, nor could they afford to create such a network. Nevertheless, the strengths, which the sector in Northern Ireland possesses, should have value in many places. With a good range of good varieties, some consultees were of the opinion that Northern Ireland could offer a strong challenge to the Dutch in the British market, in North Africa, in the Baltic States, in Eastern Europe and, possibly even, in Spain, for seed. It was accepted that it could not compete effectively in some of those markets for ware; for example, it was acknowledged that Northern Ireland could not compete with Hungary for ware in Mainland Europe, but because of its better health status, it could compete successfully for seed.

5.3.3.1 Unfortunately, it has no structure of agents, representatives, merchants or networks through which to gain entry to those markets. Accordingly, it is recommended here that:

Recommendation 7: **The Northern Ireland potato sector should, in conjunction with DARD, develop marketing and distribution partnerships with major European players (especially European companies, with which it negotiates breeding contracts) who could secure sales for Northern Ireland seed potatoes in parts of Europe and outside Europe, under such an arrangement that some propagation would occur in Northern Ireland, with carefully selected and trusted growers, and that commission on varieties bred in Northern Ireland would be returned to the breeder in Northern Ireland.**

5.3.4 Based on the analysis in paragraphs 4.9.1 *et seq.*, it is clear that not all potato farmers treat their industry totally seriously. Clearly the bigger ones do – the livelihoods of most of them are entirely dependent on their success in growing and selling potatoes - and, based on the experiences in the Republic, it is much easier to secure implementation of hygiene and health protocols and of good agronomic practices from the bigger, more professional growers. That applies equally in Northern Ireland (though there are, inevitably, some exceptions in both size categories).

5.3.4.1 On the basis of the experiences in other countries and the huge size disparities which exist in this sector in Northern Ireland, the following recommendation is made:

Recommendation 8: **DARD should concentrate its resources and its support for the potato sector on:**

- **the one hundred (or so) farmers who currently plant at least forty hectares of potatoes annually or who could be persuaded to increase their propagation to that level,**
- **the top quartile of seed producers, and**
- **any strategically-important specialist operators,**

whilst maintaining, among all growers, the inspection, certification and marketing standards devolved to it by European Union directives and national legislation.

5.3.5 Based on the analyses in paragraph 3.3.4.1, it is clear that the current levy system has, at best, very limited value; in fact, in terms of the relationship between the farmers and the Department, it has a negative impact. In a situation in which DARD decided to concentrate its resources on those farmers with the capacity to make a real difference to the sector, a general levy would probably meet with strong resistance and could be used as 'a stick with which to beat the Department' by those who might be considering leaving the industry in any event. Furthermore, in the event of the introduction of a 'pooling' approach to potato growing and marketing, a different form of levy will probably exist; two such levies could act as a disincentive to continued participation in this sector. Accordingly, the following recommendation is made:

Recommendation 9: **DARD should now undertake a zero-based analysis of the current levy scheme, with a view to abolishing it entirely, or to establishing a new levy system for the farmers who continue to receive support under whatever new dispensation is implemented, following consideration of this report.**

5.4 Quality Assurance Branch invests about ten person-years in the various activities it undertakes for the potato sector annually. That figure has been reducing over recent years, but the current state of potato farming in Northern Ireland suggests that further reductions are both necessary and inevitable. Accordingly, the following recommendation is made:

Recommendation 10: **In light of the continuing decrease in the sector, Quality Assurance Branch should reduce the staffing cohort devoted to the potato sector by 20% of its current level (i.e. to eight person-years) by the end of 2007, whilst maintaining the standards it currently applies to its inspection and certification activities.**

5.5 In the case of Newforge, the overall level of expenditure is high, at well over £200,000 for non-statutory work alone, with a further £100,000 for statutory work. Given the decline in the sector, DARD should be looking to secure some reduction in those costs. Therefore, the following recommendation is made.

Recommendation 11: **DARD should review, from zero-base, with Newforge, the need for, and cost of, the services currently being provided from there, with a view to effecting economies which would reflect the changed level of activity in the sector, whilst taking due cognisance of the statutory need to protect Northern Ireland's health status in relation to potato farming.**

5.6 CAFRE, at its Greenmount Campus, has access to the skills needed to raise the standards of agronomy and the broad appreciation of growers' roles in the overall potato supply chain. It also has access to benchmarking data, which would demonstrate to Northern Ireland potato growers how their efficiency could be improved and what benefits would accrue from better marketing and the provision of better service to customers. That provides an opportunity for the growers, but it also provides an opportunity for DARD to make a useful intervention in encouraging improvements in potato farming and potato marketing. Against that background, the following recommendation is made.

