



EDUCATION AND R&D IN
AGRICULTURE AND FOOD SCIENCE

REPORT OF REVIEW PANEL

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Submissions to the consultation exercise have been placed on the World Wide Web at 'www.agresedreviewni.gov.uk'. Hard copies can be obtained by application to the Secretariat to the Review of Education and Research and Development in Agriculture and Food Science at Dundonald House, Upper Newtownards Road, Belfast BT4 3SB.



CHAIRMAN'S
INTRODUCTION

Dear Minister,

The task which you set for the Review Panel was at once important, challenging and urgent. It is clearly of considerable importance to Northern Ireland because of the significance of agriculture and food in this economy. We approached the review with those considerations very much in our minds.

We would like to stress, at the outset, that we were impressed with the overall standard of provision, the enthusiasm and professionalism of staff and the excellence of teaching and research and development programmes. The Science Service, the Agri-Food Development Service and the Agricultural Research Institute of Northern Ireland can be justifiably proud of their many achievements.

As with all systems which have been in place for some time, there are complexities, traditions and processes which a Review Panel must take time to understand before it can move to drawing conclusions and making recommendations. We were assisted greatly in achieving this understanding by a spirit of co-operation and welcome exhibited by everyone we met. I would like to thank the many members of the Science Service, the Agri-Food Development Service and the Agricultural Research Institute of Northern Ireland for their helpfulness. We are also grateful to the Permanent Secretary, Mr Peter Small, and his senior colleagues in the Department of Agriculture and Rural Development, including Professor Cecil McMurray, Chief Scientific Officer, Dr Bob McCracken, Chief Veterinary Officer and Mr Roy McClenaghan, Chief Agricultural Officer whose willingness to facilitate our work was both generous and open. We were provided with an excellent secretariat – Dr Bernie Stuart, Mr Brian Murphy, Miss Lyanda McFarlane, Mrs Sheelagh McCausland and Mrs Jean Maginnes, whose dedication and professionalism knew no bounds. We are also grateful to Mrs Cheryl Snoddy who undertook the economic appraisal of options with great enthusiasm. All concerned have respected the independence of the Review Panel and the recommendations we make are unanimous and ours alone.

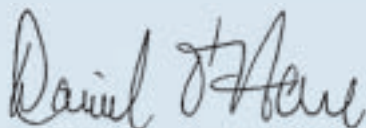
The system which the Review Panel advocates addresses the weaknesses of the current system and puts processes in place which can respond effectively and with flexibility to the changes which are apparent at the moment. Most importantly, our recommended system is sufficiently flexible in its structures and relationships to be able to respond quickly, effectively and innovatively to the many unanticipated changes, needs and threats which will emerge as this decade unfolds. This is, perhaps, the greatest strength of our recommendations and it is with much conviction that we advocate their adoption in their entirety to the people and Government of Northern Ireland.

I should emphasise that the Review Panel is not recommending change for its own sake; rather, our Report contains our best advice as to the steps which should be taken and the structures which should be put in place which will best prepare for the future, with all its attendant unpredictabilities and challenges.

The Review Panel would like to emphasise that these proposals build on the most important foundation of all, namely, the excellence and dedication of the many people in the Department of Agriculture and Rural Development, including the Science Service and Agri-Food Development Service, and the Agricultural Research Institute of Northern Ireland. Northern Ireland is indeed fortunate to have such an abundance of talent. It is a source of great confidence to the Review Panel that our recommendations can be built on such a secure base.

We hope that our recommendations will be deemed to be helpful by all those concerned. Change is, necessarily, a demanding process to manage and to accept. But without change, the future, as it unfolds, can be daunting and threatening. Challenges which are ignored, or not met, become problems – possibly insuperable; and problems not confronted can lead to chaos.

We wish you, Minister, and all concerned, every good fortune as you consider the adoption of our proposed new system. We believe that these proposals offer real and lasting benefits to the people of Northern Ireland.

A handwritten signature in black ink, reading "Daniel O'Hare". The signature is written in a cursive, flowing style.

DR DANIEL O'HARE,
CHAIRMAN
APRIL 2002

EXECUTIVE SUMMARY

1. The Minister of Agriculture and Rural Development established an independent Review Panel in September 2001 to examine the arrangements for undergraduate and postgraduate education and research and development (R&D) in Northern Ireland. The terms of reference for this Review are given in Chapter 1.
2. A secretariat was provided to assist the Review Panel and a Steering Committee, chaired by the Minister, with senior Department of Agriculture and Rural Development (DARD) civil servants as members, was established to assist us in our work.
3. The Review Panel engaged in an extensive process of consultation with the public, DARD senior management, and staff within the Science Service, in the DARD Colleges and in the Agricultural Research Institute of Northern Ireland and with representatives of other bodies and organisations throughout Northern Ireland. We also visited a number of countries.
4. We studied, in depth, the current structures and arrangements in Northern Ireland and articulated, explored and tested a number of alternative models. In addition, an economic appraisal was undertaken.
5. Based on the extensive evidence presented to the Review Panel, we agreed a set of principles which an effective system should support and contain. These were that:
 - Northern Ireland should retain a significant teaching and R&D capacity in agriculture and food science;
 - a clear customer/contractor relationship should exist between DARD and all relevant R&D and teaching bodies in Northern Ireland;
 - agriculture and food science should join mainstream educational provision under the Department of Employment and Learning (DEL) with continuing policy input from DARD;
 - economies of scale, consistent with the maintenance of quality, should be fully exploited;
 - an integrated technology transfer system should be put in place throughout Northern Ireland;
 - organisational structures and their underpinning legal basis should encourage innovation and entrepreneurship;
 - transparency should be evident in relation to all financial transactions and transfers;

6. Our recommendations consist of seven related elements. They are:
- the R&D funds provided by DARD should be open to competitive bidding by all competent institutions and individuals.
 - a new central decision taking process ([Section 7.2](#));
 - transfer of the School of Agriculture and Food Science (SAFS) to either the Queen’s University of Belfast (QUB) or the University of Ulster (UU) ([Section 7.3](#));
 - integrate the teaching function of each of the DARD Colleges with the neighbouring Institute of Further and Higher Education (FE Institutes) ([Section 7.4](#));
 - establishment of a Non-Departmental Public Body (NDPB) to be called, for the purposes of this report, the Northern Ireland Agriculture and Food Research Institute (NIAFRI) ([Section 7.5](#));
 - inclusion of the Agricultural Research Institute of Northern Ireland with NIAFRI ([Section 7.6](#));
 - establishment of a new technology transfer facility within NIAFRI ([Section 7.7](#));
 - introduction of a competitive bidding process for DARD funded R&D ([Section 7.8](#)).

Summary

7. The fine details of these proposals are obviously a matter for discussion between the relevant institutions and persons who are affected by them and it is not a matter for the Review Panel to describe such details.

It is, of course, axiomatic that the transitional arrangements which would be required in order to give effect to these proposals should fully address the concerns and welfare of individuals.

Adhering to the status quo – or to a system close to the status quo – will not serve Northern Ireland well. Major changes to the agri-food industry have been taking place for some years and there is every likelihood that these changes will accelerate in the future and that it will become increasingly difficult to anticipate them or to make an adequate response. The current system appears to us to be too rigidly structured and compartmentalised to face such unpredictability with confidence.

In order to ensure that our proposals are clearly understood, we believe it to be important to explain our thinking and to describe in some greater detail the many elements of these proposals. These are contained in the body of this Report.

The Review Panel advocates the full adoption of our recommendations as providing the best service to Northern Ireland in this important area of its economy.



CHAPTER 1
INTRODUCTION AND BACKGROUND

1.1 TERMS OF REFERENCE

The Review Panel was established to undertake an independent review of DARD's arrangements for undergraduate and postgraduate education and R&D in agriculture and food science. Its specific terms of reference were:

- to carry out a comprehensive review of the existing arrangements in relation to undergraduate and postgraduate education and R&D in agriculture and food science and to make recommendations;
- to examine the long established link between DARD and the School of Agriculture and Food Science (SAFS) at the Queen's University of Belfast and to address the effectiveness of that link in terms of service delivery and cost;
- to examine similar provision in the DARD Colleges and any other similar services provided directly within DARD, having regard to any similar provision in other education institutions in Northern Ireland;
- to consult extensively with stakeholders and others as appropriate;
- if the Review was to recommend change, then it should:
 - set out any options for change and identify the cost implications of any such options;
 - address the implications for R&D and the delivery of science and technology advice;
 - address the impact on the Department's statutory testing programme and its management;
 - address the implications for the DARD Colleges;
 - address the implications for the Agricultural Research Institute of Northern Ireland (ARINI); and
 - address the implications for the link between DARD and the School of Agriculture and Food Science at QUB.

1.2 REVIEW METHODOLOGY

- 1.2.1 In conducting the Review, the Review Panel wished to familiarise itself with existing arrangements and activities, as well as ensuring that all interested parties had the opportunity to present their views. To these ends we arranged:-
- a written public consultation;
 - visits to a number of DARD establishments, in the Science Service and Agri-Food Development Service (AFDS) as well as to ARINI, at which insight into practical functions was obtained, a range of presentations was received and the opportunity was given for staff to meet the Review Panel. The list of DARD centres visited is given in Appendix A;
 - interviews with representatives of various organisations as well as individuals both inside and outside of DARD.
- 1.2.2 We also sought to familiarise ourselves with relevant arrangements in other countries through receipt of papers and through visits to appropriate organisations and persons in The Netherlands, England, Scotland and the Republic of Ireland (ROI).
- 1.2.3 To permit and encourage open public debate, we set up a website – www.agresedreviewni.gov.uk – which reported on progress with the Review as well as publishing the public response to our consultation paper.
- 1.2.4 Panel members met the Agriculture and Rural Development Committee of the Northern Ireland Assembly for a discussion on the Review.

1.3 CONSULTATION PROCESS

- 1.3.1 A public consultation document was issued to 760 people and organisations and an appropriate advertisement was inserted in 41 newspapers including local, national, farming and ROI editions. In all, 73 written replies were received from a range of interested organisations and individuals. A list of parties from whom submissions were received, other than those given on a strictly confidential basis, is given in Appendix B. Copies of the submissions are on the website referred to above. Hard copies can be had on application to The Secretariat to the Review of Education and R&D in Agriculture and Food Science, Dundonald House, Upper Newtownards Road, Belfast, BT4 3SB.

1.4 CONTEXT OF THE REVIEW

In undertaking this Review, we have had regard to a number of factors which we consider relevant, to a greater or lesser degree, to the topics under consideration. These contextual aspects are set out below.

Changing Face of Agriculture and Food Production

- 1.4.2 Agriculture in most developed countries has already entered and will continue to undergo a period of fundamental change with consequent uncertainty. It has experienced decline in terms of employment and number of farms. The Northern Ireland farming industry has shared in this change with a fall in farm incomes being particularly evident.
- 1.4.3 The Common Agricultural Policy (CAP) has been, and will continue for some time to be, subject to change. This reflects a range of factors such as affordability, particularly in the context of enlargement of the European Union (EU), and World Trade Organisation (WTO) demands. Reform of the CAP has already taken place and more is envisaged with the introduction of the Second Pillar concept giving greater recognition and funding support to rural development activities. The mid term review of the CAP is scheduled for the middle of 2002.
- 1.4.4 There is increasing public and political interest in matters such as food safety, animal health and welfare and the protection of the natural environment, all of which have a direct bearing on agriculture. In this respect the increasing volume of relevant EU and national legislation can bring a requirement for new types of R&D work as well as training to assist farmers to comply.
- 1.4.5 The globalisation of markets, for both products and farm inputs, has implications for the food processing industry as well as for farming. The revolutionary impact of information technology in relation to the management of resources and the development and co-ordination of markets has to be taken into account.
- 1.4.6 Government's farming policy, including that of DARD, is in the process of refocusing on the needs of the rural community including the farming community rather than on farming per se, as has been the case for decades. This will continue to present new challenges for agriculture.

Wider Context

- 1.4.7 We noted with interest the recommendations in the Dearing Report (Higher Education in the Learning Society: Report of the National Inquiry Committee into Higher Education, July 1997). Specific recommendations were made regarding provision in Northern Ireland including that the principle of institutional separation from national and sub-national levels of government be applied. That Report, in Chapter 22, Recommendation 84, recorded that the Committee was “wholly convinced and firmly commend to the Government” the principle that there should be an arm’s length relationship between government, nationally and regionally, and the higher education system. In the view of that Committee, this was required to assure the autonomy of institutions within a broad framework of public policy.
- 1.4.8 Rationalisation of provision of Further Education (FE) in general in Northern Ireland has been on-going with the establishment of 17 FE Institutes as incorporated bodies. This process also involved a number of Government Training Centres being subsumed within the FE Institutes. We considered that our deliberations on the future of the DARD Colleges could not meaningfully take place without regard to the overall provision of FE.
- 1.4.9 We have noted with interest the recommendations of the Vision Group (Vision for the Future of the Agri-Food Industry, DARD 2001) particularly those relating to the Key Themes of Developing People and Targeting R&D and Technology Transfer. We also find interesting, in terms of our Review, the overall conclusion of the Vision Group exercise, that the agri-food industry must become more competitive and responsive to evolving markets and that government and industry will need to make adjustments to ensure that structures are appropriate to the challenges and opportunities which lie ahead.

The recommendations specific to education and R&D point to a demand for new initiatives which our Review cannot ignore.

1.4.10 We have considered the Northern Ireland Executive's Programme for Government and, in particular, note that one of the Executive's priorities is "Investing in Education and Skills". The Executive thus recognises the importance of education and training at all levels. It has decided that it is important to focus on:

- ensuring high quality education and training for all;
- providing an education and training system which recognises and responds to the diversity of our society and the needs of its young people, promotes a culture of tolerance, unlocks creative potential and ensures equality of provision for all;
- equipping our young people with the skills and qualifications to gain employment in a modern economy;
- providing lifelong learning opportunities to enable people to update their knowledge, skills and qualifications;
- assisting and supporting the socially excluded to enable them to enter or return to the workforce; and
- preserving our cultural and information resources and making them available to the widest possible audience.

1.4.11 We have noted the announcement by the First and Deputy First Ministers of a complete review of public administration in Northern Ireland. The Executive is committed to reviewing arrangements for the accountability, administration and delivery of public services here, and to bringing forward options for reform which are consistent with the arrangements and principles of the Belfast Agreement (The Belfast Agreement, Governments of UK and Ireland 1998), within an appropriate framework of political and financial accountability. It is timely that our report provides specific recommendations on the arrangements for the delivery of agri-food education and R&D.

1.4.12 Our recommendations for the provision of R&D in agriculture and food science must be set in the context of the Belfast Agreement. There is scope for the development of further links with the Republic of Ireland in the context of R&D programmes, through the North/South implementation bodies, such as the Food Safety Promotion Board and the Trade and Business Development Board. Further co-operation would appear to be appropriate and beneficial in areas listed under "Areas of Co-operation" in the Agreement, such as animal and plant health and environmental R&D.

- 1.4.13 We have also familiarised ourselves with the contents of the 1965 Lockwood Report (Higher Education in Northern Ireland, Report of the Committee appointed by the Minister of Finance, Cmd. 475).
- We noted in particular the recommendation that a faculty or School of Agriculture should be established at the recommended second university with, as a consequence, the existing arrangement between the (then) Ministry of Agriculture and QUB being terminated.
- 1.4.14 We also noted the content of the Committee of Public Accounts' Report on "Department of Agriculture for Northern Ireland: Science Service: Research and Development" (17th Report, Session 1994-95. House of Commons). That report highlighted a number of issues of concern such as the customer - contractor relationship for R&D.



