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Report to  
SEERAD

December 2005

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# 1. Introduction

## 1.1 Background and context

The Science and Research Group (SRG) of the Scottish Executive Environment and Rural Affairs Department (SEERAD) secures scientific research related to the Department's responsibilities. To date, this research has been procured from a number of providers, namely the Scottish Agricultural College (SAC) and the Scottish Agricultural and Biological Research Institutes<sup>1</sup> (SABRIs) - collectively termed the main research providers (MRPs) – on an institute-by-institute basis by means of grant-in-aid payments. Such funding covers direct running costs, overheads and capital investment and provides a platform from which other funding sources can be accessed. As part of this sponsorship arrangement, SEERAD provides funding to assist MRPs to meet superannuation commitments and the cost of redundancy payments as they fall due.

SEERAD is unusual in that as a policy department it provides significant funding to maintain a research capability. Thus it plays a role analogous to a Research Council by providing a core strategic grant to support research capacity; however, in its role as a “customer” for research outputs, SEERAD does not necessarily always need or make use of the full outputs of the research base over and above its specific requirements. As a consequence, the SABRIs are heavily dependent on SEERAD for funding and SEERAD's research needs are met by a small number of providers.

In addition, the MRPs are all small in scale and there is concern as to whether they have the critical mass required for long term sustainability in an environment where both capital and operating costs associated with research are rising. All need to examine their future strategies and funding, along with organisational structures and external relationships to support a sustainable future.

SEERAD's Strategic Research Strategy for 2005-2010<sup>2</sup> presents a new model for the funding of the MRPs through the commissioning of long term research programmes rather than through the sponsorship of institutes through the provision of grant-in-aid. This new funding mechanism will take effect from 2006/07 and research outputs will be aligned with SEERAD's policy requirements.

<sup>1</sup> Macaulay Land Use Research Institute (MLURI), Moredun Research Institute (MRI), Rowett Research Institute (RRI), Scottish Crop Research Institute (SCRI) and the Hannah Research Institute. Following a decision to withdraw SEERAD funding from March 2006, the Hannah research Institute does not form part of this study.

<sup>2</sup> Strategic Research for SEERAD 2005-10

In the short term, a move to commissioned research programmes as outlined in the SEERAD Research Strategy will result in a significant and fundamental change in the relationship between SEERAD and the MRPs; their relationship will become more “arm’s length” and become one of customer and supplier rather than direct sponsorship.

Over the longer term, a move to commissioned research programmes will provide SEERAD with the opportunity to identify alternative research providers and to open up some of its research procurement to competition. This will require that the MRPs identify and gain access to additional funding sources for current work or open up new areas of contract work, and they will need a sufficient period of time to do so.

Although the move to the commissioning of research programmes will take effect in April 2006 and submissions put forward by the MRPs are currently under review, the introduction of competition to the process is recognised as a longer term objective. Such a transition will require careful management and will involve significant change to the businesses of the MRPs; access to the alternative sources of funding that will allow them to compete on a “level playing field” will be critical and may take time to acquire. SEERAD recognise these factors.

## **1.2 Terms of reference**

The purpose of this study is to advise the SRG on how far it is likely to be able to go in moving away from sponsorship of the MRPs towards procurement through open competition and how such a process could be achieved. Specifically, advice is required on a viable commissioning model (or models) that, over a ten year time span (and beyond), will:

- Manage rolling programmes of policy relevant environmental, biological and agricultural research
- Increase levels of competition in these programmes for SEERAD funding
- Manage the financial impact of transferring contingent liabilities from SEERAD to MRPs (taking account of the potential need for funds to facilitate this)

The development of such a model (or models) will be influenced by:

- The continuing science needs of SEERAD during and beyond the period of transition
- The likely availability of funds
- The Report of the Research Council Institute and Public Sector Research Establishment Sustainability Study (RIPSS)
- Past consultancy by Pricewaterhouse Coopers (PwC) reviewing alternative organisational structures for the MRPs
- The potential impacts on the present research base

- Present and potential strategic alliances within the research base
- Experience from elsewhere of remodelling relationships with public sector research establishments.