Recommendation 12: **DARD, through its staff who are in direct contact with potato growers (especially those at CAFRE's Greenmount Campus and those in Supply Chain Management), should encourage increased use of the Department's expertise in agronomy, bench-marking, supply chain management, marketing and technology transfer, by the cohort of growers on which it proposes to concentrate its support, through making courses and advice available to those growers; it should also promote the need for growers to reduce their costs to levels which will make them competitive with growers elsewhere; and DARD should set five-year performance targets for these activities, so that failure to achieve reasonably feasible improvements will result in reductions in the resources allocated to those activities.**

5.7 Two other areas of need were identified during this assignment; firstly, there is clearly an issue in relation to the short shelf-life of both potatoes themselves (some of which have particularly short shelf-lives e.g. Maris Piper) and some of the down-stream products. While the latter is essentially a processing issue, both need to be addressed. Secondly, enough evidence was produced during this assignment to indicate that the potato-breeding programme operated by the NIHPBS has suffered because of inadequate investment in the marketing of its output. That too needs to be addressed in the future. Therefore, the following three further recommendations are made:

Recommendation 13: **DARD, through its contacts with educational and research bodies, should promote and support the concept of research into how the shelf-life of potatoes and potato-based products could be extended.**

Recommendation 14: **DARD should prepare plans to ensure that any potentially successful new varieties emanating from the strategic breeding programme, which it supports, will be complemented by adequate marketing, even if that were to involve the sale of some specific varieties to private sector businesses with the requisite marketing skills and financial resources.**

Recommendation 15: **DARD's strategy for the marketing of Northern Ireland's potato output and for the marketing of any down-stream products from potatoes, should involve co-operation with the sector in the Republic of Ireland, and the implementation of such a strategy should be facilitated and supported through appropriate cross-border entities.**

5.8 Finally, it is clear from the foregoing analyses that DARD's support for the potato sector is spread over a very wide range of different delivery entities. A number of these have clear statutory remits; others have mainly discretionary roles. But the range involved suggests that real and realistic co-ordination has to be difficult. On the other hand, the potato sector cannot be treated entirely differently from other sectors, especially from other arable crops, for the purpose of governmental support.

5.8.1 Nevertheless, there is a need for some greater co-ordination, so that the benefit of whatever support is available to this sector can be maximised. Accordingly, the following recommendation is made:

Recommendation 16: **Farm Policy Branch should immediately undertake an assessment of the organisational implications of appointing a person to co-ordinate the delivery of its statutory responsibilities to the potato sector and its overall support for that sector, and, in the absence of seriously negative implications, should make such an appointment.**

5.9 The foregoing conclusions and recommendations have been drawn from the analysis of the literature and the evidence collected during the consultation process, and are submitted to DARD as essentially a strategic approach to the issues arising from the Department's expenditure on the potato sector. However, this submission is made in full recognition of the fact that any major improvement in the performance of this sector must be created by the growers themselves; DARD can only facilitate any such improvement, but it should make this, possibly final, further attempt to maintain a viable potato sector in Northern Ireland and that will require additional investment by the sector itself, as well as the support of DARD.

CLOSING COMMENTS

6.0 CLOSING COMMENTS

6.1 This report provides a summarised analysis of the current state of potato farming in Northern Ireland. It describes a sector, which is declining rapidly, as it is in many other parts of Europe – not least in the rest of this Island. The most significant difference in relation to Northern Ireland is that it had, and has lost, a major export business, especially in the seed sub-sector.

6.2 Those losses of export markets have come at a time when consumption of potatoes, both nationally and internationally, is in serious decline; without adding value to potatoes, that decline is likely to continue. Against such a background, there is a need for the highest standards and the most competitive costs in production and marketing (and in processing too, if it wants to add real value to potato production – though the prospects for an internationally competitive processing business in Northern Ireland are not good).

6.3 The current reality is that, in production terms, the general standards of agronomy, would need to improve dramatically (though there are high standards among some farmers who produce on contract). The current high proportion of potato farmers who plant only small acreages, many of whom would qualify as 'hobby farmers' (as far as this sector is concerned) militates against rapid progress on that front. Potato farming is fast becoming a professional business and the sector in Northern Ireland has too many players who are not geared towards a professional approach to growing potatoes, nor to the implementation of the necessary agronomy protocols.

6.4 From a marketing perspective, this sector has failed to harness one of its greatest strengths – the high health, disease-free status applicable to Northern Ireland; maintenance of that status is partially dependent on the Republic's being able to remain free of potato diseases too, because of its close proximity and the common land boundary. But the sector has also failed to develop an integrated approach to its overall supply chain, where farmers would begin to see themselves as the first link in a chain that stretches from the potato field to the consumer's table. The current systems of marketing and distributing

potatoes in Northern Ireland have not worked, in that respect; consumers' needs have not been communicated effectively to the producers, who view themselves as producers of a 'commodity product' – not the best way to develop a profitable and viable sector.

6.5 It would be easy, in such circumstances, to decide to abandon potato farming entirely, or for DARD to conclude that any further support would effectively be 'throwing good money after bad'. What this report suggests is that the strengths and the potential of this sector are too good to waste – albeit that they have both been wasted, or mismanaged, in the past. There could be a future for potato farming in Northern Ireland, with a more professional approach to production and a more sophisticated approach to marketing.