CHAPTER 2 THE CURRENT SYSTEM

2.1 GENERAL OVERVIEW

- 2.1.1 The Review Panel has benefited greatly from a range of presentations and visits involving the various providers of education and R&D in agriculture and food science. These have been valuable in gaining an understanding of the present system and in forming a view on the issues which are the subject of this review.
- 2.1.2 In considering the current system for the delivery of education and R&D in agriculture and food science in Northern Ireland, it became obvious to us that it involved a number of features distinct from those applying elsewhere.
- 2.1.3 The provision of these services forms part of an inter-connected system. This implies that changes in any one part can have implications for the system as a whole or for other parts of the system.
- 2.1.4 Responsibility for the provision of agricultural and food science education lies with DARD and that function is therefore outwith the normal arrangements for higher and further education in Northern Ireland. Funding is provided by DARD.
- 2.1.5 The Queen's University Act (Northern Ireland) 1928 and the Agriculture Act (Northern Ireland) 1949 centred agricultural degree teaching in QUB. This is delivered at the School of Agriculture and Food Science (SAFS). As a consequence, a relationship, known as the DARD/QUB link, exists between the university and a particular government department which is different from arrangements for any other subject area. Consequently there is greater emphasis than is usual on academic R&D and its relevance to the agri-food industry in Northern Ireland and to the importance of technology transfer.
- 2.1.6 The SAFS staff are employed by DARD and the majority are members of that Department's Science Service, having recognition as QUB lecturers and professors. Many have multiple functions including R&D determined by DARD, technology transfer and support for the local agri-food industry.
- 2.1.7 There are three DARD Colleges – Greenmount, Loughry and Enniskillen – within AFDS, which are also DARD funded and staffed. These provide an alternative route to undergraduate qualifications as well as supplying FE and HE Certificate and Diploma courses. They have also developed relationships with partner institutions and validating bodies, including universities, in progressing a number of programmes of study.

2.1.8 The DARD Colleges have a distinctive role in serving the agri-food sector through people development initiatives involving a range of formal and informal activities and access to programmes of study.

2.1.9 R&D is undertaken within a range of DARD institutions including SAFS, the Science Service including the Veterinary Sciences Division (VSD) and in ARINI. This activity involves projects funded by DARD, as well as other external interests. The latter are achieved in competition with other R&D organisations in the UK and internationally. Development activity is a feature of work at the DARD Colleges, although it is classified by AFDS as technology transfer.

2.2 EDUCATION

2.2.1 SAFS provides a range of undergraduate and postgraduate degree courses in agri-food sciences.

In autumn 2001, there were 129 Full Time Equivalent (FTE) undergraduate students. Appendix C shows details of postgraduate student numbers. Teaching in SAFS was provided by 86 members of DARD staff, equivalent to 24 FTE teachers. Some teaching is provided by other QUB Schools and Faculties, for which QUB is compensated financially. SAFS staff provide teaching into some other QUB schools.

Further details of courses and student numbers are given in Appendix C.

2.2.2 The DARD Colleges offer courses in subjects closely related to agriculture: horticulture, equine studies, countryside management and rural development, food technology and food supply management. Courses are offered at Further and Higher Education level including undergraduate and postgraduate degrees, HNC/HND, ND/NC/First Diploma and NVQ levels 2-4. Students on these courses may choose to acquire supplementary qualifications required for employment in the industry e.g. Pesticide Application, Food Hygiene, First Aid and Health and Safety certificates. A wide range of short courses is also offered on a part-time/day release basis, some of which also lead to recognised qualifications.

2.2.3 The DARD Colleges also provide People Development Programmes which are aimed at developing the competencies and values of people involved in the agri-food industry through lifelong learning. This activity includes developing and demonstrating new farming systems as well as products, processes and systems in the food sector.

A comprehensive series of lifelong learning programmes, known as the Challenge Programmes, have been initiated to assist those in the industry develop competencies of direct relevance to their business, utilising the business as the learning resource.

Details of student numbers are given in Appendix D.

2.3 RESEARCH AND DEVELOPMENT

2.3.1 The DARD Science Service pursues a range of research programmes and related technology transfer. Research programmes pursued and sites involved are listed in Appendix E.

2.3.2 In autumn 2001 the total number and value of projects being taken forward by the Science Service (including ARINI) were as follows:

Table 2.1:
Number and value of R&D projects – DARD and ARINI

FUNDING SOURCE	TOTAL NUMBER	TOTAL VALUE £'m
DARD	220	6.55
OTHER UK DEPARTMENTS	87	11.72
EU	33	6.33
PRIVATE SECTOR	53	3.30
TOTAL	393	27.9

Note: The figures given represent the total value of pending and on-going contracts in autumn 2001 rather than the annual flow of receipts. Most of these contracts are delivered via QUB.

2.3.3 SAFS undertakes certain R&D which is not DARD funded. It secures external R&D grants and contracts through QUB, using a competitive process; financial arrangements are in place which cover the allocation to DARD and QUB of the relevant external funds. A diverse range of expertise is available through the DARD/QUB link to provide supervision for postgraduate research students.

Funding for higher degrees by research comes from a variety of sources. A large proportion of PhD projects are directly related to DARD R&D while others involve studies which link with expertise in other QUB faculties or schools.

- 2.3.4 The focus of R&D work undertaken by ARINI is in crop and animal production. The Institute provides staff and facilities for research programmes which are undertaken within the Agricultural and Environmental Science Division of the DARD Science Service. It also provides resources for R&D carried out by other divisions in the Science Service as well as facilities for QUB students. Further R&D in keeping with the aims of the Institute is carried out with funding from outside bodies.

2.4 TECHNOLOGY TRANSFER

- 2.4.1 The Review Panel regards technology transfer as the process by which the findings of R&D are made known to those who are in a position to apply it to farming or industry processes. The DARD technology transfer programme is delivered by a number of staff in the Science Service, AFDS and ARINI. It is delivered in a variety of ways including direct presentations and demonstrations to farmers, fisheries and forestry interests and relevant sectors of the food industry as well as through press articles and TV and radio programmes.

2.5 ANALYTICAL AND DIAGNOSTIC WORK

- 2.5.1 Analytical and diagnostic work incorporates a wide range of analyses and diagnostic services for government, industry, farmers and growers.

Much of the diagnostic work provides monitoring and surveillance information, which can then be used to inform decisions, with consequential impacts on domestic and EU legislation/regulations. Diagnostic testing underpins DARD's animal surveillance, for example, for epizootic diseases such as Foot and Mouth Disease (FMD) and Swine Fever.

2.6 OTHER SERVICES PROVIDED

Advice to government

- 2.6.1 The existing system provides expert scientific and technical advice in support of government, thereby contributing to the development and implementation of a range of policies and programmes.

Emergency response

- 2.6.2 Emergency situations, mainly involving animal health, can require a re-focusing of resources which demands flexibility in the overall system. A somewhat extreme example of this was the 2001 FMD crisis which required redeployment of resources across many areas

of DARD, and which, in particular, diverted scientific staff and equipment to tasks related to that emergency.

Enforcement of legislation and statutory work

2.6.3 This type of work is undertaken by the Science Service for a range of purposes of which the following are examples.

The analytical testing undertaken by VSD serves to confirm the freedom of Northern Ireland food producing animals from notifiable diseases and from undue concentrations of veterinary drugs. In instances where illegal drugs are involved, the work underpins prosecution action against offenders. It also undertakes statutory functions related to animal diseases of economic and public health importance, primarily tuberculosis, brucellosis and salmonellosis.

The Northern Ireland Plant Testing Station, located at Crossnacreevy, is an official seed testing station which is responsible for seed testing and certification in Northern Ireland. Tests are conducted to determine purity, germination, and freedom from weed seeds to satisfy UK and EU statutory regulations. Testing methods are developed and agreed internationally through the International Seed Testing Association.

Certification of seed, involving crop inspections and “growing-on” assessment, is conducted to internationally agreed standards, to allow free movement within the EU and between Member States of the Organisation for Economic Co-operation and Development.

2.7 NEEDS SUPPLIED BY CURRENT SYSTEM

2.7.1 The current education and R&D activities of DARD supply a number of needs. The Higher Education (HE) provision by SAFS is designed to ensure the supply of high calibre agriculture and food science graduates to industry in Northern Ireland as well as to government. The Further Education (FE) activity at DARD Colleges is intended to provide suitably trained people for the agri-food industry as well as re-training on a lifelong learning basis to equip people to respond to technical advances or changes in market demand.

2.7.2 The R&D activity together with statutory and diagnostic work assists government by informing policy and supporting enforcement of statutory requirements. It is also designed to assist the agri-food industry to improve competitiveness, to add value to primary products and to ensure the supply of safe and healthy food. It further informs the wider community and so contributes to considered choices.

2.8 SERVICE DELIVERY ELSEWHERE

- 2.8.1 It must be acknowledged, in seeking to benefit from the experiences of other countries, that a range of factors including size of country, relative importance of its agricultural industry and nature of its political structures makes comparisons difficult. This is compounded in some cases by the lack of clarity or relevance of available written material.
- 2.8.2 We did establish, however, that the arrangements in certain countries demonstrated features which were relevant to our work – The Netherlands, Canada, ROI, Scotland, England, New Zealand.
- 2.8.3 In order to further our understanding of the relevant systems in Great Britain, we commissioned a review of existing arrangements in England, Scotland and Wales. This exercise was undertaken by Dr John Walsh and is available on our website.
- 2.8.4 A number of countries have recently attempted to update the way in which they provide these services. This appears to reflect an awareness of a changing and more competitive environment and a feeling that established systems may not be the most appropriate to meet the challenges and opportunities of the 21st century. The potential of these developments in competitor countries to increase competition with Northern Ireland in the area of agri-food exports should not be ignored by the industry. However, most changes have been relatively recently introduced and it is too early to reach conclusions on the benefits to the economies concerned or, indeed, Northern Ireland.
- 2.8.5 Our discussions did, however, reveal certain problems including:
- the difficulty of handling near market R&D;
 - how to establish links between basic research and that applied to industry or government needs;
 - the problem of discontinuity in research between that driven by government concerns and that originating from the progress of science;
 - the difficulty of handling intellectual property where publicly funded R&D is linked to and exploited by R&D in the commercial sector;
 - the costs which institutions incur in submitting bids within competitive systems;
 - the problems in education posed by a declining demand for agricultural courses.



CHAPTER 3
VIEWS EXPRESSED IN EVIDENCE

3.1 INTRODUCTION

3.1.1 This Chapter deals with a number of issues which emerged from the public consultation exercise and the evidence gathering presentations and interviews. We were told in general that the current system fulfilled multiple functions through a variety of institutional structures. These include education at all tertiary levels, R&D, development and policy advice as well as monitoring, surveillance and enforcement. It also provides direct services to the agri-food industry through technology transfer work, problem solving and indeed, in particular instances, as an incubator for new businesses. We heard views from a variety of interests on the extent to which these functions are adequately discharged as well as suggestions for improvements.

3.2 WHAT THE REVIEW PANEL WAS TOLD

3.2.1 We note, from what people told us, that a number of opinions exist, sometimes divergent, on the workings of the current system. These range from commendation through to reservations and suggest:

- (a) that a high international reputation has been earned by Science Service and ARINI researchers;
- (b) that the system has proven capable of providing expert scientific advice to government over a wide range of scientific issues;
- (c) excellence of the facilities within the Science Service, shared in many cases by postgraduate students from QUB, and in the DARD Colleges;
- (d) that, on balance, employers valued the quality of graduates from the SAFS and from the DARD Colleges.
- (e) an overall DARD system well geared to respond in a timely and effective manner to major crises as evidenced by the handling of the recent FMD emergency;
- (f) a divergence of view regarding the value of the DARD/QUB link;
- (g) a need to retain education and R&D activity in agriculture and food science within Northern Ireland;
- (h) a need to develop arrangements appropriate to the challenges and opportunities presented in the areas of agricultural education and R&D, by a rapidly changing economic and political environment, in which the importance of agriculture is diminishing with concurrent increasing public interest in matters such as food safety, the natural environment and rural development and diversification;

- (i) a need for innovative R&D in the food sector to maintain and enhance Northern Ireland's competitive position, bearing in mind the critical importance of exports.
- (j) a situation where ARINI is less independent in practice than might be expected of a Non-Departmental Public Body;
- (k) the desirability of broadening and strengthening inter-disciplinary R&D;
- (l) the existence of a debate on how best to test DARD R&D activity against international standards;
- (m) a reduction in popularity of agriculture-based courses with a concurrent increase in importance of certain science based but less traditional activities such as environmental policy, food chain development and the interaction between food and health;
- (n) concern in parts of the food industry that the focus on education in the DARD Colleges was on competencies and skills at a level higher than required by food processing companies;
- (o) questions on the transparency of the system for deciding on R&D programmes and projects as well as degree courses;
- (p) absence of a clearly separated customer-contractor relationship in respect of DARD's R&D activity;
- (q) a concern that technology transfer had not been optimised through traditional arrangements, including an apparent absence of adequate and effective linkages between R&D and technology transfer;
- (r) concern about the exclusion of other providers from access to important areas of DARD publicly funded R&D;
- (s) economic non-viability of the low student enrolments in individual DARD Colleges and at SAFS;
- (t) a potential problem evidenced by the fall in the Research Assessment Exercise (RAE) score for SAFS – from 5 to 4 for the Agriculture Unit of Assessment between the 1996 and 2001 RAE;
- (u) unhappiness of industry with the extent of consultation with it by the Science Service;
- (v) an opaque management control system in SAFS;
- (w) a lack of adequate interaction between AFDS and the Science Service;
- (x) a lack of transparency regarding costs and flows of funds between the Science Service and QUB;

- (y) a disincentive to seek external funding and R&D when receipts from such work by Science Service and DARD Colleges are liable to be returned to the Exchequer under Government Accounting Rules rather than be made available to develop the R&D facilities involved;
- (z) that little attention was being devoted to the longer term implications of an ageing staff profile in the Science Service; this situation may to some extent, be a consequence of the Civil Service system of recruitment and career planning.



CHAPTER 4
THE ROLE OF AGRI-FOOD
EDUCATION AND R&D
IN NORTHERN IRELAND

4.1 INTRODUCTION

The Review Panel was asked to consider what changes, if any, should be made to the provision of education and R&D in agriculture and food science in Northern Ireland in the light of the evidence submitted to us. In doing so, we sought to relate current provision to the existing and future requirements of the agri-food industry and the wider Northern Ireland economy.

The existing system seeks to meet a diversity of needs of which we identified the following broad groups.

Services to education

- 4.1.1 Through provision of education, the existing system enables students to realise their potential while at the same time strengthening the local economy by providing a flow of new entrants to the range of industries involved in agriculture, food and the use of land. It recognises a range of abilities and a diversity of potential employment as evidenced by the type of courses provided, which range from food processing to those concerned with farm production and environmental impact. It also encompasses the spectrum of abilities from certificate and diploma courses to postgraduate degrees. In keeping with the growing importance of knowledge based industries, it provides access to lifelong learning for the food and farming sector.

Services to government

- 4.1.2 The existing R&D activity and related scientific services underpin government in a number of ways. They help in the process of policy formulation by identifying and assessing risk, allowing early recognition of problems associated with existing policies and clarifying the implications for Northern Ireland of proposed policies.

They also play a vital role in policy delivery and the achievement of statutory objectives. This is done by surveillance, diagnostics and monitoring as well by providing, when necessary, an objective basis for enforcing regulations. They therefore have an important role in providing protection against plant and animal disease and breakdowns in food safety.

Services to the agri-food industry

- 4.1.3 Agriculture and the food industry have moved a long way from traditional craft industries to become businesses based on applied science. New science is sometimes embodied in new inputs used by businesses. In other cases it affects the daily operation of

enterprises, creating new efficiencies, linking production more precisely to market needs and providing safeguards for consumers and workers in the industry. The overall impact of this complex interaction is to increase the competitiveness of the industry and so enable it to enjoy a larger share of the markets in which it operates. Effective translation of education and R&D into improved practices strengthens the agri-food industry, thereby benefiting the Northern Ireland economy.