While we are cognisant of previous studies reviewing potential organisational structures for the MRPs<sup>3,4</sup>, it is beyond the scope of this study to develop further these analyses. However, where certain funding models will be influenced either positively or negatively by a particular organisational structure (and vice versa) these are noted.

### 1.3 Methodology

This study was conducted between September and December 2005, and involved:

- A review of prior documentation relating to SEERAD research procurement and Institute activity
- Site visits and interviews with Directors and senior colleagues at each MRP
- Round-table working sessions with MRP Directors, SEERAD staff and others
- Examination, through meetings, desk research and referral to prior Arthur D. Little experience, of a number of comparison examples of research procurement. Several were selected as case studies:
  - United States Department of Agriculture (USDA)
  - Foundation for Research Science and Technology (FRST) in New Zealand
  - The Biotechnology and Biological Sciences Research Council (BBSRC)
  - Department of Agriculture, Food and Rural Affairs (DEFRA)
- Interviews with a selection of other parties including representatives of the Prospect union and of Institute staff, DEFRA personnel and BBSRC senior executives

Our report considers:

- SEERAD's requirements
- Research procurement
- A proposed approach to research provision
- Issues to be addressed in moving towards a new model
- Implications of the funding model for the MRPs
- Recommendations and conclusions

<sup>3</sup> Research Sponsorship Review, Brian Jamieson & Associates, 2003

<sup>4</sup> SEERAD, MLURI, MRI, SAC, SCRI: Consultancy on Proposed Collective Structure, PricewaterhouseCoopers, 2005

Although we noted that institutions, most particularly SAC, play a part in other important activities such as knowledge transfer, education and consultancy, it was not part of our scope to consider these activities explicitly.

## 2. SEERAD's requirements for research

### 2.1 There are at least six reasons why a policy department may fund science

SEERAD is unusual in that within a policy-driven government department, it has retained the exclusive responsibility for a number of research institutes. However, in common with DEFRA, SEERAD is a policy department that funds substantial scientific research. There are at least six reasons why such a department may wish to fund science, namely:

- Direct requirement for scientific findings in the formulation and evolution of policy
- To ensure that the Executive has the necessary scientific capability to respond, sometimes at very short notice, to urgent issues and emergencies (e.g. of an environmental or disease character)
- Providing a capacity to anticipate new and emerging issues and assess their significance – including a horizon scanning capability
- To address the needs of key end-users, such as issues that are of importance across a relevant industry, but that industry itself is unlikely to address in sufficient scientific detail, perhaps because of their perceived longer-term nature or fragmentation of the industry (in other words, to address market failure)
- To ensure adequate provision and continuity of longer-term monitoring initiatives
- To ensure that strategically important national databases are maintained and distributed, and, if necessary, enhanced

The role of science in supporting the development and formulation of policy is of particular importance and, indeed, within the context of this study SEERAD's desire to improve the policy-relevance of research in response to a range of diverse drivers is paramount. It is key to strategy formulation that the various drivers for science in the work of the Department, and more widely in the Executive, are made explicit and balanced. It is also important to make sure that the right processes, structures and responsibilities are in place to respond to all the drivers in an efficient and cost effective way.

## 2.2 SEERAD’s research requirements centre on, but are not restricted to, policy

SEERAD’s research requirements for the period 2005 to 2010 are outlined in the document “Strategic Research for SEERAD 2005-2010”. This strategy marks a point of departure for SEERAD; it introduces commissioned research programmes and a move away from the sponsorship of institutes through grant-in-aid. Research Programmes are identified in the strategy as having high-level policy objectives as their primary drivers underpinned by a series of “cross-cutting themes”. A summary of the 2006 research programmes and cross-cutting themes is provided in Table 1.