6.6 That applies particularly to the seed sub-sector, where the demands of customers, in respect of agronomy, service, quality, delivery and regular introductions of new varieties, place on-going pressures for continued good performance. Meeting those demands and using Northern Ireland's preferential health status as a real advantage in recovering markets, which have been lost, and in penetrating new markets, will require a new 'mind-set' on the part of the industry here.

6.7 There is no guarantee that the necessary attitudinal changes will be forthcoming. Neither is there any guarantee that Northern Ireland will be capable of meeting the market's (current and probable future) demand for regular introductions of new varieties with specifically required attributes. Without both of those, this industry is destined for total collapse, in the relatively short term; to that extent, the proposals in this document involve an element of risk. The basis on which this report has been produced is that the capacity is there to meet both those challenges successfully; but both will involve major changes in the way in which this industry is operated in the future, as compared with the position to date.

APPENDICES

APPENDIX 1

TERMS OF REFERENCE

DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

TERMS OF REFERENCE FOR A REVIEW OF SUPPORT ARRANGEMENTS FOR SEED AND WARE POTATO SECTOR

The Department of Agriculture and Rural Development (DARD) wishes to commission an external consultant / contractor to undertake a review of DARD support arrangements to the potato sector.

Purpose / Objectives of Review

2. The purpose of the Review is to provide DARD senior management with an independent and objective assessment of current arrangements and make recommendations about future support arrangements.

Terms of Reference for the Review

3. The Review will be carried out within the following Terms of Reference:-

- To analyse the present contribution of the seed and ware potato sector (production and processing) to the Northern Ireland economy, assess those factors likely to influence seed and ware potato production in Northern Ireland over the next five years, and forecast the potential contribution of the sector for that period;

- To assess the impact of existing DARD support to the potato sector and consider the future needs of the sector for administrative, technical and financial support (including advisory, educational, technical and research and development services);

- To make recommendations, with forecasts of the likely implications for the potato sector, for changes in DARD policy with respect to the future provision of support to the sector.

Requirements

The Review will examine the current policy and operational responsibilities (statutory and otherwise) for the totality of the Department's support arrangements to the potato sector, in light of developments that have impacted on the Department's support arrangements to the potato sector (both seed and ware). The Review will assess the need for the present level of support provided by DARD, whether or not it provides value for money, and make recommendations as to whether the current arrangements should be maintained, strengthened, reduced or suppressed. This will require the contractor to conduct an in-depth examination of current support arrangements to the potato sector (including policy, inspection, advisory and research and development).

This will involve liaison with officials in various DARD Divisions/Branches to establish legislative and other baseline information pertaining to current support arrangements within the potato sector. The Contractor, in

conjunction with the appointed Steering Group / Liaison Officer will also consider the need to consult with relevant key industry players / interests on the necessity and value placed on the range of support services currently provided. It is emphasised however, that the Review process to be undertaken by the Contractor must be independent, objective and critical in its examination and assessment of the key areas of DARD support for the potato industry.

Outputs / Reporting / Timing

6. Following the award of the contract to the successful tenderer, the appointed contractor will be required to contact a designated officer within DARD Farm Policy Branch to set up a meeting to discuss and agree arrangements for carrying out the contract. This will be followed by the submission by the contractor of an Inception Report document that will provide detailed information on the agreed action for each stage of the contract.

7. Within 6 weeks from the commencement of the contract period the Contractor will be required to submit to the Department, a 1st draft of the Review Final Report which should be succinct and focussed on analysis. This will outline the work undertaken on all the objectives. The draft Report should also:

- map out the totality of the Northern Ireland potato sector supply chain from potato breeding through to the end consumer, taking account of its component sub-sectors and including all baseline information on, for example, the legislative base, current schemes and services etc.
- identify the industry's current baseline, especially in economic terms (including turnover and employment) and in terms of the relationship between economic and other factors
- outline the contribution of the potato sector (production and processing) to the NI economy
- detail data sources and original research undertaken
- provide a brief SWOT analysis of each of the 2 potato sub-sectors
- present the contractor's proposed conclusions on the above objectives, discuss options for future support arrangements, and make clear and concise recommendations on a future DARD support mechanism for the sector

8. The Department will circulate copy of and consult with the Rural Stakeholders Forum on the draft Review report prior to arranging a meeting between the Contractor and a Departmental Steering Group. The Steering Group will consist of senior officials from relevant DARD and Invest Northern Ireland (INI) policy / service provider Branches / Divisions.

9. It is anticipated that discussion at the Steering Group meeting will centre on the emerging conclusions / recommendations contained in the draft Review final

report and any planned or further work that may be considered necessary on the remaining objectives. Such a Steering Group meeting will take place within 2 weeks from the Rural Stakeholders Forum official response deadline date.