Safeguarding the environment

- 4.1.4 Understanding the fundamental biological and physical relationships involved in current land use, most of which is for food production, is vital in assessing the environmental impact of existing practices. It provides an essential component of any analysis of their sustainability and a starting point for the recognition of emerging problems and ways in which they might be tackled. The education and R&D funded by DARD, whilst it has been primarily focused on the production needs of the agri-food industry, can provide crucial insights into these broader considerations. This aspect will increase in importance as issues like sustainable farming and enhanced biodiversity move up the political agenda.

4.2 ISSUES REQUIRING SPECIAL CONSIDERATION

- 4.2.1 The Review Panel acknowledges that the existing system has responded to the aforementioned needs in the local economy. We, however, having been charged with making a critical assessment of its overall effectiveness, looked not only at the present situation but at the emerging pressures and challenges faced by the agri-food industry in Northern Ireland. The view which we formed was that there were some issues of general concern, together with aspects of present provision, which were of special importance in the context of Northern Ireland and which required particular examination.

We have identified a number of aspects of the existing arrangements which demand special comment.

The customer-contractor principle

- 4.2.2 We found that decisions about what R&D should be undertaken were often made by people who had responsibility for undertaking that same R&D. There was therefore no clear separation between the customer and the contractor and it was difficult, if not impossible, to apply market testing principles to the expenditure of the public money. This was an issue which had been addressed and

adversely commented on by the House of Commons Public Accounts Committee in 1995. (See Section 1.4.14 above).

The focus on the agri-food industry

- 4.2.3 We found a clear commitment to the support of the agri-food sector and, in particular to farming. Despite this, industry representatives argued for a stronger voice in determining education and R&D programmes. This was understandable and admirable in the context of the role of farming in Northern Ireland and we accept that there would be benefits in improving communication between the industry and researchers.

It was not clear to us that the appropriate level of public funding and the role of the private sector in supporting industry related R&D was being sufficiently questioned, given the longer term diminishing share of agriculture in the Northern Ireland economy. In such a situation, there is a danger that scientific resources could become trapped when, in the public interest, they ought to move.

Transparency of the system

- 4.2.4 In our opinion a satisfactory system should ensure that it is clear who takes decisions, who is responsible for their implementation and how their outcome is to be assessed. This provides the sort of transparency necessary if the public is to have confidence that its resources are being used to best advantage. In our view the desirable level of transparency is not always achieved under present arrangements. The relationship between SAFS, QUB and DARD Science Service is complex, and in an important sense, opaque. Within AFDS, the role of the DARD Colleges, the movement of staff between education and development work and the emphasis on linkages with local industry and farming makes it difficult to identify the real resource cost of particular activities.

Competitive R&D contracts

- 4.2.5 We established that the lack of transparency within the system is even more pronounced in assessing the relationship between DARD funded R&D and external institutions. We received representations arguing that DARD funded R&D, or at least a significant proportion of it, should be subject to an open tendering system which would give other competent institutions in Northern Ireland and elsewhere the opportunity to compete. Whilst we were told that such institutions are considered in the process of allocating R&D funds, this is not how these bodies perceive the situation.

Monitoring of R&D quality

4.2.6 In our view a good education and R&D system has to place a high priority on ensuring quality. We were told that, within the system in Northern Ireland there is much R&D work of high international standard. It is also clear that educational activities are well delivered, well resourced and show a readiness to innovate in respect of the course material and the mechanisms of delivery. In particular, postgraduate students gain access to first class scientific resources and to supervisors with first hand knowledge of the industry as well as often being given an opportunity to put their ideas directly into practice.

There is however a concern, which the Review Panel and the Chief Scientific Officer share, about the appropriate means for assessing the quality of R&D work. The RAE exercise, which is used to assess university R&D in the UK, is only appropriate for part of the work of the Science Service and inappropriate for the development work of the Colleges. A Visiting Group approach would enable a more holistic view to be taken of the work undertaken. However, conventional Visiting Groups are primarily concerned with R&D and in our view would need to be modified to deliver an effective appraisal of the overall quality of service provision in Northern Ireland.

Exploitation of complementarities within the system

4.2.7 In all organisations where individuals operate with a degree of independence, there is a danger of a compartmentalised mentality developing. We found some evidence of this in the existing system. The Review Panel received complaints regarding a lack of communication and, in some cases, of an unwillingness to integrate educational provision as well as a failure to co-operate fully in the process of technology transfer.

We consider that such complaints are characteristic of many large organisations but feel that they can be a symptom of a failure to exploit potential economies of scale by working together. We found this disturbing as the integration of the system of education and R&D was frequently stressed to us as one of the key advantages of the DARD/QUB link.

It is also a matter of concern that emerging economies, which might be realised at the HE/FE level by co-operation between DARD and local FE colleges, are not being fully developed.

Impact of public sector rules

- 4.2.8 The people working in education and R&D funded by DARD are employed as civil servants and consequently operate within Civil Service rules. In some situations, this may be inappropriate for an activity of which part has to be sharply focused on a competitive sector. A recognised problem arises from Government Accounting Rules under which money received for external contract work is liable to be taken by the Exchequer rather than readily made available to develop R&D capacity at the particular centre. This can act as a disincentive for staff to seek external R&D contracts. One of the strong features of the DARD/QUB link is that this disincentive can be avoided and the work of scientists allowed to grow organically. However, such contrived relationships contribute to a loss of transparency.

Funding of R&D

- 4.2.9 We hold the view that public expenditure has to be justified in terms of the benefits it brings to the community as a whole. Published R&D can be taken up by businesses where they recognise that it can enable their activities to develop and prosper. It is through this mechanism that the benefits of new discoveries reach consumers and bring advantage to society as a whole. In the process, R&D will have added to the profits of private business either in Northern Ireland or elsewhere.

A strong case has been argued that where agricultural or food R&D is near market, and in the sense that since profits can be made from its exploitation, the private sector should pay. Where this is accepted, publicly funded R&D has tended to withdraw from such activities. Given the small scale of farming businesses and many food enterprises in Northern Ireland, it is difficult for us to envisage the present level of agricultural and food R&D being sustained if it were wholly dependent on private funding.

We conclude that, whilst there may be some scope for more levy funded R&D or work paid for by groups of farmers, continued public investment in this sector is justified by its benefits to consumers and by its contribution to maintaining the competitiveness of the Northern Ireland agri-food sector.

Localisation of provision

- 4.2.10 We were told that it is critical to retain agricultural education and R&D within Northern Ireland. Although there are possibilities of buying these services elsewhere in the UK, or from ROI or further afield, we were told that local provision is essential. It was pointed out that when local Northern Ireland students go abroad to study, a relatively high proportion do not return to work in Northern

Ireland. We understand that the proportion failing to return can be as high as 70 per cent. This implies that without local provision there would be an insufficient flow of new entrants to the agri-food industry to sustain its level of activity. It was put to us that the circumstances of Northern Ireland are sufficiently different that both education and R&D need to be specifically focused on the local situation; also that, in formulating policy, government needs scientific advice firmly grounded in an understanding of the particular and relevant characteristics of Northern Ireland.

We considered these arguments carefully and conclude that, whilst students should be able to access wider educational opportunities within the UK or elsewhere and that there were some R&D areas where it makes sense to buy these from external agencies, there is a strong case for continuing a significant education and R&D provision in agriculture and food within Northern Ireland. This conclusion reflects the greater importance of these industries within the Northern Ireland economy and the high quality of much of the present provision.

Economies of scale

4.2.11 By international standards, Northern Ireland is a relatively small community. This makes it difficult to justify local provision of services that have heavy costs in terms of the minimum provision necessary to be effective.

Economies are secured to some degree, and access to first class facilities made possible, through sharing resources in SAFS with QUB and in the DARD Colleges with the wider work of AFDS. Furthermore, the separation of resource provision into separate categories of teaching, advice and R&D is thought to bring greater focus to specific parts of the programme.

We recognise the importance of the latter arguments. However, we believe that the present system does not necessarily deliver the greatest benefit in terms of economies of scale. The co-existence of undergraduate degree programmes originating in SAFS and the Colleges, for which there were often relatively small numbers of students on each course, suggested that some rationalisation could secure real savings. The development of FE and HE teaching separately in the DARD Colleges and local FE institutions does not fully exploit economies to be derived from using these resources jointly to meet the needs of the communities served.

Indeed, we have a significant concern about the unviability of the DARD Colleges arising from their extremely small student populations of 330, 250 and 120 full-time equivalents. These, by any criterion, are non-viable.

In the area of R&D, economies to be derived from a fully shared responsibility for technology transfer are not always realised as SAFS and AFDS staff largely operate independently of each other.

We conclude that whilst economies of scale are an important consideration in the present system, there are other ways in which they can be secured; indeed, some aspects of the present system may impede their full attainment.

Integration of services

- 4.2.12 We heard strong claims that the present system is so well integrated that scientific developments are rapidly made accessible to both industry and government. It is argued that, by creating a fully publicly funded system, DARD has ensured that the focus on the needs of Northern Ireland industry and policy are given priority. This is an important characteristic; we saw examples of how well it worked in some cases, for example in the development of spreadable butter and the superior capacity of Northern Ireland to achieve the traceability of cattle in the wake of the BSE crisis. We also heard from some critics that there exists a lack of communication within the system between the Science Service and AFDS, that there was tension between operational centres where the search for external funding might dominate the focus of R&D and that the voice of industry was insufficiently heard in the determination of priorities.

The system does not, in our view, enable a clear picture to be established of the allocation of resource between education, R&D, technology transfer and support for the industry.

We accept the proposition that securing close co-operation between the various education and R&D services is of great importance. It is a pre-condition of securing the potential economies of scale which, in a number of ways, the existing system delivers. It is important that individuals should perceive added value to themselves from working together. Although there is much goodwill, it seems that institutional factors sometimes make this difficult.

Technology Transfer

4.2.13 We acknowledge that securing the appropriate application of science in practice is a critical and often difficult process. There is a problem of recognising the relevance of new discoveries to industrial applications. There is an issue of translating the language of science into terms understood by non-scientists. There is a need for scientists to be sufficiently aware of the practices and problems of the businesses concerned to be able to apply science to improved methods of production. All this requires those involved to move beyond their specialisms if the maximum benefit in terms of the value to society of its investment in science is to be secured. We were impressed by the commitment to technology transfer at all levels of the education and R&D system in Northern Ireland. We noted that relevance to industry was stressed in most of the discussion about R&D and it was impressed on us that educational services provide excellent opportunities for students to obtain first hand experience of industry. Representatives of the industry told us of the benefits they perceived from their interaction with the DARD Colleges.

This does not mean that improvements are not needed. In some situations, it seemed less than clear to the scientists just who was to be responsible for bringing science to industry. There were complaints that some science outputs are not made available in language that practitioners could understand. Some sectors of the industry feel that R&D needs to be more focused on their particular problems. These problems are common to all educational and R&D systems but we believe that their recognition is essential in assessing any possible reconfiguration of the way in which these services are provided.

Relationship with government

4.2.14 Northern Ireland differs from the rest of the UK in that tertiary educational services in agriculture and food science are provided directly by a government department. This sort of role for a government department was criticised in the Dearing Report (see Section 1.4.7 above) and clearly it had to be considered by the Review Panel. The dangers which are inherent in the existing system are that education and R&D may be too much influenced by the current needs of government and insufficiently independent or critical of official policy. There is also a more general risk that this form of support may lead to a disproportionate emphasis on agricultural and food related R&D in relation to the overall needs of the Northern Ireland economy or wider community.

We believe that the particular circumstances of Northern Ireland make it appropriate that DARD should continue to play a very

important role in relation to agri-food education and R&D. This does not necessarily mean that it should provide these services itself or that there is not a need to review current provision in relation to the changing face of farming in Northern Ireland and to developments in consumer preference and public priorities.

The provision of services to government

- 4.2.15 Government requires scientific support in a number of roles. In formulating policy and contributing to policy debates in the UK and EU, it needs high quality scientific briefing. In ensuring food safety and environmental protection, it needs scientific surveillance and monitoring. In administering policy, it requires the capacity to diagnose problems and, where necessary, to enforce regulations. In Northern Ireland these requirements are met via such units as the Science Service, AFDS, ARINI and the Veterinary Service. We consider that in this process there needs to be good communication between the scientists involved, trust within industry in the competence and integrity of the service and confidence among the public.

4.3 CONCLUSIONS

- 4.3.1 We find that in many ways the existing system provides a level of scientific support for the agri-food industry that compares favourably with that experienced elsewhere. We are especially impressed by the capacity of the system to mobilise good quality resources quickly within DARD as a whole to cope with emergencies.
- 4.3.2 The provision by DARD of education and R&D relating to agriculture and food in Northern Ireland has established a long tradition of service to the community and a high reputation elsewhere in the UK and beyond. However, the existing arrangements were established more than 70 years ago in an economic and political context very different from that of 2002. We believe, therefore, that it is timely to explore whether alternative arrangements can meet contemporary needs more satisfactorily.
- 4.3.3 Any new system should meet the needs to which we have referred in this Chapter as well as, if not better than, the present system. It must use resources efficiently, deliver high quality outputs, be responsive to future needs as they emerge and be conscious of the impact on the local community.



CHAPTER 5
THE APPROACH TO SELECTION OF
OPTIONS AND THE APPLICATION OF
ECONOMIC APPRAISAL

5.1 BACKGROUND

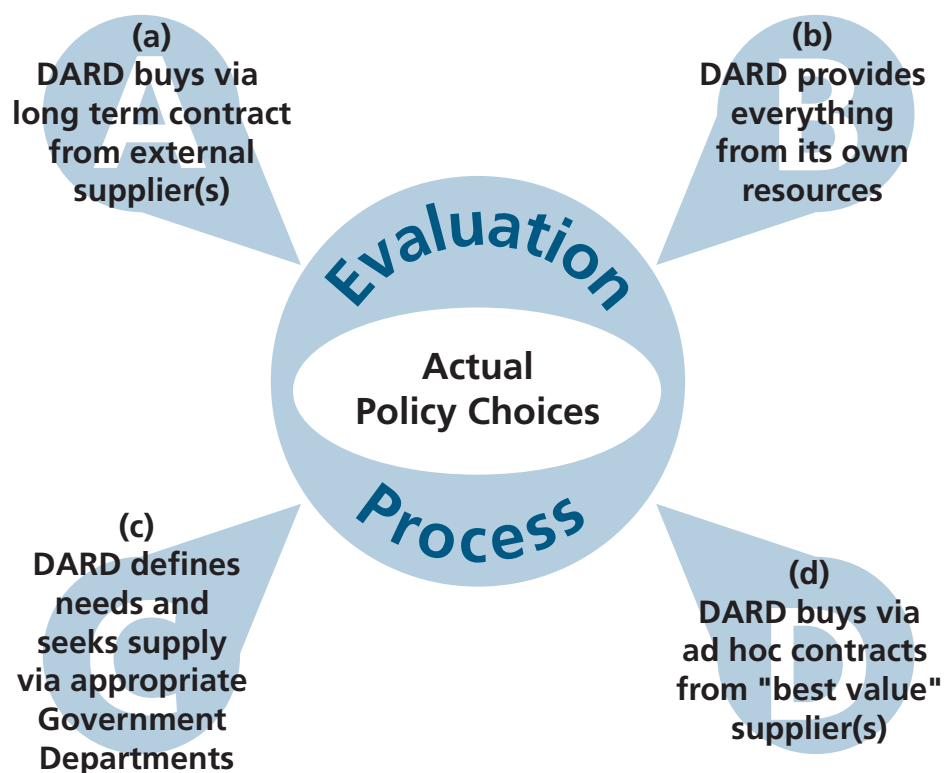
5.1.1 The Review Panel was asked to suggest options for the future, including an economic analysis of the alternatives. This chapter deals with the Review Panel's exploration of possible options, discusses critical aspects of the determination of economic value and concludes with a brief outline of the public expenditure involved in education and R&D activity.

5.1.2 The economic analysis work, to be published on our website and in hard copy, can be obtained by application to the Review Secretariat; the address is given in the Contents Section of this Report.