**Table 1: Summary of 2006 Research Programmes and Cross-Cutting Themes**

| Research Programmes                              | Cross-Cutting Themes  |
|--|---|
| Profitable and Sustainable Agriculture - Plants  | Responding to Climate Change  |
| Profitable and Sustainable Agriculture – Animals | Protecting Biodiversity   |
| Land Use and Rural Stewardship                   | Environmental, Social and Economic Sustainability of Rural Scotland |
| Impacts on Human Health                          |   |

Source: Strategic Research for SEERAD 2005-2010

The major policy drivers and illustrative outputs of the research programmes are outlined in the Strategy document in the form of high-level aims and policy outputs rather than by prescription of specific research projects. The MRPs have provided proposals against the research programmes indicating how they propose to deliver the outputs required by SEERAD and meet the policy aims.

The strategy outlines SEERAD’s broad policy requirements for research, engaging end users and ensuring appropriate knowledge transfer. In the current strategy, these requirements are aligned closely to the MRPs’ existing activities – in part a transitional support mechanism to allow the institutes’ time to adapt to the move to commissioned research. However, at present there is little indication of SEERAD’s future policy direction and research requirements beyond the 2006-2011 commissioning round. SEERAD have instituted a framework through the appointment of a Strategic Science Advisory Panel to address this from 2006 onwards.

### **2.3 A variety of providers could potentially meet SEERAD's research requirements**

The current SEERAD strategy enshrines a move towards scientific research of increased policy relevance. A move to commissioned research programmes is seen as allowing SEERAD to manage its funding within its research requirements, thereby minimising “cross subsidy” for research activities that lie beyond the bounds of policy relevance. Traditionally, the MRPs have been the primary providers of policy-related research for SEERAD and, given the experience and expertise in the MRPs, such a relationship is likely to continue even under a model of research commissioning.

However, the open commissioning of research programmes provides an opportunity to allow a diversity of suppliers to contribute to SEERAD's total research requirements. It also recognises that the research requirements of the Department are changing as policy demands new evidence and are likely to continue to change. SEERAD needs to be able to respond to these changes. In the future, suppliers could potentially include: the MRPs; other public sector research establishments; universities; and commercial research providers. For many areas of research SEERAD's requirements may be met from within the Scottish research base; however, alternative suppliers may exist elsewhere in the UK or overseas.

It is recognised that the scope for international competition is limited, and in some areas the MRPs are likely to continue to be best placed to deliver SEERAD's future policy-relevant research requirements. For example, the delivery of Scottish policy-relevant research may require specific fieldwork to be conducted in Scotland, and therefore competition will be limited to Scottish providers with accesses to appropriate field sites, or in the case of long-term monitoring studies, future providers are most likely to be the existing MRPs. Where the work requires specific understanding of conditions in Scotland or relevant expertise, it is likely that the Scottish providers will be in the strongest position in international competition.

### **2.4 The scope for a move to competitive procurement is constrained by several factors**

SEERAD's research strategy makes clear the desired intent to move to, and maintain, the commissioning of research programmes, initially in a non-competitive manner, but with the potential to increase the level of competition for funding over time. Such a move is influenced by a number of issues including:

- Recognition that the existing funding arrangements for grant-in-aid will not be sustainable in the longer term

- The desire to fund only policy-relevant research, through rolling research programmes, although these will include provision for supporting infrastructure within the programme funding
- The wish to give the MRPs flexibility to determine their own future and make their own management decisions
- A need to reduce additional and continuing exposure to pension and redundancy liabilities
- The need to meet changing research requirements

Notwithstanding SEERAD's need to move to commissioned research and consequent changes to the relationship with the MRPs, a number of factors are likely to ensure that the MRPs continue to play a strong role in both the provision of policy relevant research and in the national science base. Similarly, the rate at which competition is introduced to the procurement process and the extent of competition will be constrained by a number of factors, and these are examined below. However, SEERAD does not intend to move to open competition across all its funding for scientific research.