0. Subject to completion by the contractor of any action/s resulting from the Steering Group meeting, the contractor will submit a final draft report within 1 week of the meeting with the Steering Group. This will contain an Executive Summary.

1. Subject to the Steering Group's clarification / acceptance of, and any amendments which may be agreed, regarding the content of a final draft report, the contractor will provide 6 copies of the completed final report on the Review of Support Arrangements for the Seed and Ware Potato Sector within 1 week of approval by the Department of the final draft.

2. The contractor will also provide one copy of each report on compact / floppy disk compatible with DARD systems and conforming to Microsoft Word, with any spreadsheet data in Microsoft Excel compatible format. Any graphs, figures or maps should be provided in digital format (to be agreed with DARD Farm Policy Branch) and as full colour hard copies.

3. It is anticipated that the assignment will primarily involve consultation with DARD Farm Policy Branch officials, examination of files and relevant Reports as well as any relevant Reviews pertaining to the potato sector,

4. The contract will commence in October 2004.

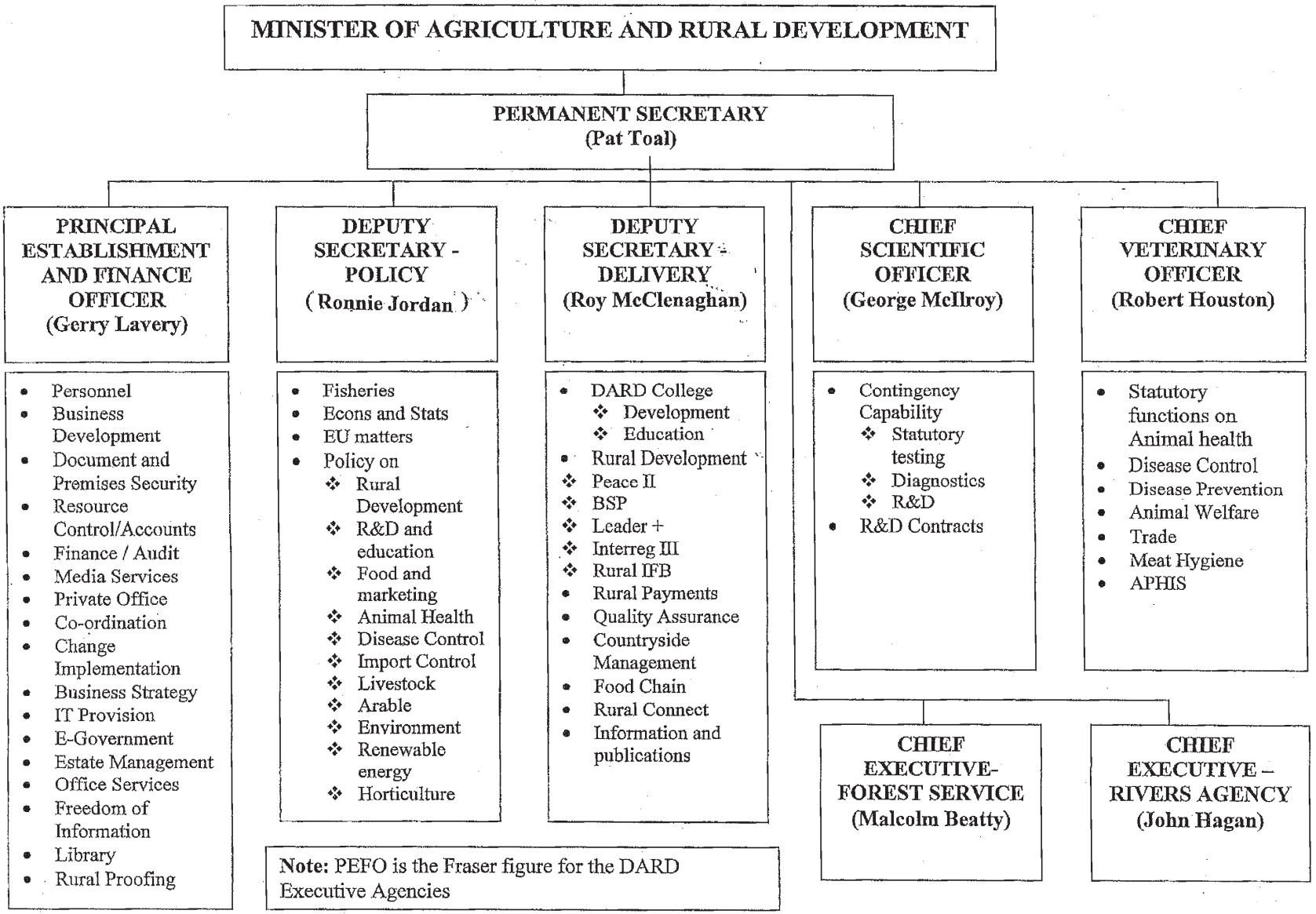
Project Management

5. DARD's Farm Policy Branch will manage the contract on a day-to-day basis. The contractor will manage the project through one named project manager, who will be responsible for the delivery of outputs, and will be the first point of contact.