5.2 THE APPROACH TO SELECTION OF OPTIONS

5.2.1 In order to explore what might be possible, the Review Panel firstly identified four distinctly different approaches to the delivery of the education and R&D services. The following diagram illustrates these.

Diagram 5.1



- 5.2.2 Governments, faced with deciding on the allocation of resources to education and R&D for agriculture and food, have to do so in the context of the many other claims on those resources, both within the Department directly concerned, and in the context of the wider calls on public resources. This process is referred to in Diagram 5.1 as 'Actual Policy Choices'. To make such choices a Minister requires authoritative, independent analyses of the need for these services and of the ways in which they might be provided. This is described in the Diagram as the 'Evaluation Process'.
- 5.2.3 These requirements exist whatever system of supply is chosen and we recognise the critical role of the central organisation in the decision taking process for R&D, education, development and technology transfer. We therefore gave very careful consideration to that process, and our recommendations are dealt with in detail in the next Chapter.
- 5.2.4 We then considered four approaches based on fundamentally different perceptions about the appropriate way to provide education and R&D services. These are represented in Diagram 5.1 by the boxes (a) – (d). In brief these in turn would involve DARD:-
- (a) Buying what it requires on long term contracts from known providers. It would not employ staff or acquire its own facilities to provide education or carry out scientific R&D. Such contracts could be with universities or with R&D institutions in the public or private sector anywhere in the world or with private consultancy agencies.
 - (b) Providing all the services it needs directly, employing its own staff, creating its own institutions for teaching at all levels and providing and equipping fully the required scientific laboratories. Interface with the industry at all levels would be by DARD staff.
 - (c) Taking the view that the provision of education and R&D in agriculture and food, including advice to industry, should be treated on the same basis as any other sector of the economy. Services would be provided by other appropriate government departments and the role of DARD would be to argue the case for the agri-food sector.
 - (d) Taking the view that it should, in all cases, buy its requirements on an ad hoc basis from the market, seeking the least cost provider and committing itself to no more than the particular contract.

- 5.2.5 It is clear to us that none of these distinct positions represents a pattern of provision that is likely to be appropriate in the situation of Northern Ireland. However, consideration of their tendencies helped to identify features which might well be important in addressing the more realistic options explored in the next Chapter.

5.3 MAKING AN ECONOMIC APPRAISAL

- 5.3.1 The Review Panel was asked to provide an economic appraisal of the implications of any alternative options it considered.
- 5.3.2 Economic appraisals are concerned with the resource cost of activities and with the benefits they provide to society. In the context of the current study, it is understandable that attention is first directed to the question of public expenditure. However, whilst this is of major importance it is insufficient as:
- (a) It does not include personal costs in making use of the services provided – thus, although a degree course may be subsidised, the student will not only have to meet some direct costs, fees and books, for example, but will also forfeit the opportunity to earn income in full time employment; while this cost is personal it is also a cost to society.
 - (b) Expenditure alone does not take account of the benefits to society which derive from the education and R&D which is funded. The real rate of return to society must depend upon a balance between expenditures and costs. In the case of education and R&D, this is difficult to measure. There are usually substantial delays before the benefits from expenditure are fully realised. To allow for this, we have to attribute values to future streams of benefit and use a discount rate to reflect the diminished value to today's society of benefits, which may arrive, if at all, at some very much later date.
 - (c) Most difficult of all, it must include benefits and costs to which no monetary value is determined in a market place. If these are ignored and only those elements to which some money number can readily be attached are included, the appraisal will lead to a systematic misdirection of resources.

5.3.3

Non-monetary costs and benefits

Non-monetary costs and benefits of education and R&D exist in both the public and the private sectors. The lists below identify some of the important areas in which they arise. For this purpose it is essential to recognise that this list is only illustrative and that, in evaluating options, all those affected need to ensure that non-monetary considerations which apply to them are fully taken into account.

- (a) Environmental non-monetary costs and benefits:
 - impact on wildlife, habitat and the aesthetic value of the countryside;
 - pollution of soil, water and air;
 - provision of access for unpaid recreation etc.
- (b) Impacts on rural communities:
 - number of people employed;
 - impact on the built environment as demand rises for specialist buildings and transport facilities change.
- (c) Impacts on animal welfare:
 - animal feeding, breeding and housing;
 - selection of animals for intensive or extensive systems of production.
- (d) The integrity of the system, its impact on public confidence and the trust people feel in their food supply. This requires transparency, including:
 - a clear separation of the customer and the contractor so that objective judgements are seen to be made about R&D funding and educational provision;
 - evidence that the surveillance function prevents unsafe food reaching consumers or animal disease affecting livestock thereby giving assurance that the diagnostic, analytical and enforcement procedures work.
- (e) Managerial non-monetary costs and benefits:
 - efficiency - avoidance of duplication, focus on issues of importance to the public, incentives to minimise cost, delivery of high quality service;
 - a capacity to recognise and to respond to a changing environment, in emergency situations and in relation to more gradual changes in the economy, in society and in the expectations of the public.

- (f) Effective communication with the stakeholders:
 - ensuring awareness of relevant new technology, providing decision takers with information to enable them to apply new advances in a cost-effective and safe manner;
 - ensuring that all stakeholders have a voice in the development of R&D programmes.
- (g) Social and community costs and benefits:
 - enhancing the capacity of the public to make informed judgements about the food and farm sector, education including lifelong learning, in relation to productive methods, environmental impacts and diet-related health consideration;
 - creating opportunities for individuals to attain their potential through appropriate education along both formal and informal channels.
- (h) Personal job satisfaction:
 - many people, including farmers and scientists, derive satisfaction from their work; in agriculture, contact with nature, producing food and maintaining family responsibilities all embody non-monetary values.

5.3.4 This list illustrates some of the very wide range of costs and benefits to which money numbers based on transactions in a market place cannot be attributed. Attempts are sometimes made to provide surrogate money numbers based on a variety of techniques. These can involve, for example, asking people hypothetical questions about their willingness to pay, observing spending behaviour - for example, how much they spend on travel or how specific environmental characteristics may relate to differences of property prices in adjacent areas. A great deal of ingenuity is deployed inventing such measures. Where this leads to relatively consistent results, this adds confidence to the procedure.

5.3.5 Such measures can help to inform discussion but they do not solve the problem of incorporating non-monetary values in economic appraisals. In part, this is because the numbers generated can often depend upon the particular questions posed, the way in which they were framed and the people who were consulted. Still more, to conduct such analyses over the entire range of relevant non-monetary values is clearly impracticable.

5.3.6 This inability to attach defensible money numbers to alternative systems which involve non-monetary costs and benefits was acknowledged by the Review Panel. We, therefore, in considering alternatives had to consider whether options were likely to be

more or less efficient in giving recognition to such values when decisions about future educational and R&D systems are made.

- 5.3.7 Such decisions are essentially the outcome of political processes and it is in no way the role of a Review Panel to substitute its own judgements for those of the population, expressed through the mechanisms of government. However, the concerns expressed about aspects of the existing system, such as the transparency of the system, the freedom of individuals to express dissenting views and the ability of stakeholders to make their priorities known, all reflect the practical importance of these considerations.

In the process of this appraisal the Review Panel draw attention to a number of specific non-monetary aspects of particular options expressed. However, we are clear that these have to be supplemented by evidence from all those affected and will include issues not mentioned in this analysis.

5.4 CURRENT FINANCIAL FLOWS

- 5.4.1 We have conducted the economic appraisal, full details of which are given on our website, by seeking at the outset to identify the flows of resource involved in the present system. In doing so, we have been greatly helped by staff in DARD and in the Queen's University of Belfast.
- 5.4.2 This account of how public funding is deployed forms the starting point for our exploration of each of the options dealt with in the next Chapter. We also take the opportunity to draw attention to some important potential changes in non-monetary options. As will become clear, in many cases whilst changes may have major impacts on the revenue and costs involved within particular institutions, the impact on the Northern Ireland economy as a whole is much smaller, as activities formerly conducted through one mechanism are taken up, possibly done with greater efficiency, through other mechanisms.
- 5.4.3 One further caveat needs to be made before embarking upon this examination of existing provision and possible alternatives, which concerns both public expenditure and the wider economic analysis of current practice. The data we present is based upon recent information concerning the work of a large number of people. This provides an essential starting point but it is important not to overlook the significance of time. Within a relatively short period in the life of institutions, certainly less than a decade, changes in technology, in the economy, in public attitudes and in EU policy will reshape the opportunities to use resources productively in

Northern Ireland as elsewhere. Thus, in interpreting any economic appraisal, it is necessary to consider how far the systems explored might respond to a changing world and how the costs and benefits might change

5.5 HOW THE PRESENT SYSTEM USES RESOURCES

- 5.5.1 The analysis of any resource consuming function starts most conveniently with the current financial flows involved. To interpret their full significance this information needs to be supplemented with more detailed information about the inputs used and the outputs delivered. To move to a full economic appraisal means confronting the need to allocate both costs and returns over time, and to take on board the complexities of non-monetary costs and returns. This necessarily involves a substantial amount of text. The outcome of the work done for the Review Panel is presented on our website.
- 5.5.2 Here, a preliminary examination deals only with the main financial flows associated with the provision of education and R&D. These are largely made up of payments by DARD and some receipts it receives for services provided. This chapter presents the available information that shows the main headings under which these flows took place.
- 5.5.3 Moving beyond this first account, to probe more carefully the applications of some of these flows, the economic appraisal has, with the considerable assistance of the DARD staff involved, broken down this summary information into greater detail so that flows can be more precisely related to the variety of activities undertaken by SAFS, the Science Service and AFDS. The outcome is presented in the economic appraisal.
- 5.5.4 The responsibilities of DARD cover a broad range of issues concerned with agriculture, food, fisheries, forestry, rivers, rural development and diversification. It is helpful at the outset to place expenditure by the AFDS and the Science Service in the wider context of the Department's activities. Table 5.1 does this in gross terms. These figures reflect the value of the resources used in the provision of the various activities involved. Some part of the expenditure represents activities which lie outside the remit of the Review Panel. The economic appraisal provides more detail on the expenditure on education, R&D and technology transfer activities.

5.5.5 **Table 5.1: Actual Expenditure – DARD 1997/98 to 2000/01**

Gross Expenditure	£'000			
	97/98	98/99	99/00	00/01
<i>Agri-Food Development Service</i>	20,856	20,576	21,607	24,115
<i>Science Service</i>	26,339	26,233	26,919	28,464
<i>Veterinary Services</i>	16,877	18,367	19,354	20,233
<i>FFEPG¹</i>	43,235	31,152	34,017	37,525
<i>Fisheries and FCILC²</i>	5,097	5,309	5,647	3,266
<i>Rivers Agency</i>	17,808	17,811	17,890	21,261
<i>Forest Services</i>	10,830	10,945	10,523	11,611
<i>Central Services</i>	23,382	20,169	20,182	21,718
<i>Rural Development</i>	6,590	7,002	7,413	7,327
<i>EU Structural Funds</i>	2,153	3,829	3,342	3,076
<i>EU Peace and Reconciliation Programme</i>	11,262	3,743	4,215	7,168
<i>Common Agricultural Payments funded by EU³</i>	131,773	169,868	119,227	161,588
<i>Environmental and Hill Livestock Compensatory Allowance payments funded by EU⁴</i>	3,575	3,926	15,769	8,902
<i>Environmental payments funded nationally⁴</i>	2,741	2,896	4,076	2,980
<i>Hill Livestock Compensatory Allowances, Current and Capital grants funded nationally</i>	27,957	22,245	20,000	21,827
<i>Other Expenditure</i>	28	26	21	14
TOTAL EXPENDITURE	350,503	364,097	330,202	381,075

Notes:

1. Food, Farming and Environmental Policy Group
2. Foyle, Carlingford and Irish Lights Commission
3. Livestock Subsidy Schemes and Arable Crops Area Payments
4. Grants for Conservation in Environmentally Sensitive Areas, Organic Farming, Farm Woodland Schemes.

- 5.5.6 A large part of this expenditure is determined by EU policies which DARD administers. This includes CAP payments, EU structural funds and EU peace and reconciliation programme payments. Expenditure on the services provided by AFDS and the Science Service was £52.58 million in 2000/01.
- 5.5.7 A further adjustment is required. This is a table of gross public expenditure. DARD, including the Science Services and AFDS, also generates revenue which is set against the cost to the public purse of the provision of these services. Together in 2000/01, AFDS and the Science Service revenue accounted for £2.8 million. To understand the value of these services to the Northern Ireland agri-food sector, we need to include all these resources.
- 5.5.8 Table 5.1 indicates that there is a significant flow of resource in support of science and technology into agriculture and food in Northern Ireland which, although it represents a relatively small proportion of the total spent on agriculture and food, is nonetheless significant. It is far from a negligible input. In the short run, varying such expenditures is unlikely to have a major impact on the financial prosperity of the industry. However, in the longer run their contribution to the development of the industry – its capacity to compete in an increasingly tough international market and to meet the environmental and welfare standards required by society – is critical. It is against this background that the Review Panel explored ways in which these resources might be used more effectively in the future.



CHAPTER 6
OPTIONS FOR THE FUTURE

6.1 INTRODUCTION

6.1.1 At the outset it is worth stressing that the Review Panel considered carefully the continuation of the existing system, with incremental changes in some aspects of current activity as one of the options to be explored. We concluded that more fundamental changes were called for. However, in that process we wish to preserve and develop many of the strong points of a structure that has served Northern Ireland well over the past 70 years.

6.1.2 The features of the status quo which, in our opinion, need to be addressed have been outlined in Section 4.2. These, for recall purposes, are as follows:-

<i>Customer Contractor principle</i>	<i>Funding of R&D</i>
<i>Focus on the Agri-Food industry</i>	<i>Localisation of provision</i>
<i>Transparency of the system</i>	<i>Economies of scale</i>
<i>Competitive R&D contracts</i>	<i>Integration of services</i>
<i>Monitoring R&D quality</i>	<i>Technology Transfer</i>
<i>Exploitation of complementarities</i>	<i>Relationship with Government</i>
<i>Impact of Public Sector rules</i>	<i>Services to Government</i>

These issues, taken together with our understanding of the wider context within which this Review takes place and which we dealt with in Section 1.4, set the backcloth to our consideration of options for any new arrangements.