#### ***The importance of science for SEERAD and for Scotland***

SEERAD's future policy development requirements will always require high quality research conducted in Scotland. While this does not guarantee the future role of the MRPs in providing policy relevant research to SEERAD, the specialist skills and facilities that reside with in the MRPs make such a role highly likely. The MRPs will wish to address on a continuing basis how they are best able to maximise this opportunity.

As SEERAD moves towards competitive procurement of research it will be essential that appropriate consideration is given to the geographic location of potential suppliers where this may affect delivery capacity (e.g. by requiring access to Scottish field sites) as well as ensuring that the research delivered represents good value for money. In addition, SEERAD will wish to take account of the potential impact on the integrity of the overall Scottish science base. Experience from New Zealand, where the provision of agricultural and environmental research has been opened to competition, indicates that preserving the integrity of the national science base is vital: competition in such a case should be limited to national organisations. The experience of the Foundation for Research Science and Technology (FRST) in New Zealand highlights the negative impacts on a small nation's science base of the introduction of competitive research commissioning. In particular, where there are only a small number of suppliers of specialist research, the impacts of "losing" in a competition for funding can be devastating both for the individual supplier and for the national science base as a whole.

More broadly, science underpins business and enables progress towards a more knowledge-based economy. This is as true of environmental and life sciences as of other fields of science. The Scottish Executive recognises this through the Scottish Science Strategy and through the Deputy First Minister's endorsement of the national Life Sciences Strategy. The Executive is committed to the development of the sector in Scotland. As part of the Executive, SEERAD will take due account of this wider policy context.

In the future, as now, SEERAD will require access to strong, robust science on which to formulate and evaluate policies based on high quality outputs, as well as fulfilling its responsibility to feed information to Europe on the Scottish dimension *via* the lead UK department, DEFRA. However, a move to commissioned research programmes and the potential introduction of competition must be done in such a way that the integrity of the Scottish science base is not adversely affected. Current plans for a move to commissioned research will significantly reduce SEERAD's direct involvement with the MRPs, and will potentially provide the various institutes a greater degree of freedom and independence from Government than they have had to-date. With such freedom comes a greater requirement to address issues of sustainability through partnerships and diversifying funding, but it is not for SEERAD to make the necessary decisions on behalf of the Boards of the MRPs.

#### ***“Ownership” of the MRPs***

The MRPs are relatively small institutions in an environment where, generally speaking, “big is beautiful”. Their sustainability is in question on grounds of size alone: while there are examples of small and viable research providers (e.g. SAMS, PML), it is often difficult for small institutions to maintain the critical mass across a wide skills range, and the necessary programmes of equipment and infrastructure investment, to sustain a top quality scientific position and attract first-rate staff. Although the MRPs are constitutionally independent bodies they currently depend heavily on SEERAD, and simply to set the MRPs on a more fully independent path may not be a wise course: it could prejudice the survival and/or quality of some, and hence SEERAD's future ability to call upon them for research.

A related constraint arises from the requirements of RIPSS which has been accepted as applicable to institutions in England and is under consideration by the Executive for Scotland. This report calls upon those public agencies that fund a substantial proportion (>15%) of the turnover of an establishment to exercise, in effect, an element of shared responsibility for it, and not to confine their relationship to that of a customer with a supplier. The RIPSS report outlines the need for clear and explicit agreement on responsibilities in relation to investment and risk sharing, particularly to ensure that longer-term sustainability is not compromised by short-term operational pressures.

In moving to the commissioning of research programmes, SEERAD's requirements for sustainability as a customer will be to ensure the sustainability of the research programmes themselves, rather than that of any individual institute, and to ensure a continuing ability to secure the research outputs that it requires. This does not necessarily imply maintaining the existing institutions in their current format. A move to commissioned research will require the MRPs to adapt to a new funding regime (potentially involving alliances, research pooling, and/or merger with other institutions) as well as obtaining support from SEERAD during a transitional period. Such a transition period is likely to be that of the first round of commissioned research programmes, within which SEERAD has committed to:

- Commission long term programmes of research that allow a balance of basic and applied science together with procurement of underlying capabilities
- Support capital investments consistent with the needs of the programmes
- Develop a framework of "restructuring support" (including support in relation to employment liabilities) to allow MRPs to adapt their business models for longer term sustainability
- Develop methods for identifying long term research needs
- Restrict competition to the periphery of commissioned programmes, and for new work only in future years.