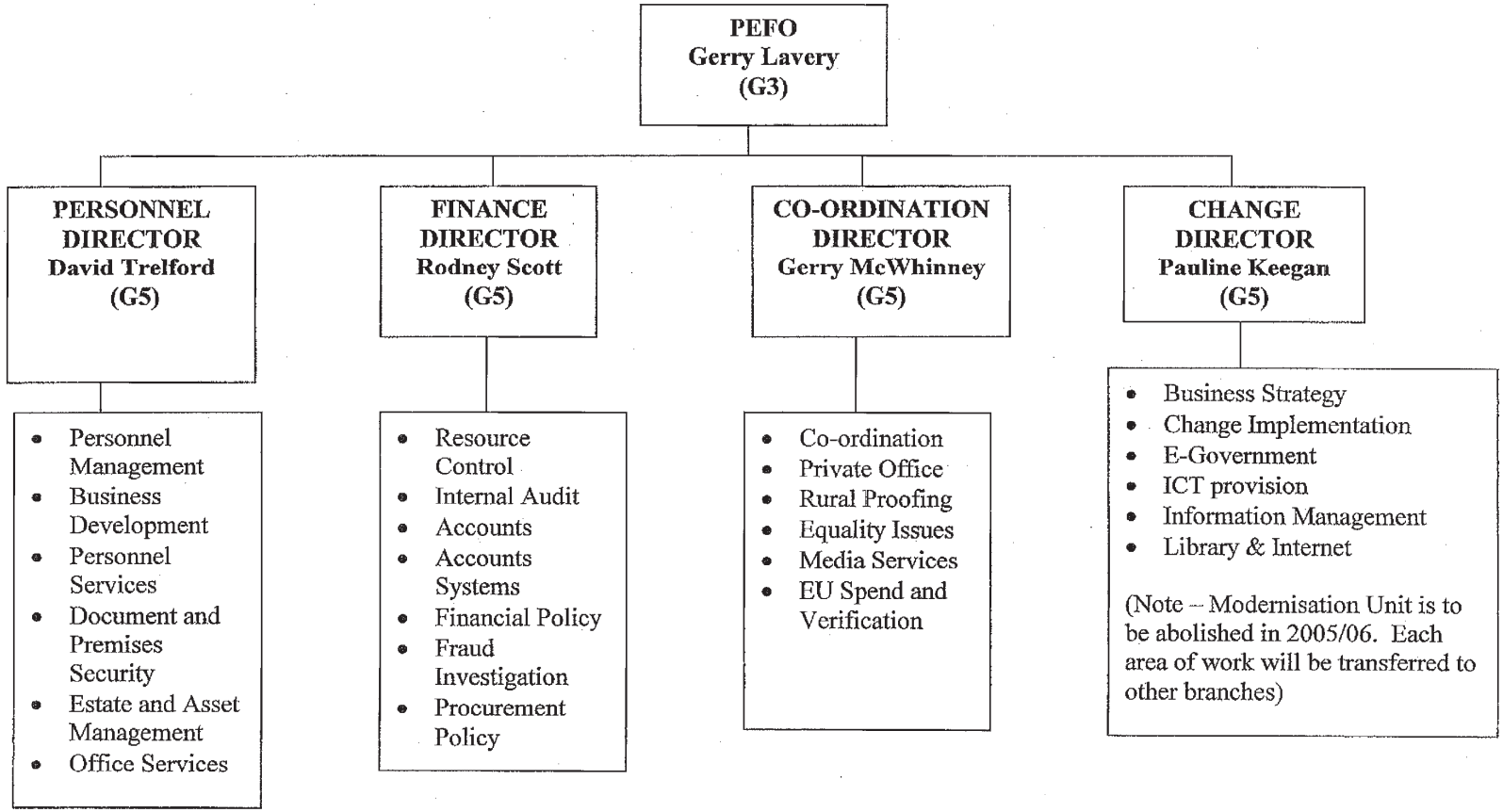
6. As already stated senior DARD officials will act as the steering group for the Review contract. The steering group will act as a sounding board for the interim report and draft final report. Members may also take part in the initial briefing meeting with the contractor.