6.2 METHOD OF APPROACH IN THIS CHAPTER

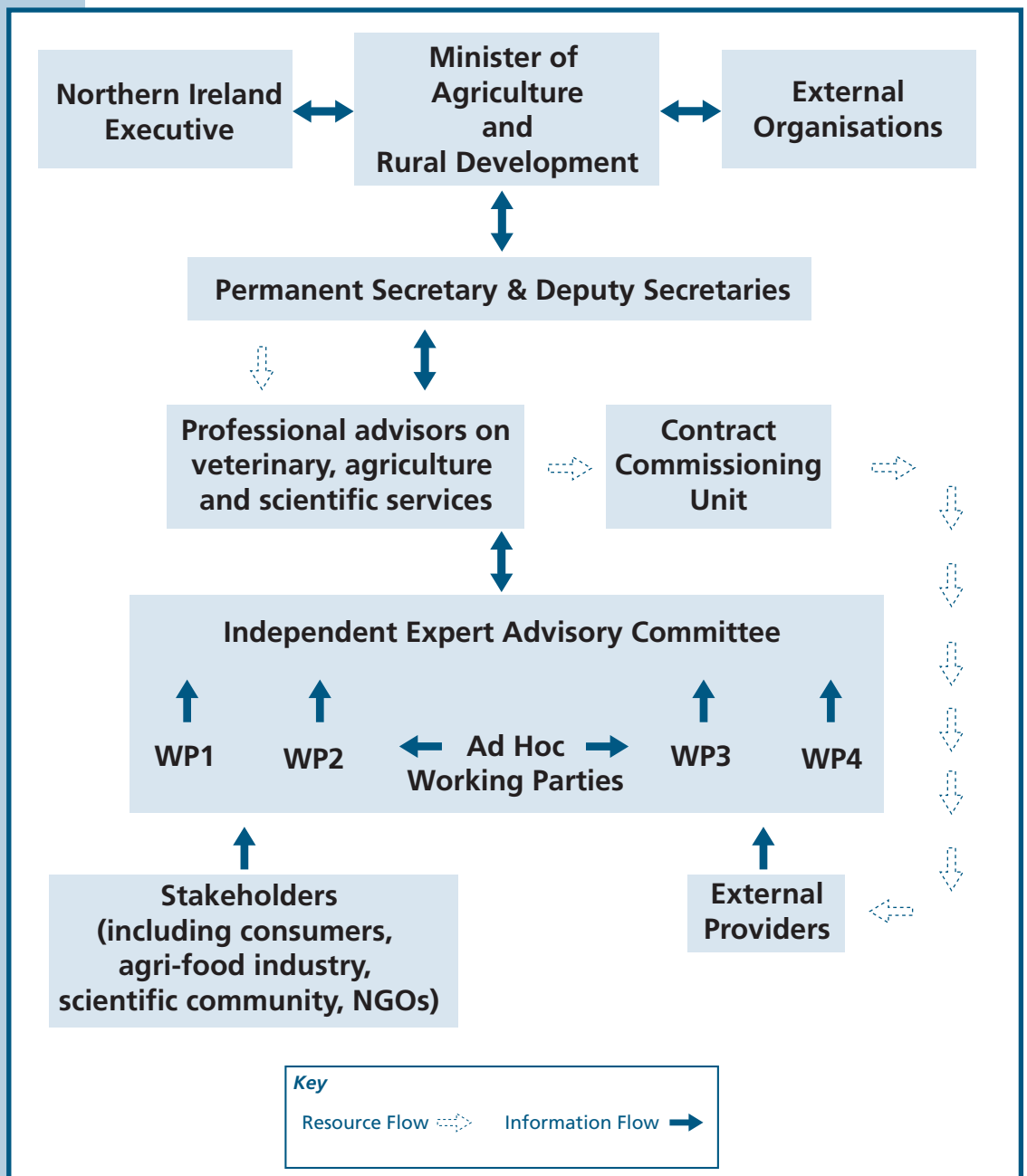
6.2.1 In approaching this part of our task, we address the key issue of the central decision taking process which we regard as the foundation of any alternative system. We then set out and discuss four possible options which singly or in concert might deliver the optimum new system. In explaining the common central decision taking structure and each of the options by which services can be delivered, we have made use of a number of diagrams. (In each diagram the solid lines represent flows of information and advice and the broken lines represent flows of funds and instructions.)

6.3 THE CENTRAL DECISION TAKING PROCESS

6.3.1 The objective of the system (outlined in Diagram 6.1) is to ensure that there is a clear separation of customer and contractor, that decisions are informed by both scientific and technical concerns, that they are in line with the overall policy of the government of Northern Ireland and that the decision taking process is

transparent. The system, which would deal with R&D and technology transfer as well as education in agriculture and food science, allows for access at a number of levels by industrial and other interests. All proposals would be assessed by an independent expert advisory committee, which would consider proposals originating within DARD and from external agencies.

Diagram 6.1 - Central Decision Taking Structure for Education and R&D and Technology Transfer for Agriculture and Food Science



6.3.2 The main characteristics of this system are:

- (a) Policy decisions would, as at present, be taken by the Minister of Agriculture and Rural Development on advice from the Permanent Secretary and the Minister would continue to be open to representations from all stakeholders and from colleagues within the Executive and the Assembly.
- (b) The Permanent Secretary would be advised by senior professional staff, namely the Chief Scientific, Chief Veterinary and Chief Agricultural Officers, here described as the Professional Advisors. It would be their task to assess proposals put forward in terms of their scientific content, their economic significance and their cost. They would be independent of the providers of the services over whom they would have no managerial control, a situation which would differ significantly from the existing arrangements. The role of these providers is described in the options considered below.
- (c) Implementing DARD policy involves commissioning work and monitoring performance. Responsibility for the detailed scientific evaluation and monitoring of performance of the agreed work would lie with the Professional Advisors. The preparation and negotiation of contracts with suppliers would be undertaken by a contract commissioning unit which would report to the Professional Advisors and liaise with the Permanent Secretary.
- (d) Provision would be made for the Professional Advisors to receive formal advice from an Independent Expert Advisory Committee. It is suggested that this should consist of an independent chairman and approximately ten members. Its members would be appointed using clearly defined criteria; they would be people of the highest quality from science and industry selected in accordance with their scientific skills and professional interests. The Professional Advisors would have observer status at these meetings.
- (e) The Independent Expert Advisory Committee would receive representations regarding education and R&D in agriculture and food science from consumers, the agri-food industry and other stakeholders, including scientists, potential providers of R&D, local government and non-governmental organisations (NGOs). The Committee would establish ad hoc working parties to take an independent and expert view of particular proposals. Although it would not include any DARD officials or personnel from any service provider, it would be able to invite such staff and any other experts it chooses, to make

presentations to the committee or to serve on its working parties.

- (f) The minutes of the Independent Expert Advisory Committee meetings and the recommendations it makes should be published and submitted formally to the Professional Advisors. They would consider all proposals in the light of the advice given, the available resources and government policy before making their own formal recommendations to the Permanent Secretary. In order to maintain transparency, such recommendations should also be published.

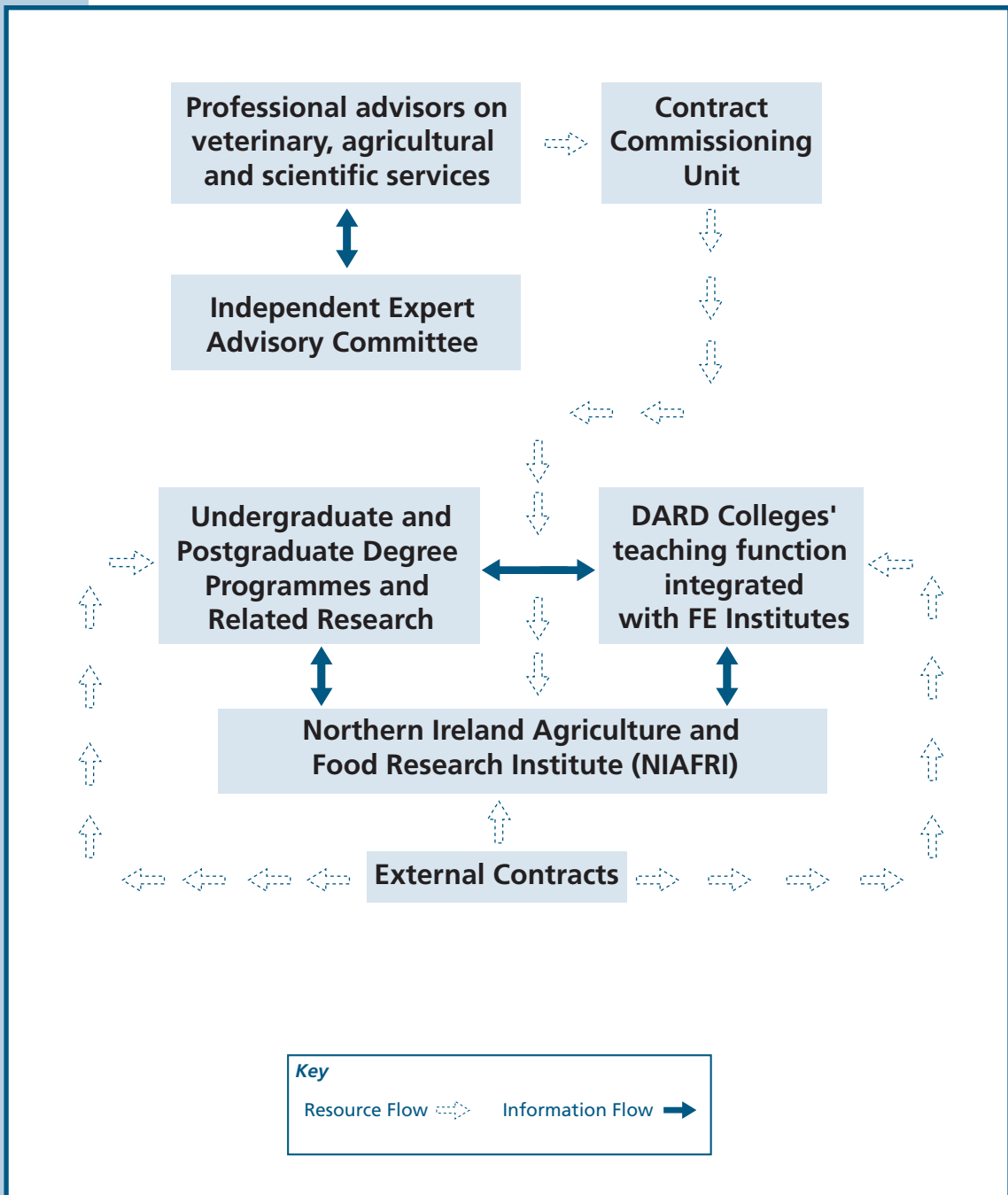
6.3.3 *Conclusion*

The Review Panel is firmly of the view that, whatever method is to be used to provide education and R&D and technology transfer services, the central decision taking process must be seen to be transparent, to separate clearly the customer from the contractor and to be open to input from any interested party. We believe that the structure outlined above would deliver these desired outcomes.

6.4 OPTION 1: THE SEPARATION FROM DARD OF THE PROVISION OF EDUCATIONAL AND SCIENTIFIC SERVICES

Option 1 is outlined in Diagram 6.2.

Diagram 6.2

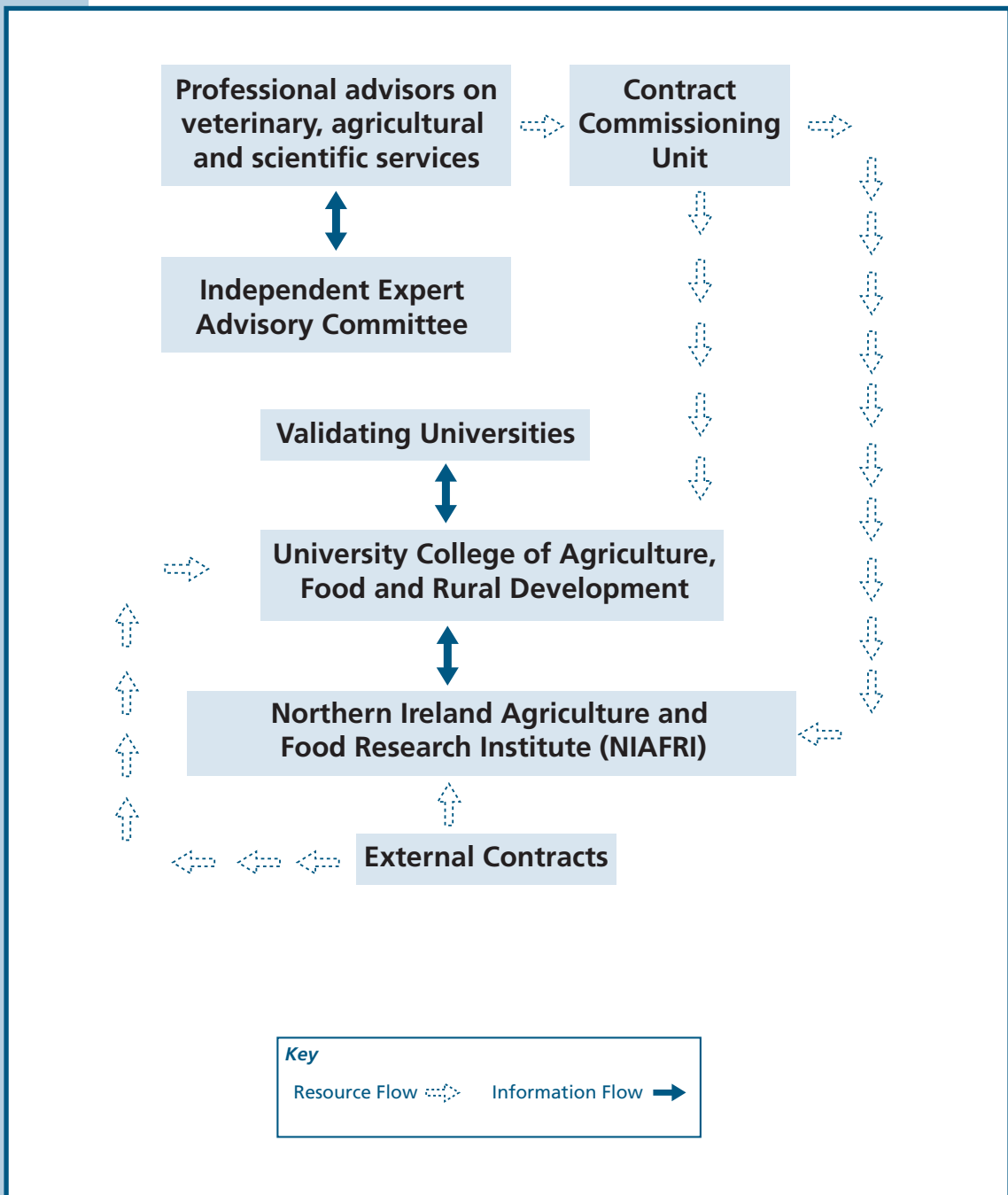


- 6.4.1 Under Option 1, undergraduate and postgraduate teaching previously provided from within the Science Service in agriculture and food science would be provided by a Northern Ireland university. The selection of the university and the terms on which this is realised would be subject to negotiation. The principal funding source would be DEL with DARD having a continuing policy input.
- 6.4.2 Teaching programmes currently undertaken in DARD Colleges would be continued but within the framework of the FE college system. The teaching function of the DARD Colleges would be integrated within appropriate Institutes of Further Education. While DEL would be the funding source, DARD would have a policy input.
- 6.4.3 R&D and technology transfer would be undertaken by a new Northern Ireland Agricultural and Food Research Institute which, for the purposes of this Review we have termed NIAFRI. This would be an NDPB. It would bring together all the existing divisions within the Science Service (excluding SAFS) and ARINI as well as a new facility concentrating on technology transfer, comprising the relevant personnel and resources currently in the Science Service and AFDS ie the DARD Colleges' technology transfer and development work.
- NIAFRI would be funded directly by DARD for the services it provides and it could also seek funds from other sources for its R&D. Programmes of R&D would be commissioned according to the central decision taking process outlined in Section 6.3. NIAFRI would put forward its programme annually and funding would be awarded on a rolling basis, providing reasonable security but allowing, over time, for changes in direction. In addition, as an NDPB, NIAFRI would be able to compete for and secure, and retain additional funding from external contracts in Northern Ireland, GB, EU and further afield.
- 6.4.4 The central decision taking process would ensure that the DARD R&D budget is available for open competition.
- 6.4.5 The immediate resource implications of this option are likely to be neutral; the services currently provided continue to be provided, although by different routes. In the longer run, two types of economic benefit should be realised. Firstly, the process of R&D selection should lead to a pattern of expenditure that better reflects the needs of Northern Ireland. Secondly, the introduction of a greater element of competition for R&D contracts should lead to a downward pressure on costs. Whilst the impact on Northern Ireland as a whole would be neutral, this option would lead to a significant redistribution of funding between institutions.

6.5 Option 2: A University College of Agriculture, Food and Rural Development (a variation on educational provision within Option 1)

Option 2 is outlined in Diagram 6.3.