### ***Liabilities and staff employment conditions***

Continuing liabilities in respect of pensions and redundancy rest with the MRPs although SEERAD provides funding specifically to assist MRPs with the costs. These liabilities are considerable, since SABRI and some SAC staff are employed on conditions equivalent to those of the BBSRC Staff Code, i.e. analogous to Civil Service terms and conditions. Were the SABRIs to be unable to access SEERAD support and have to assume in full the liabilities, they would need to have access to considerable alternative funds to cover them.

In the future, a Civil Service type set of employment conditions may be less appropriate than in the past. Changes should be approached with caution by the MRPs however, in order that career opportunities in science continue to be seen as attractive and the MRPs as exemplary employers<sup>5</sup>.

<sup>5</sup> Across Scotland and indeed the UK there is an acute problem in attracting talented young people into scientific careers. One reason is the perceived insecurity and inferior rewards often associated with such careers (partly owing to excessive use of short-term contracts in the past by universities). It would be a retrograde step if any change in the organisation or funding of research institutes were to be perceived as undermining the attractiveness of scientific careers through the introduction of less favourable pension and redundancy terms.

### ***Initial funding levels***

Funding levels for the first commissioned research programmes (2006-07) are approximately 10% higher than equivalent funding for 2005-06 for Programmes 1-3 and approximately 3% higher for Programme 4 on an institute-by-institute basis. Funding in subsequent years of the research programmes is expected to be provided at the same level for 2006-07 for Programmes 1-3 plus a further 3% increase for Programme 4. Together with assumed efficiency savings of 2% per annum, it is anticipated that over the lifetime of the research programmes inflationary increases of up to 4% can be absorbed by the MRPs.

The senior management teams of the MRPs, however, have expressed considerable concern that, in real terms, the level of funding will decline over the lifetime of the research programmes and that this may lead to significant financial pressures across their businesses. This is especially so in view of reductions in R&D funding in certain areas by public clients such as DEFRA and by private companies. The RIPSS report suggests that it should be government policy for public sector customers to pay the full economic cost (FEC) of research from public sector research establishments (PSREs). Similarly, PSREs must be able to demonstrate that FEC has been calculated fairly. SEERAD and MRPs are considering the implications of pricing designed to recover the full economic cost of work performed.

### **2.5 In practice, introduction of competition will be confined to selected research areas only**

The effects of the introduction of competition to research procurement are difficult to determine; however, beyond the commissioning of the initial round of research programmes an element of competition will be introduced. The introduction of competition is viewed by SEERAD as a means by which the quality, relevance and efficiency of research programmes can be increased. It will also allow them to seek providers where new work is identified outside the capabilities of the present MRPs.

Clearly, the extent to which competition is introduced will have a direct effect on the MRPs; the greater the level of competition, the greater the level of uncertainty will be for the MRPs in securing programme funding. Initial indications from SEERAD suggest that the level of competition to which the MRPs will be exposed during the second round of commissioned programmes will be relatively limited. The main areas of competition will be:

- A new work package on environment in health to be developed during 2006 and put to open tender

- Identification of affordable new work that lies outside the existing research programmes or capabilities of the MRPs (as identified by the Strategic Advisory Panel) and which will be open to competition in 2008-09

The timescale for the introduction of competition is effectively the first full research programme cycle, and this is considered to be sufficient time to allow the MRPs to adapt. We would expect that in subsequent cycles the duration of research programmes may vary; some may run for less than five years whereas other may run for longer.