APPENDIX 2

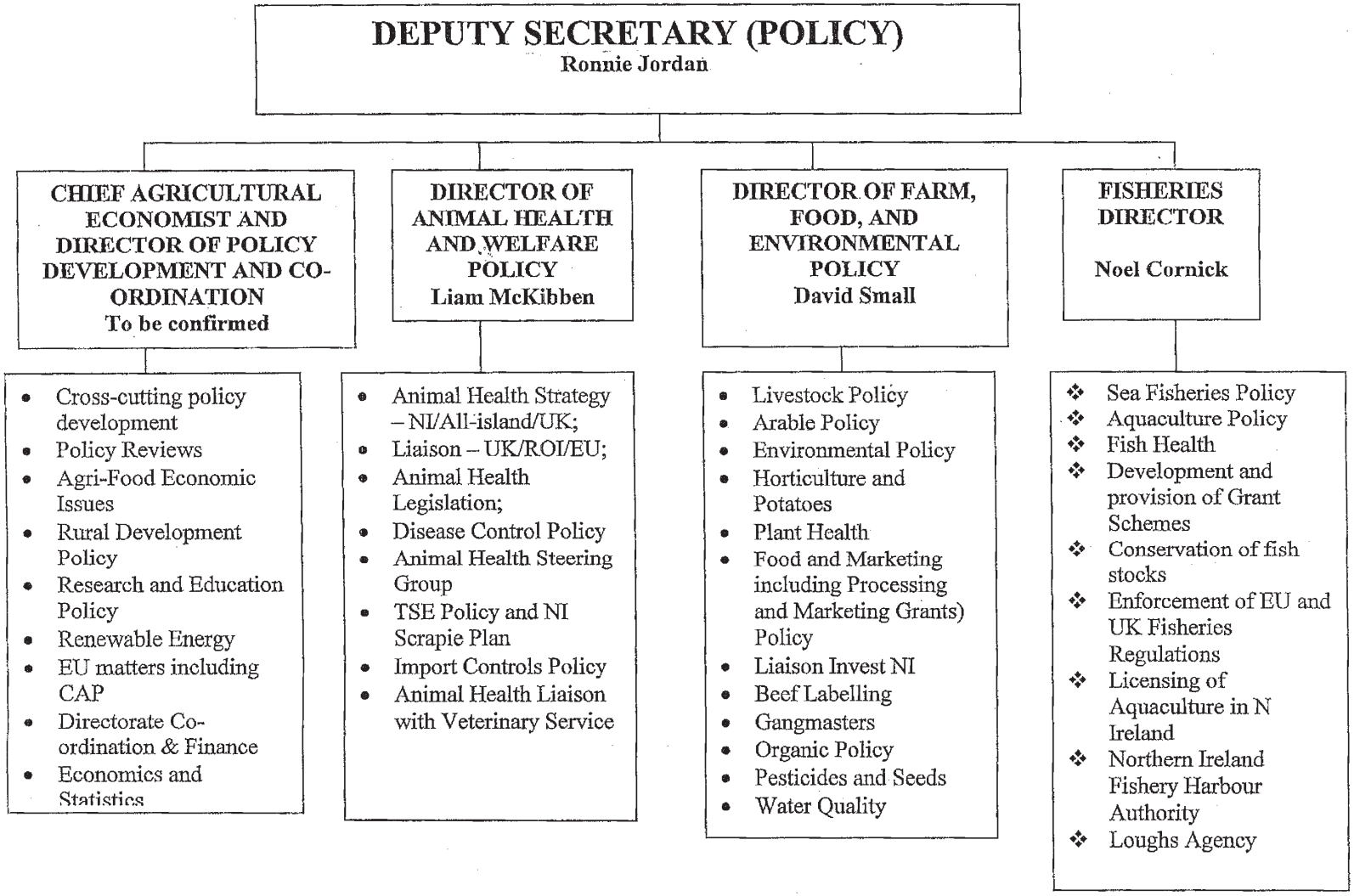
ORGANISATION CHART FOR DARD

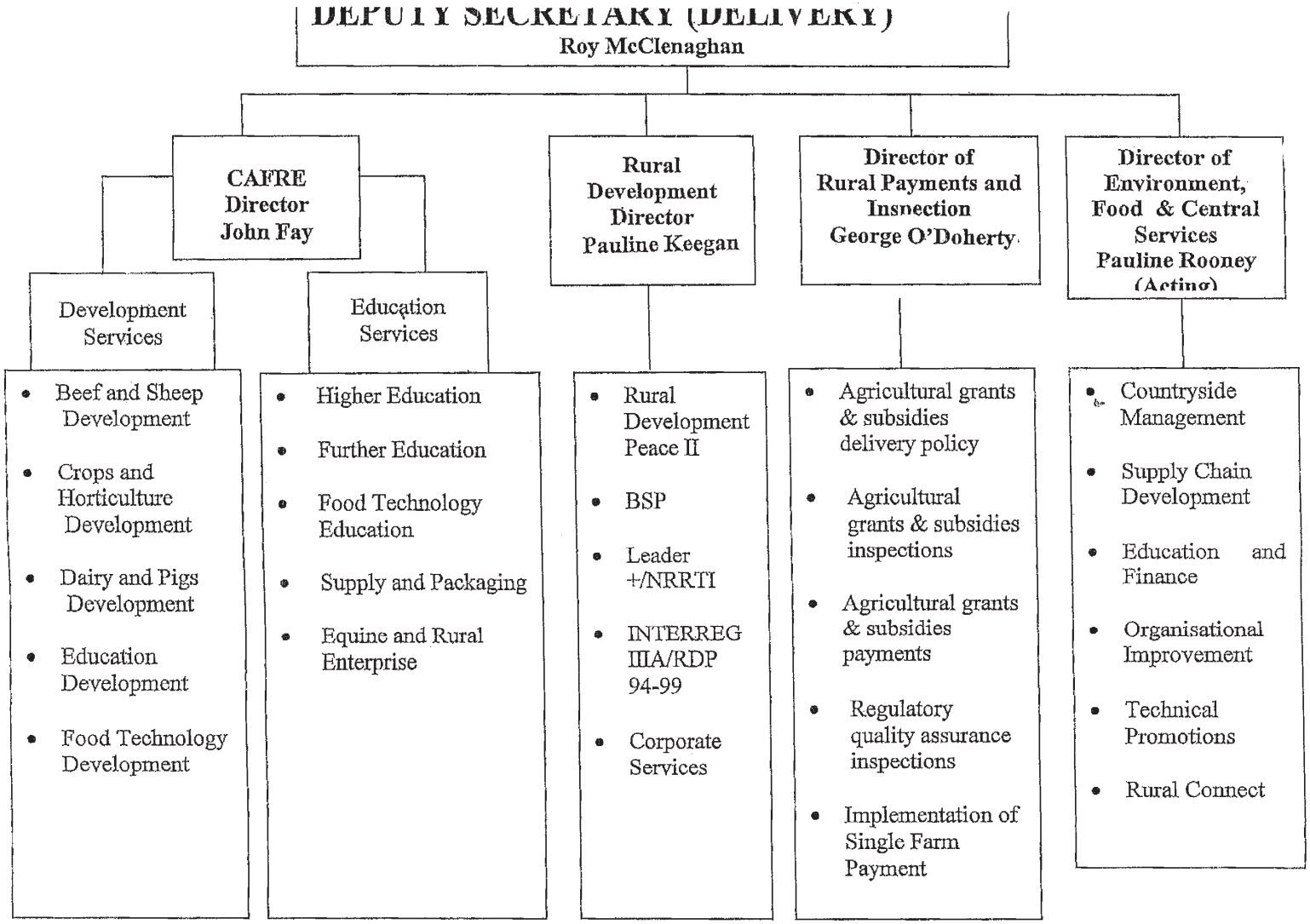


PRINCIPAL ESTABLISHMENT AND FINANCE OFFICER



Note: The PEFO is the Fraser figure for the DARD Executive Agencies (Rivers Agency and Forest Service)


DEPUTY SECRETARY (POLICY)
Ronnie Jordan
CHIEF AGRICULTURAL ECONOMIST AND DIRECTOR OF POLICY DEVELOPMENT AND CO-ORDINATION
To be confirmed
DIRECTOR OF ANIMAL HEALTH AND WELFARE POLICY
Liam McKibben
DIRECTOR OF FARM, FOOD, AND ENVIRONMENTAL POLICY
David Small
FISHERIES DIRECTOR
Noel Cornick
Cross-cutting policy development
Policy Reviews
Agri-Food Economic Issues
Rural Development Policy
Research and Education Policy
Renewable Energy
EU matters including CAP
Directorate Co-ordination & Finance
Economics and Statistics
Animal Health Strategy – NI/All-island/UK;
Liaison – UK/ROI/EU;
Animal Health Legislation;
Disease Control Policy
Animal Health Steering Group
TSE Policy and NI Scrapie Plan
Import Controls Policy
Animal Health Liaison with Veterinary Service
Livestock Policy
Arable Policy
Environmental Policy
Horticulture and Potatoes
Plant Health
Food and Marketing including Processing and Marketing Grants) Policy
Liaison Invest NI
Beef Labelling
Gangmasters
Organic Policy
Pesticides and Seeds
Water Quality