Diagram 6.3



- 6.5.1 Option 2 would bring together all the current agricultural and food teaching activities funded by DARD, at both SAFS and the DARD Colleges, into a new University College. This would include a full range of courses from certificate through to degree. The R&D and technology transfer activities would be continued in the NIAFRI framework dealt with in Option 1.
- 6.5.2 The funding of the University College would be via conventional routes for further and higher education, namely DEL, with continuing policy input by DARD.
- 6.5.3 The University College would establish links with an established university for validation of its degree programmes. It seems likely that the validating university would be in Northern Ireland but this option does not exclude the development of links in other directions, should these prove more relevant.
- 6.5.4 DARD would develop linkages with the University College. This would involve facilitate a process of mutual consultation and facilitate the efficient use of resources in Northern Ireland as a whole.
- 6.5.5 The University College would undertake external work on a contractual basis. It would be expected to have a strong industry interface in its teaching, R&D and technology transfer.
- 6.5.6 This option provides for the funding of education directly by DEL; it also provides for the funding of NIAFRI. Given the assumption of a continued level of service, this looks like a rearrangement of existing funding. There are however some issues to which attention needs to be directed.
- (a) The new University College would have to carry all the overheads of providing a diverse range of courses. It might also require considerable capital funding if a new campus had to be provided. Whilst arrangements with local institutions might ease some part of these costs, it seems probable that the outcome would be subject to higher unit costs of provision than under Option 1.
 - (b) There are also non-monetary issues relating to the extent to which degrees from the new college would be accepted as equivalent to those currently delivered by established universities.

- (c) It is important that in any region, a range of higher education options is available to students and to employers. This is currently represented by the more traditional QUB approach – and the less traditional DARD College approach. A consequence of amalgamating both into the University College would be to eliminate one or other approach or to generate a composite one. In either case, the richness and diversity of choice currently available in Northern Ireland to students and to industry would be severely curtailed.

- 6.6.1 Option 3, describes an approach that would seek to secure as many of the requirements of DARD as possible by ad hoc contractual arrangements. Only those functions that could not be contracted out would be provided internally.
- 6.6.2 In this model, DARD would have to specify its requirements and invite potential providers to compete to carry out the various functions required by contract.
- 6.6.3 The model implies that there would be willing and competent institutions capable of bidding for the work and carrying it through to the standard required. This need not mean the movement of work out of Northern Ireland. Should an arm's length contractual system be adopted, some of the institutions currently funded by DARD might be taken over by existing staff through one or more management buy outs. In principle, many of the resources required already exist within the DARD service. This approach would effectively put them on a commercial contractual basis. The quality of service provided by both the DARD Colleges and Science Service, their links with local industry and understanding of local conditions, suggest that they could together provide a strong, Northern Ireland based competitor for both teaching and R&D.
- 6.6.4 Despite these possibilities, it is impossible to predict what pattern of provision might remain in Northern Ireland. Importantly, this raises the issue of what activities it is essential to retain on a local basis. Such services would have to be offered through what is described here as the DARD unit, charged with delivery of various scientific services.
- 6.6.5 Technology transfer, too, could be provided on a contractual basis by staff presently involved in this type of activity. However, experience in England suggests it may be more difficult to retain a coherent organisation. The more successful advisors may see merit in going it alone rather than having to share in the overhead costs of a larger organisation. There would be strong competition from accountancy based companies, and organisations such as the Scottish Agricultural College and the Agricultural Development and Advisory Service as well as from independent agricultural consultants .
- 6.6.6 For government, the critical decision would be what resources DARD needs to continue to own and manage in order to carry out its functions. In some cases, direct provision might be favoured on grounds of cost – although the strongly competitive nature of the market for R&D suggests that this is unlikely to be the case in that sector. More probably, it is likely to be judged that provision by DARD is justified for social, political or legal reasons. This is

critically true where intervention has to be intrusive or invoked for the purpose of enforcing the law. The implication is that a core capacity in surveillance, diagnostics and monitoring would be needed both to reassure the public and to provide a prompt response in emergency situations.

6.6.7

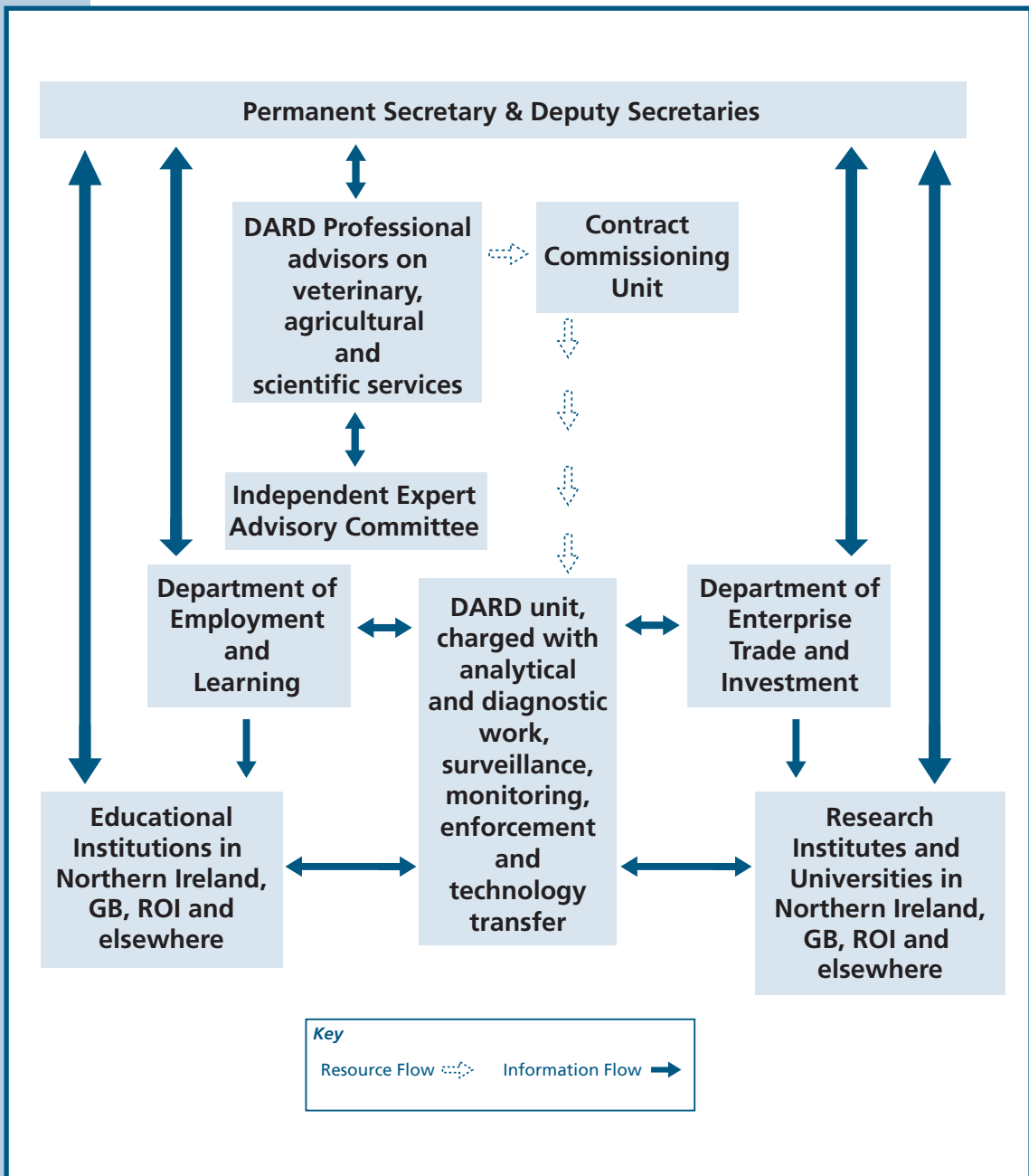
The main motive for pursuing such an approach is the argument that competition leads to the least resource cost for providing a given level of service. If competition is effective, it affects both the cost at which services can be purchased and the quality of the services delivered. This is a powerful argument but there are some considerations that would need to be addressed.

- (a) In those areas of science where economies of scale are substantial, contractual provision seems likely to lead to more work being bought outside Northern Ireland. Balancing this, some Northern Ireland institutions might succeed in maintaining skills and increasing scale by expanding their market to compete on an international scale. Within this market it is important not to overlook the degree to which other countries may continue to subsidise their own R&D establishments.
- (b) In terms of public expenditure, this need not be a bad outcome for the overall Northern Ireland economy, if the R&D bought is of equivalent quality and relevance and subsidised by taxpayers in other countries. In short, the benefits would be accessible to Northern Ireland citizens at less than their true cost.
- (c) However, the non-monetary costs and benefits are likely to dominate. There is an understandable wish to retain local talent in Northern Ireland. Where day-to-day contact with the agri-food industry is involved, local knowledge and the trust of the local community is necessary to ensure an effective service. Bringing in external experts, who are working to secure a profit for their companies, may fail to deliver what is needed, not because of lack of skill but from loss of confidence in them by the community.
- (d) A critical feature of any system concerned with rapid response to disease or food safety issues is the ability to mobilise a greatly increased cohort of trained and trusted staff at short notice. In this sense, retaining a larger wholly owned DARD capacity could be seen as an insurance policy.

6.7 Option 4: DARD as an Advocate rather than a Provider

Option 4 is outlined in Diagram 6.5.

Diagram 6.5



- 6.7.1 Under Option 4 the agri-food sector would be treated like any other industrial activity. Its needs for education and R&D would be handled in the same way as for other sectors. The government department responsible would have a duty to represent within government the special needs of its sector - in this case, it would be to ensure that departments responsible for education and industrial development are aware of the needs of the agri-food sector. The government department would only use resources to do those things directly which are in the public interest but which cannot be delivered by other departments.
- 6.7.2 DARD would still require an independent expert advisory committee and would need to ensure that there are adequate consultative procedures. The Professional Advisors would have a mixed function of advice to the Department and of commissioning and overseeing the work of DARD involved in delivering those essential activities that other departments cannot provide. They would also need to maintain close contact with the industry and be open to its requests for R&D work.
- 6.7.3 The DARD unit with responsibility for scientific services would have a general watching brief on the provision of agri-food services by other departments and an important role in ensuring that the industry's priorities would not be overlooked.
- 6.7.4 The institutional pattern of provision for education that emerged would be for DEL to determine. This does not mean that it would necessarily be radically different from that envisaged under Option 1. As with that option, there would be some pressure to reassess this level of provision in the context of the continuing development of the Northern Ireland economy.
- 6.7.5 There is no certainty, under this approach, that specifically agricultural research institutes would continue to exist in Northern Ireland.
- 6.7.6 DARD has major responsibility for ensuring the health of plants and animals, for example. This requires detailed knowledge of the industry and a strong capacity to identify problems early, to recognise their severity, to identify appropriate remedies and to take action when necessary to protect the community. This has been a very strong feature of the existing system and it suggests that the DARD scientific unit would continue to need substantial resources.

- 6.7.7 As with the other options explored here, the major resource impact, assuming that an equivalent level of service is to be retained, would be to redistribute rather than radically change the costs involved. This is not a negligible consideration because it would mean that spending on agriculture and food would have to be clearly justified in the overall provision of science and educational services. The special role of agriculture in the life and economy of Northern Ireland has been the foundation of this provision in the past. It is still of great importance but, as the economy develops, it is likely to diminish.

6.8 OVERVIEW OF THE OPTIONS

- 6.8.1 The Review Panel has considered differing ways in which the service now provided might be organised. None of them have shown possibilities of rapid and dramatic savings if the current level of provision is to be maintained. Any of them would impose considerable change on the operation of the present system. However, our view is that they represent ways in which some important deficiencies of the present system could be addressed.
- 6.8.2 We conclude, therefore, that a fundamental change in present procedures is possible and called for. In bringing this about, a guiding principle must be that a new system will lead to a continuing pressure towards the more efficient use of resources.
- 6.8.3 In the next chapter we recommend the system which we believe would be most appropriate at this stage of the evolution of these services in Northern Ireland.



CHAPTER 7 RECOMMENDATIONS

7.1 INTRODUCTION AND RECOMMENDATIONS

The Review Panel proposes the following system for the delivery of education and R&D and related technology transfer in agriculture and food science in Northern Ireland. In arriving at our conclusions, we have taken account of the information, opinions and data provided to us and of the wider context.

Our recommendations consist of seven related elements, which are:

- a new central decision taking system;
- transfer of the School of Agriculture and Food Science to either the Queen's University of Belfast or the University of Ulster;
- transfer of the teaching function of each of the DARD Colleges to the neighbouring Institute of Further and Higher Education (FE Institute);
- establishment of a Non-Departmental Public Body to be called, for the purposes of this report, the Northern Ireland Agriculture and Food Research Institute (NIAFRI);
- inclusion of the Agricultural Research Institute of Northern Ireland within NIAFRI;
- establishment of a new technology transfer facility within NIAFRI;
- introduction of a competitive bidding process for DARD funded R&D.

These elements are outlined below.

7.2 THE CENTRAL DECISION TAKING PROCESS

7.2.1 Our proposed new central decision taking process has been outlined in Section 6.3 and it is restated here for completeness.

The objective of the system (outlined in Diagram 6.1) is to ensure that there is a clear separation of customer and contractor, that decisions are informed by both scientific and technical concerns, that they are in line with the overall policy of the government of Northern Ireland and that the decision taking process is transparent. The system, which would deal with R&D and technology transfer as well as education in agriculture and food science, allows for access at a number of levels by industrial and other interests. All proposals would be assessed by an independent expert advisory committee, which would consider proposals originating within DARD and from external agencies.

The main characteristics of this system are:-

- (a) *Policy decisions would, as at present, be taken by the Minister of Agriculture and Rural Development on advice from the Permanent Secretary and the Minister would continue to be open to representations from all stakeholders and from colleagues within the Executive and the Assembly.*
- (b) *The Permanent Secretary would be advised by senior professional staff namely the Chief Scientific, Chief Veterinary and Chief Agricultural Officers, here described as the Professional Expert Advisors. It would be their task to assess proposals put forward in terms of their scientific content, their economic significance and their cost. They would be independent of the providers of the services over whom they would have no managerial control, a situation which would differ significantly from the existing arrangements. The role of these providers is described in the options considered below.*
- (c) *Implementing DARD policy involves commissioning work and monitoring performance. Responsibility for the detailed scientific evaluation and monitoring of performance of the agreed work would lie with the Professional Expert Advisors. The preparation and negotiation of contracts with suppliers would be undertaken by a contract commissioning unit which would report to the Professional Advisors and liaise with the Permanent Secretary.*
- (d) *Provision would be made for the Professional Advisors to receive formal advice from an Independent Expert Advisory Committee. It is suggested that this should consist of an independent chairman and approximately ten members. Its members would be appointed using clearly defined criteria; they would be people of the highest quality from science and industry selected in accordance with their scientific skills and professional interests. The Professional Advisors would have observer status at these meetings.*
- (e) *The Independent Expert Advisory Committee would receive representations regarding education and R&D in agriculture and food science from consumers, the agri-food industry and other stakeholders, including scientists, local government and non-governmental organisations (NGOs). The Committee would establish ad hoc working parties to take an independent and expert view of particular proposals. Although it would not include any DARD officials or personnel from any service provider, it would be able to invite such staff and any other experts it chooses, to make presentations to the committee or to serve on its working parties.*

(f) *The minutes of the Independent Expert Advisory Committee meetings and the recommendations it makes should be published and submitted formally to the Professional Advisors. They would consider all proposals in the light of the advice given, the available resources and government policy before making their own formal recommendations to the Permanent Secretary. In order to maintain transparency, such recommendations should also be published.*

7.2.2 The benefits which would be facilitated by this process are:

- a clear distinction between those commissioning the R&D and those delivering it;
- the provision within DARD of professional advice on its R&D, technology transfer and education programmes, irrespective of where these functions are delivered;
- a transparent mechanism for external experts to comment and advise on the education, R&D and technology transfer programmes;
- a method by which interested organisations can have input to those programmes and to know what advice had been given and what decisions have been taken within the system;
- a facility to establish working groups to assist the external advisors on specific topics;
- a facility within DARD to commission and monitor the outputs delivered.

7.2.3 There is yet another unmet challenge and it is that DARD must choose to pursue a limited range of disciplines and topics to be covered by its own R&D programmes. This is neither surprising nor worrying - much larger countries have accepted for some time that they cannot afford to cover all desirable R&D areas and topics, such is the huge cost of international quality R&D. This new structure would facilitate rational choices being made for Northern Ireland regarding R&D priorities.

7.2.4 Decisions by the DARD Minister for Agriculture and Rural Development on which areas of R&D to pursue should in our view be taken in the light of the overall R&D programmes, for agriculture and food, throughout the rest of the UK and in ROI. We feel that much could be gained through a co-ordinated approach to achieve this objective.

7.3 UNDERGRADUATE AND POSTGRADUATE TEACHING AND RELATED R&D

- 7.3.1 The Review Panel recommends the transfer of the existing undergraduate and postgraduate teaching and related R&D provision to the Queen's University of Belfast or the University of Ulster. The choice of university would be a matter for negotiation between DARD and the named universities based, perhaps, on a competitive tendering process.
- 7.3.2 The details of the proposed transfer of students and staff would be a matter for the appropriate legislation and for detailed discussion between the university, DARD, the relevant Trade Unions and individuals; the Review Panel has neither the competence nor the remit to engage in such important and detailed discussions. However, the following indicative arrangements may help to resolve potential ambiguities regarding our recommendations.
- (a) All current undergraduate and postgraduate students – and all new enrolments in the future – would transfer to the appropriate school in the university. It is expected that the university would then address issues such as increasing student intake, diversifying programmes and attracting foreign students.
 - (b) A number of existing Science Service staff would be transferred to the university on an agreed basis, together with their R&D interests.
 - (c) Should the university researchers require access to R&D facilities within NIAFRI, or to engage NIAFRI staff to provide part-time teaching, this could be accommodated via a service level agreement which would also provide for appropriate financial transfers.
 - (d) Should NIAFRI wish to involve the university in any of its R&D programmes, formal contracts could be drawn up to provide for this, as and when required. Such contracts would provide for the transfer of funds between the two bodies.
 - (e) Appropriate accommodation for students and staff – laboratories, classrooms, staff common room, staff offices, for instance – could be identified and made available to the university by agreement with NIAFRI or DARD.
 - (f) Access to facilities at Newforge Lane and at other NIAFRI sites could be made available to university and NIAFRI staff and students on terms to be agreed.

- (g) Appropriate funding would transfer to DEL and be applied using the relevant funding formula. This may require transitional funding arrangements via DARD for a stated period.
- (h) DARD would continue to have a policy input into the university's agriculture and food teaching and R&D provision.

7.3.3 We believe that many benefits would flow from our proposals.

- (a) It would allow the university to pursue an R&D policy for agriculture and food science in Northern Ireland which would be complementary to established DARD policy. This alternative source of R&D, with its attendant expertise, could become an independent critic of, or commentator on, DARD policy, something which is prominently and worryingly absent from current arrangements.
- (b) Because of the university's independence from government, it could seek private sector funding to support teaching and R&D functions, it being the case that donors are not willing to contribute philanthropic funds to government.
- (c) Full integration into the university would encourage the development of a greater interaction between agriculture and food science teaching and R&D and the many other academic specialisms represented in the university. We believe that this would broaden the scope of R&D undertaken and the breadth of academic taught programmes would expand well beyond the current range of options.
- (d) Government Accounting Rules regarding earned income – whereby such income is liable to be returned to the Exchequer – would not apply under this new arrangement. This would encourage staff to seek alternative sources of income.
- (e) The arrangement would greatly facilitate more extensive R&D and teaching interaction with the wider university community. It would also facilitate a greater influence by the university on the R&D activities of the staff involved and hence on future RAE gradings.
- (f) The ambiguous and unsatisfactory position of the management of SAFS - referred to by respondents - would be resolved in that the management arrangements would align with those in the university.

- (g) Resource allocation would be brought into line with that of the university with the potential for a reduction in unit costs of taught courses. There would be greater transparency regarding the allocation of resources between the university and the science activity of NIAFRI, thereby removing most of the considerable and unresolved ambiguity which exists within the current system.

7.4 THE DARD COLLEGES

Teaching function

7.4.1 We recommend that the teaching function both staff and related resources, at DARD Colleges should be integrated with appropriate local Further Education Institutes. The pairings which seem appropriate to each college are as follows, though we suggest that final decisions on this matter should emerge from a detailed consideration by DEL and DARD and the relevant institutes. The suggested pairings are:

- Enniskillen College with Fermanagh College;
- Loughry College with East Tyrone College;
- Greenmount College with North East Institute.

7.4.2 In the course of arriving at our recommendation, we considered a number of possibilities including:

- merging the DARD Colleges into one institution, which we rejected because economies could not be achieved due to the distance between the colleges and the low combined student numbers;
- merging them individually or collectively with a university, which we rejected because this would undermine the special focus of these colleges, as they would be dominated by university philosophies regarding the approach to provision, curricular content and student transfer.

7.4.3 Many details within these proposals will be determined by appropriate legislation and negotiation between DARD, DEL, the FE Institutes, Trade Unions and individuals. The following ideas, therefore, represent broad brushstrokes which provide a more general picture as to how the new arrangement would be put into operation.

- (a) The DARD Colleges teaching functions, both staff and resources, would become integrated with the FE Institutes.
- (b) The membership of the Board of Governors of each of the enlarged Institutes could be augmented to ensure that the agri-food industry would be adequately represented. It would be appropriate also to put in place an Advisory Board for Agriculture, Food and Rural Development, including industry representatives, in each of the three FE Institutes.

- (c) This teaching function being, under these proposals, part of the general further education/higher education provision, would become the responsibility of DEL. This would mean that the relevant funding would transfer to DEL with an appropriate funding formula applying. It is recommended that transitional funding arrangements should be put in place to allow for a gradual hand over of funding responsibilities from DARD to DEL. However, DARD should continue to have a policy input into the teaching provision which was formerly in the DARD Colleges.

Technology Transfer

- (d) The technology transfer activities and resources of the colleges would be transferred to a technology transfer facility within NIAFRI. It is stressed that these resources could remain in their current location in order to ensure local involvement and service – a particular and strong feature of the current arrangements.

Development work

- (e) The development work of the DARD Colleges, currently carried out under the technology transfer banner, would transfer to an appropriate applied R&D unit within NIAFRI, with resources remaining at their present locations.

7.4.4 The rationale for our proposals is as follows:

- (a) The evidence we received indicated substantial satisfaction with the quality and range of the education provided, though there were some claims from industry that its needs, particularly at the lower levels of course and skills provision, are not being fully met. Their commitment to technology transfer was accepted as being dedicated and of a good standard. We believe that our proposals would ensure that the standards delivered by the existing system would at least be maintained.
- (b) Some reservations were expressed regarding existing attention to, and capability in, rural development and diversification which, for success, depend on subjects and disciplines which are not generally found in agricultural colleges.
- (c) The data on the student population of each college – contained in Appendix D – show that each college, though excellent, is rather small and economically unviable with full-time equivalent student numbers of 330, 250 and 120 giving a total of 700. A contrast with the size of Further Education Institutes was made where the average student

population was 1300 full-time equivalents, which the Review Panel noted was significantly greater than the combined full-time equivalent student numbers of all three colleges.

- (d) The inevitable consequence of such small size is that unit costs per student are necessarily increased due to the small size of the DARD Colleges. We believe that such costs are unsustainable, even in the short term, particularly when national budgets will be put under further pressure.
- (e) It is reasonable to assume that student numbers in traditional agriculture will fall as employment opportunities decline. If left as they are, the DARD Colleges are likely to face a bleak future within the next decade.

7.4.5 Our proposal would have a number of positive aspects:

- (a) As the teaching function of the DARD Colleges would be part of an incorporated institute, there would be greater freedom to innovate and to attract and retain income from sources other than government and to interface with, and be influenced by, the needs of the agri-food industry.
- (b) The outcome would mean no diminution of support for or presence in, the local communities associated with each existing college. Indeed, it would make the college facilities available and attractive to a wider range of people.
- (c) It would reduce costs through the economies of scale which would flow from being a part of a larger institution.
- (d) It would, potentially, add to enrolments in agriculture and food programmes since the FE and HE students in the institutes could avail themselves of modules in the former DARD Colleges in order to enhance the range of skills which they could develop.
- (e) The students at the former DARD Colleges could broaden their range of knowledge and skills in complementary areas by studying modules in a wide range of subjects including management, marketing, foreign languages and economics.
- (f) Incorporation status would make it possible for extra income to be earned and retained in relation to the teaching function which would otherwise have been liable to be returned to the Exchequer under Government Accounting Rules.

(g) Much new activity could be anticipated:

- new programmes could evolve as industry requirements change;
- a wider range of educational provision for the local community adjacent to the college and for the agri-food industry throughout Northern Ireland could be developed;
- development of provision to support rural development and diversification would be expected.

7.5 NORTHERN IRELAND AGRICULTURE AND FOOD RESEARCH INSTITUTE

7.5.1 The Review Panel's recommendation is that a Non-Departmental Public Body (NDPB) - named the Northern Ireland Agriculture and Food Research Institute for the purposes of this report – should be established. NIAFRI would consist of all of the existing Divisions within the Science Service (excluding SAFS) together with ARINI as well as the relevant personnel and resources currently engaged in the technology transfer activity of AFDS ie the technology transfer and development work currently undertaken by DARD Colleges. The details of the technology transfer changes are developed in Section 7.7.

7.5.2 We recommend most strongly that NIAFRI should have an autonomous governing body consisting of an independent chairman and also members of the highest quality from science and industry, including from outside Northern Ireland, chosen in accordance with their scientific skills and professional interests.

It should have a Chief Officer – with an appropriate title. He or she, together with the heads of units, would constitute the top management team of NIAFRI.

7.5.3 The NIAFRI Management Statement and Financial Memorandum should ensure that its functions and scope would be defined clearly, requiring that it would inter alia:

- continue to receive funds from DARD in respect of many of its functions;
- be accountable to the Comptroller and Auditor General;
- retain income earned for any valid purpose of NIAFRI;
- be free to establish companies, owned in whole or in part by NIAFRI;
- respond to requests for assistance by DARD or the Northern Ireland Executive in emergencies;
- provide services such as teaching, R&D, diagnostic and testing to other bodies and be remunerated for such services;
- collaborate with any body within Northern Ireland, GB or any other country;
- undertake, as competent authority, a range of appropriate statutory functions on behalf of DARD; legal guidance available to us indicates that NIAFRI could undertake this role, provided it is clearly set out in the Management Statement and Financial Memorandum;

- should be subject to scrutiny of its programme of work by the Independent Expert Advisory Committee, which forms part of our recommended central decision taking process;
- develop a focused R&D programme which would complement or be complemented by those of neighbouring jurisdictions, thereby extending the overall range of R&D for the benefit of Northern Ireland.

7.5.4 The Review Panel considered, in separating the Science Service from DARD, whether an Executive Agency or a Non-Departmental Public Body would be the most appropriate new organisational arrangement. Whereas it was clear that an NDPB could, depending on how its status and remit were defined, be as non-autonomous as an Executive Agency, it was equally clear that an Executive Agency could not have the same freedom of operation and execution provided for it, as could an appropriately established NDPB.

7.5.5 The rationale for and benefits of our proposals are seen as:

- (a) The freedoms which the NDPB status could confer on NIAFRI are vitally important, not only for the service which it must provide, but also for its ability to innovate and to lighten the burden of financial support from the shoulders of government. Being a formal part of the Civil Service – which the status quo (or indeed Executive Agency status) formalises – brings with it constraints in operational freedom which are entirely proper to the Civil Service but which are equally inappropriate for organisations which are meant to be innovative, entrepreneurial and responsive to external needs and to engage with the business community.
- (b) The establishment of NIAFRI would create a broadly based, multi-disciplinary body spanning all of the major agriculture and food disciplines. It would ensure a broad response to and engagement in R&D, regulatory, diagnostic and other aspects of the needs of the agri-food sector in Northern Ireland. It would also lend itself to taking on a range of wider government R&D e.g. environmental as well as other government scientific work, including water quality monitoring.
- (c) There is also the substantial issue of Government Accounting Rules which, while appropriate for Civil Service bodies, would operate as a disincentive to attracting funding from external resources.

7.6 THE AGRICULTURAL RESEARCH INSTITUTE OF NORTHERN IRELAND

7.6.1 Having considered and balanced all of the evidence made available to us, we recommend that ARINI should be an integral part of NIAFRI. It would, as a result, have a close relationship with the other units of NIAFRI and, therefore, the disciplines which they represent.

The rationale for and potential benefits of our proposal include the following:

- (a) The evidence presented to the Review Panel contained some very favourable comment on the work of ARINI. However, some concerns were expressed regarding the lack of independence of ARINI from DARD and the lack of a close relationship with relevant parts of the Science Service – and vice versa. There was also concern expressed regarding the relatively narrow R&D span of ARINI and the need to place these disciplines in closer proximity, in organisational terms, to the many disciplines represented by the Science Service. Our proposal can serve to meet these concerns.
- (b) There were mixed messages regarding the influence which industry had on the ARINI R&D programme, and much adverse comment on the relatively low priority perceived to be accorded by it to technology transfer to the agri-food industry. The existence of the new technology transfer facility in NIAFRI would provide the underpinning support structure which can guarantee the regular and complete transfer of knowledge regarding the outcomes of the latest ARINI R&D projects to the agri-food industry; it would also have that, necessarily greater, autonomy, vis-à-vis DARD, which is significantly absent from the current arrangements.

7.7 TECHNOLOGY TRANSFER

- 7.7.1 We recommend the establishment within NIAFRI of an integrated technology transfer facility, perhaps a division, in agriculture and food science in Northern Ireland. It would:
- integrate the technology transfer work currently carried out at the DARD Colleges and by the Science Service and ARINI;
 - harvest the outcomes of R&D - published or unpublished – in universities and R&D institutions in Northern Ireland and world wide for the benefit of the agri-food industry in Northern Ireland.
- 7.7.2 (a) This facility would be responsible for the effective delivery of technology transfer throughout Northern Ireland. Its work should be included in a multi-annual rolling plan for NIAFRI which would include technology transfer. NIAFRI's annual report should include specific account of technology transfer and be subject to regular and detailed scrutiny by DARD.
- (b) As already outlined in Section 7.4.3 (d) above the technology transfer resources, both human and physical, currently within the DARD Colleges would be united with corresponding resources currently within the Science Service and ARINI under a new technology transfer facility within NIAFRI. This does not imply a change in the present distribution of technology transfer resources throughout Northern Ireland. However, in the longer term this will have to respond to changing needs.
- 7.7.3 The rationale for, and potential benefits of this arrangement are:
- (a) In Chapter 4, we pointed out the important role which technology transfer plays in bringing the outcomes of R&D programmes to the attention of the agri-food industry and the challenge that exists for the institutions to help that industry in applying these outcomes to improve existing processes and products and in helping to develop new products.
 - (b) It is clear that the existing Science Service and AFDS, including the DARD Colleges and ARINI, have all had an important and, we suggest, an interlinking role in relation to technology transfer.
 - (c) It is also clear from the evidence presented that whereas there are many successes to which the current system can properly lay claim, the picture is not uniformly positive. Evidence suggests that some parts of the current system pay too little attention to the technology transfer function and, in addition,

there appears to be inadequate collaboration between the various players.

- (d) DARD has opted to invest in R&D related to its highest priorities and yet, there is R&D being undertaken in other countries whose results, where applicable to local circumstances in Northern Ireland, could make a very significant contribution to Northern Ireland's agri-food industry. A technology transfer facility in NIAFRI would better ensure that the agri-food industry in Northern Ireland is kept abreast of relevant world wide developments.