Sea Fisheries Policy
Aquaculture Policy
Fish Health
Development and provision of Grant Schemes
Conservation of fish stocks
Enforcement of EU and UK Fisheries Regulations
Licensing of Aquaculture in N Ireland
Northern Ireland Fishery Harbour Authority
Loughs Agency


DEPUTY SECRETARY (DELIVERY)
Roy McClenaghan
CAFRE Director John Fay
Rural Development Director Pauline Keegan
Director of Rural Payments and Insnection George O'Doherty
Director of Environment, Food & Central Services Pauline Rooney (Acting)
Development Services
Education Services
• Beef and Sheep Development
• Crops and Horticulture Development
• Dairy and Pigs Development
• Education Development
• Food Technology Development
• Higher Education
• Further Education
• Food Technology Education
• Supply and Packaging
• Equine and Rural Enterprise
• Rural Development Peace II
• BSP
• Leader +/NRRTI
• INTERREG IIIA/RDP 94-99
• Corporate Services
• Agricultural grants & subsidies delivery policy
• Agricultural grants & subsidies inspections
• Agricultural grants & subsidies payments
• Regulatory quality assurance inspections
• Implementation of Single Farm Payment
• Countryside Management
• Supply Chain Development
• Education and Finance
• Organisational Improvement
• Technical Promotions
• Rural Connect

APPENDIX 3

ROLES AND RESPONSIBILITIES OF QUALITY ASSURANCE BRANCH

QAB Roles and Responsibilities

Potato Plant Health:

- Plant Health Surveys to fulfil EU requirements. These involve visual inspection and the collection of samples e.g. Ring Rot and Brown Rot, Rhizomania and Colorado Beetle surveys.
- Inspections and sampling of seed and ware imports for Ring Rot and Brown Rot.
- Plant Health inspections for seed and ware growers and for potato processors and packers. These inspections ensure that individual businesses comply with the requirements of the Plant Health Order.
- Ware Plantings inspections to ensure that growers comply with the regulations on planting material.
- Inspections of land that is infested with PCN to ensure that no potato crops are grown.
- Sampling of land previously infested with PCN. Land is sampled 15 years after the initial outbreak and if no evidence of the pest is found the land can grow potatoes again.
- Sampling of land for PCN prior to seed potato production.
- Inspections of land that was previously infested with Potato Wart Disease or land in the Safety Zone around such outbreaks to ensure that only resistant varieties of ware are grown.
- Sampling land previously infested with Wart Disease. If no Wart disease is found then the restrictions on growing potatoes in this land can be removed.

Seed Potato Certification:

- Potato growing crop inspection to classify the growing crop according to the level of virus, blackleg and varietal purity.
- Planting, harvest and storage checks to ensure adequate separation and identification of seed stocks.
- Burning down inspections to ensure the haulm of the crop is destroyed by the Statutory Burning Off date.
- Tuber inspections (sealing) to ensure that the minimum marketing standard for seed potatoes is achieved.
- Inspections of containers and lots for export.
- Production of Phytosanitary Certificates for seed potato lots exported to third countries.

Besides these two main areas QAB is also involved in the following areas;

- Assistance to other DARD divisions e.g. yield digs for Economics and Statistics, collecting data for the Plant Testing station for the recommended potato varieties list, carrying out a potato blight survey for APSD and assistance to Farm Policy Branch.

- Assistance to the potato industry e.g. maintenance of Nuclear Plots, individual guidance to growers, assistance to private potato breeders and participation in the Seed Potato Initiative.
- Inspecting ware for export to non-EU countries such as the Canary Islands.
- Inspections and sampling duties outside of the potato sector e.g. Voluntary Quality Assurance Schemes for Cereals and Oats, surveys for Bee diseases, surveys for the Western Corn Rootworm in Forage Maize and inspections under the Noxious Weeds Order (Northern Ireland) 1977.

APPENDIX 4

LIST OF PERSONS AND ORGANISATIONS CONSULTED and LITERATURE SURVEYED

DARD Potato Review

List of Consultees

(i) **DARD Personnel**

- Deputy Departmental Secretaries (Tony McCusker and Roy McClenaghan)
- Farm Policy Branch (Peter Cassells and John Magee)
- Chief Scientific Officer (George McIlroy)
- Quality Assurance Branch (Wilf Weatherup and R. Coleman)
- Science Service (Mike Camlin and Paul Watts)
- Supply Chain Development Branch (Jim Crummie)
- Environmental Policy Branch (Ian McKee)
- CAFRE (Martin McKendry)

(ii) **Applied Plant Science Division - Newforge**

- Roy Copeland

(iii) **Ulster Farmers' Union**

- Wesley Aston
- Patricia Erwin
- Their Central Potato Committee (Twice)

(iv) **Packers**

- Glens of Antrim (Charlie McKillop)
- Wilson's Country (Angus Wilson)
- Fane Valley (Eric Holmes)
- Glens of Antrim and Agrico (Geert Knottenbelt) (Twice)

(v) **Merchants**

- Jim McCreight, Geoff Conn, James Ringrose and Amanda Laughlin
- Robin Cherry

(vi) **Mini-Tuber Producer**

- Ian Hill

(vii) **Processor**

- Ballymoney Foods (Ben Robinson)

(ix) **Teagasc**

- Leslie Dowling

Northern Ireland Assembly

Appendix 5

List of Witnesses who Gave Oral Evidence to the Committee

List of Witnesses who Gave Oral Evidence to the Committee

1. Mr Noel Lavery, Accounting Officer, Department of Agriculture and Rural Development (DARD);
2. Mr Gerry Lavery, Deputy Secretary, DARD;
3. Mr Seamus Kennedy, Chief Executive, AFBI;
4. Mr Norman Fulton, Director of Policy and Economics, DARD;
5. Mr Kieran Donnelly, Comptroller and Auditor General; and
6. Ms Fiona Hamill, Treasury Officer of Accounts, Department of Finance and Personnel.

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