7.8 COMPETITIVE TENDERING FOR R&D FUNDING FROM DARD

We recommend that, in principle, all R&D funds should be open to competitive tendering. It is for DARD to determine what resources or capacity it needs to have control over or to have available to it. DARD would also take into account the need to retain certain scientific facilities in Northern Ireland.

The central decision taking process described in Section 6.3 would provide the mechanism for DARD to make informed, objective and transparent decisions on R&D funding. The funding for technology transfer, diagnostics, analytical, monitoring, surveillance and enforcement work would be dealt with separately.

The rationale for, and benefits to be derived from, this proposal are listed below.

- (a) Evidence was presented to the Review Panel criticising what was regarded as a non-competitive system in relation to the allocation of R&D funds. We received representations arguing that a significant percentage of R&D funds should be made available for competitive bidding by universities and R&D bodies.
- (b) It was also put to us that the structure currently in place within DARD and the Science Service, if applied to a competitive bidding process or competition, would necessarily be judged by one of the competitors and that this would generate issues regarding transparency and balance in relation to the resultant decisions. This issue would be resolved under our proposals to distinguish between customer and contractor in the new central decision taking process for education, R&D and technology transfer which we have already described in Section 6.3.

7.9 SUMMARY

Major changes to the agri-food industry have been taking place for some years now and there is every likelihood that these changes will accelerate and will become increasingly difficult to anticipate or to make an adequate response. In this context, adhering to the status quo – or to a system close to the status quo - will not, in our view, serve Northern Ireland well.

It is the strongly held view of the Review Panel that the full implementation of our proposals will further enhance the quality and cost effectiveness of the services provided to the agri-food industry in Northern Ireland.

The Review Panel advocates the full adoption of our recommended new system as providing the best future for all of the services – educational, R&D, technology transfer, diagnostic, analytical, monitoring, surveillance and enforcement work – which Northern Ireland will require.

APPENDIX A

LIST OF DARD ESTABLISHMENTS VISITED BY THE REVIEW GROUP

Department of Agriculture and Rural Development,
Dundonald House

Agricultural Research Institute of Northern Ireland,
Hillsborough

Agriculture and Food Science Centre,
Newforge

Northern Ireland Horticultural and Plant Breeding Station,
Loughgall

Northern Ireland Plant Testing Station,
Crossnacreevy

River Bush Salmon Station,
Bushmills

Veterinary Sciences Division,
Stormont

Veterinary Sciences Division,
Omagh

Research Vessel Lough Foyle

Greenmount College,
Antrim

Enniskillen College

Necarne Castle,
Irvinestown

Loughry College,
Cookstown

Forestry School,
Pomeroy

APPENDIX B

SUBMISSIONS RECEIVED

The Board of Trustees, The Agricultural Research Institute of Northern Ireland

Agri-Environment Group, Agricultural and Environmental Science Division, Newforge Lane, Belfast

AgriLink

AgriSearch

Prof AT Andrews, School of Applied Sciences, University of Wales Institute

Judith A Annett, Countryside Consultancy

Mr K Baird, Technical Director, Moy Park Ltd

Prof J Buckley, Department of Food Science, Food Technology and Nutrition, University College, Cork

Committee of University Professors in Food Science and Technology, University of Reading

Council for Nature Conservation and the Countryside

Raymond Coyle, President, Student Representative Council, Loughry College

Dr M Dickey-Collas, Aquatic Systems Group, Agricultural and Environmental Science Division, DARD, Newforge Lane, Belfast

Disability Action

Ecology and Land Use Section, Applied Plant Science Division, DARD, Newforge Lane, Belfast

Environment and Heritage Service

Dr Linda Farmer, Head of Food Chemistry, Food Science Division, DARD, Newforge Lane

Food & Drink Training Council

Food Microbiology Section, Food Science Division, DARD, Newforge Lane, Belfast

Food Science Division, DARD, Newforge Lane, Belfast

Foresight Northern Ireland

Greenmount Advisory Board

Michael Haverty, Department of Agricultural and Food Economics, Newforge Lane, Belfast

Heather Henning, Newry

Mr Raymond Hilman, Syngenta Crop Protection

The Institute of Food Science and Technology
 Irish Farmers Journal
 Irish Thoroughbred Breeders Association
 Prof EW Jones, Harper Adams University College
 Mr John Kidd, Banbridge
 Seamus Lillis and Associates
 Marcus McAuley, Deputy Chief Fisheries Officer, Department of Culture, Arts and Leisure
 Mr Miceal McCoy, Co. Armagh
 Dr P McGrattan, Department of Medical Genetics, Belfast City Hospital Trust
 WA McIlmoyle and Associates
 T A McIlroy
 Rodney Magowan PR, Hillsborough
 Prof JR Mitchell, School of Biosciences, University of Nottingham
 Molecular Biology and Biotechnology Section, Applied Plant Science Division, DARD, Newforge Lane, Belfast
 Dr DG Neilly, Linen manufacturing company
 Newry and Mourne District Council
 North of Ireland Veterinary Association
 Northern Ireland Assembly Committee for Agriculture and Rural Development
 Northern Ireland Dairy Association
 Northern Ireland Environment Link
 Northern Ireland Food and Drink Association
 Northern Ireland Grain Trade Association
 The Northern Ireland Institute of Agricultural Science
 Northern Ireland LEADER Network
 Northern Ireland Meat Exporters Association
 Northern Ireland Public Service Alliance
 Plant and Environmental Protection Section, Applied Plant Science Division, DARD, Newforge Lane, Belfast
 Quest International
 Royal Society for the Protection of Birds
 Rural Community Network, Northern Ireland
 Rural Development Council

Rural Generation Ltd
Rural Innovation and Research Partnership, Northern Ireland Ltd
School of Agriculture and Food Science Staff Stakeholder Paper
Edmund Slaine, Loughry College, DARD
Prof K J Thomson, University of Aberdeen
Ulster Farmers' Union
University of Ulster
Prof CT Whittemore, Institute of Ecology and Resource
Management, University of Edinburgh
Graham Wilson, Roche Products Ltd Ireland
Young Farmers' Clubs of Ulster

Note: Submissions were received from respondents who requested confidentiality; their names are not included in the above list.

APPENDIX C

SCHOOL OF AGRICULTURE AND FOOD SCIENCE, UNDERGRADUATE DEGREE COURSES

Agriculture, BAgr

Agricultural Science, BAgr/BSc

Agricultural Technology, BSc, (in collaboration with Greenmount Agricultural College)

Animal Science, BSc

Agricultural Economics and Management, BSc

Food Science, BSc

Food Technology, BSc

Microbiology, BSc

Plant Science, BSc (not available for entry after 2001)

SCHOOL OF AGRICULTURE AND FOOD SCIENCE, POSTGRADUATE COURSES

MSc/Graduate Diploma in Food Science

MSc/Certificate in Food Safety Management, Part-time

SCHOOL OF AGRICULTURE AND FOOD SCIENCE – STUDENT NUMBERS

Table C1: Bachelor Degrees awarded by the School of Agriculture and Food Science at QUB

SUBJECT AREA	1997	1998	1999	2000	2001
Agriculture	11	19	21	26	20
Animal Science	NA	NA	NA	NA	NA
Food Science	16	9	5	13	13
Food Technology	5	8	1	0	0
Plant Science	0	0	0	0	0
Microbiology	3	1	1	0	1
Agricultural Economics and Management	14	19	20	17	14
Agricultural Science	0	3	3	6	2
Agricultural Technology	NA	NA	NA	NA	NA
TOTAL	49	59	51	62	50

Note:

NA = Not applicable. The first graduates from Animal Science and Agricultural Technology are due to graduate in July 2002.

Table C2: New Undergraduate Enrolments in QUB School of Agriculture and Food Science

	96/97	97/98	98/99	99/00	00/01
Number of new enrolments	85	87	78	63	45

Table C3: Postgraduate Enrolments in QUB School of Agriculture and Food Science

NUMBER OF POSTGRADUATE STUDENTS	96/97	97/98	98/99	99/00	00/01
Research	120	107	132	103	86
<i>Full-time</i>	66	52	59	47	41
<i>Part-time</i>	31	34	32	24	21
<i>Thesis only</i>	23	21	41	32	24
Taught Courses ^{1,2}	12	9	34 ³	55	38
TOTAL	132	116	166	158	124

Notes:

1. *Postgraduate students enrolled in SAFS in the MSc/Dip/Cert in Communication, located at Loughry, are not included in these figures but are included in the total for DARD Agricultural Colleges.*
2. *Postgraduate students in Rural Studies at the Gibson Institute are not included in these figures.*
3. *The taught course in Food Safety Management was introduced in 1998/99.*

APPENDIX D

*Student Numbers at DARD Colleges**Table D1: Students Enrolled at the Colleges by Academic Year*

ENROLMENTS	96/97	97/98	98/99	99/00	00/01
Loughry					
Full-time	257	274	279	281	247
Part-time	68	121	128	185	205
Total	325	395	407	466	452
Greenmount					
Full-time	388	414	353	353	315
Part-time	426	453	387	444	404
Total	814	867	740	797	719
Enniskillen					
Full-time	94	140	130	142	137
Part-time	190	181	137	130	99
Total	284	321	267	272	236
Total Three Colleges					
Full-time	739	828	762	776	699
Part-time	684	755	652	759	708
GRAND TOTAL	1,423	1,583	1,414	1,535	1,407

Note: Student numbers at Enniskillen College include enrolments on the National Diploma in Equine Studies. Fermanagh College is the lead partner in this course but students are based in Enniskillen College.

Table D2: Students Enrolled at the Colleges by Academic Year, Full-time Equivalents

ENROLMENTS	96/97	97/98	98/99	99/00	00/01
Loughry					
Full-time	191	216	212	217	210
Part-time	19	29	31	32	37
Total	210	245	243	249	247
Greenmount					
Full-time	288	302	261	273	255
Part-time	87	84	85	68	76
Total	375	386	346	341	331
Enniskillen					
Full-time	77	98	102	108	105
Part-time	33	30	28	25	12
Total	110	128	130	133	117
Total Three Colleges					
Full-time	556	616	575	598	570
Part-time	139	143	144	125	125
GRAND TOTAL	695	759	719	723	695

Note: Full-time equivalent student numbers (FTEs), for full-time students are different from those in Table D1. The calculation of FTE's for full-time students takes account of students who are out on work placements and those whose course does not last for the full academic year.

Table D3: Provision of Short Courses at DARD Colleges

	95/96	96/97	97/98	98/99	99/00
Number of days training	8,376	14,231	18,176	17,505	18,372
Number of students trained	7,397	10,808	14,099	10,477	9,601

APPENDIX E

SCIENCE SERVICE RESEARCH PROGRAMMES

Crop and Grass Production

Livestock Production

Animal Health and Welfare

Food Quality and Processing

Food Safety

Fisheries and their Environment

Environmental Management

Economics and Rural Development

Forestry

SCIENCE SERVICE SITES

Agriculture and Food Science Centre, Newforge Lane, Belfast

Food Science Division

Applied Plant Science Division

Agricultural and Environmental Science Division

Agricultural and Food Economics Division

Biometrics Division

Veterinary Sciences Division, Stormont, Belfast

Veterinary Sciences Division, Omagh

Northern Ireland Plant Testing Station, Crossnacreevy

Northern Ireland Horticultural and Plant Breeding Station,
Loughgall

River Bush Salmon Station, Bushmills

Marine Research Vessel "Lough Foyle", based in the Port of Belfast

The Agricultural Research Institute of Northern Ireland,
Hillsborough

Note:

ARINI is a quasi-autonomous Non-Departmental Public Body, established in 1927 by Act of Parliament. It is managed by a Board of Trustees, including some DARD officials. The Director of the Institute and its project leaders are DARD civil servants.

APPENDIX F

GLOSSARY OF ACRONYMS

AFDS	Agri-Food Development Service
AFED	Agricultural and Food Economics Division
APSD	Applied Plant Science Division
ARINI	Agricultural Research Institute of Northern Ireland
BBSRC	Biotechnology and Biological Sciences Research Council
BIOM	Biometrics Division
BSE	Bovine Spongiform Encephalopathy
CAO	Chief Agricultural Officer
CAP	Common Agricultural Policy
CSO	Chief Scientific Officer
CVO	Chief Veterinary Officer
DARD	Department of Agriculture and Rural Development
DEL	Department of Employment and Learning
DETI	Department of Enterprise, Trade and Investment
EU	European Union
FE	Further Education
FE Institutes	Institutes of Further and Higher Education
FFEPG	Food, Farming and Environmental Policy Group, DARD
FMD	Foot and Mouth Disease
FSD	Food Science Division
FTE	Full Time Equivalent
GB	Great Britain
GM	Genetically Modified
HE	Higher Education
HNC	Higher National Certificate
HND	Higher National Diploma
IT	Information Technology
NC	National Certificate
NCVQ's	National Certificate of Vocational Qualifications

ND	National Diploma
NDPB	Non-Departmental Public Body
NGO's	Non-Governmental Organisations
NI	Northern Ireland
NIHPBS	Northern Ireland Horticultural & Plant Breeding Station
NIPTS	Northern Ireland Plant Testing Station
PG	Postgraduate
QUB	The Queen's University of Belfast
R&D	Research and Development
RAE	Research Assessment Exercise
ROI	Republic of Ireland
SAC	Scottish Agricultural College
SAFS	School of Agriculture and Food Science
SEERAD	Scottish Executive Environment and Rural Affairs Department
TQA	Total Quality Assessment
UG	Undergraduate
UK	United Kingdom
UU	The University of Ulster
VSD	Veterinary Sciences Division
WTO	World Trade Organisation

APPENDIX G

PANEL MEMBERSHIP

Dr Daniel O'Hare, Chairman

Dr O'Hare was Founding President of Dublin City University from March 1977 until September 1999. He holds a BSc and MSc in Chemistry from the National University of Ireland and a PhD from the University of St Andrews, Scotland and Honorary Doctorates from The Queen's University of Belfast, the University of Ulster, Trinity College Dublin and the National University of Ireland. He is currently Chairman of the Food Safety Authority of Ireland, the Expert Group on Future Skills Needs, the Information Society Commission, Ballymun Regeneration, The Task Force on the Physical Sciences and the Independent Hospitals Association of Ireland. He also serves as a member of the Food Safety Promotion Board. He sits on the Board of Directors of Media Lab Europe and is a non-executive Director of Calor Limited.

Professor Sir John Marsh CBE FRAgS FRASE CBiol FIBiol

Professor Marsh is a past Director of the Centre for Agricultural Strategy at the University of Reading. He has also served as Secretary and President of the Agricultural Economics Society and as Chairman of the Agricultural Wages Board for England and Wales. He is a Governor of the Royal Agricultural College, Cirencester and a member of the Governing Body of the Scottish Crop Research Institute. He is Chairman of The Society for the Responsible Uses of Resources in Agriculture and on the Land, RURAL, and is President of the British Institute of Agricultural Consultants, BIAC .

Mrs Catherine Dixon, BA Law

Mrs Dixon is a solicitor and managing partner of James H Rodgers and Co. in Portadown, Northern Ireland. She specialises in Children and Family Law. She has been a member of the Council of the Law Society of Northern Ireland since 1988, and was President in 1999. She has served on the Council of Legal Education for Northern Ireland since 1990. She is also a member of the Children's Order Advisory Committee to the Lord Chancellor. She is currently Deputy Chairman of The Police Retraining and Rehabilitation Trust.

APPENDIX H**SECRETARIAT AND CONTACT DETAILS**

Secretary to the Review Body	Dr Bernie Stuart Mr Brian Murphy OBE
Assistant Secretary to the Review Body	Miss Lyanda McFarlane (until February 2002) Mrs Sheelagh McCausland (from February 2002)
Secretarial Support	Mrs Jean Maginnes
DARD Science Service Liaison	Dr Trevor Gilliland
DARD Agri-Food Development Service Liaison	Mr Ian Titterington
DARD Rural Development Division Liaison	Miss Jennifer McLernon

Location

until 30 April 2002
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from 1 May 2002
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and R&D in Agriculture
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