## **2.6 The MRPs have made differing degrees of progress towards diversification**

There is already a wide variation in the extent to which the various MRPs have successfully developed additional research funding streams, and have diversified activities to develop revenue streams from consultancy and technology transfer. Summary financial information for 2003/4 and 2004/5 for the MRPs is provided in

Table 2 and

Table 3.

Table 2: Income and Expenditure accounts 2003/4

|                                      | MLURI        | Moredun Group | Rowett Group | SCRI         | SAC          | Total        |
|--------------------------------------|--------------|---------------|--------------|--------------|--------------|--------------|
|                                      | £,000        | £,000         | £,000        | £,000        | £,000        | £,000        |
| <b>Income</b>                        |              |               |              |              |              |              |
| Income from SEERAD - research        | 7769         | 5139          | 8862         | 10435        | 5609         | 37814        |
| Income from SEERAD - other           |              |               |              |              | 12218        | 12218        |
| Other research grants and contracts  | 2366         | 3565          | 2283         | 2926         | 7599         | 18739        |
| Tuitions fees and education contract |              |               |              |              | 1863         | 1863         |
| Investment income/interest paid      | 318          | -337          |              | 107          | -296         | -208         |
| Release deferred capital grants      | 1059         | 376           | 0            | 1726         | 1520         | 4681         |
| Other income                         | 1173         | 3011          | 1777         | 1011         | 13474        | 20446        |
| <b>Total income</b>                  | <b>12685</b> | <b>11754</b>  | <b>12922</b> | <b>16205</b> | <b>41987</b> | <b>95553</b> |
| <b>Expenditure</b>                   |              |               |              |              |              |              |
| Salary costs                         | 6858         | 5189          | 6420         | 9241         | 24223        | 51931        |
| Other expenditure                    | 4477         | 5203          | 4976         | 5112         | 15741        | 35509        |
| Depreciation                         | 1132         | 1165          | 1323         | 1757         | 1910         | 7287         |
| <b>Total expenditure</b>             | <b>12467</b> | <b>11557</b>  | <b>12719</b> | <b>16110</b> | <b>41874</b> | <b>94727</b> |
| <b>Operating Surplus/(deficit)</b>   | <b>218</b>   | <b>197</b>    | <b>203</b>   | <b>95</b>    | <b>113</b>   | <b>826</b>   |
| <b>Exceptional gains/losses</b>      | <b>-308</b>  | <b>488</b>    | <b>0</b>     | <b>-209</b>  | <b>3203</b>  | <b>3174</b>  |
|                                      | <b>-90</b>   | <b>685</b>    | <b>203</b>   | <b>-114</b>  | <b>3316</b>  | <b>4000</b>  |

**Table 3: Income and Expenditure accounts 2004/5**

|                                      | MLURI<br>£,000 | Moredun<br>Group<br>£,000 | Rowett<br>Group<br>£,000 | SCRI<br>£,000 | SAC<br>£,000 | Total<br>£,000 |
|--------------------------------------|----------------|---------------------------|--------------------------|---------------|--------------|----------------|
| <b>Income</b>                        |                |                           |                          |               |              |                |
| Income from SEERAD - research        | 7881           | 5,254                     | 9499                     | 10621         | 5811         | 39066          |
| Income from SEERAD - other           |                |                           |                          |               | 11884        | 11884          |
| Other research grants and contracts  | 2258           | 4,027                     | 2192                     | 2936          | 8563         | 19976          |
| Tuitions fees and education contract |                |                           |                          |               | 1711         | 1711           |
| Investment income/interest paid      | 418            | -222                      |                          | 125           | -230         | 91             |
| Release deferred capital grants      | 1084           | 435                       |                          | 1789          | 1643         | 4951           |
| Other income                         | 1161           | 3,191                     | 1798                     | 1066          | 13366        | 20582          |
| <b>Total income</b>                  | <b>12802</b>   | <b>12,685</b>             | <b>13489</b>             | <b>16537</b>  | <b>42748</b> | <b>98261</b>   |
| <b>Expenditure</b>                   |                |                           |                          |               |              |                |
| Salary costs                         | 7101           | 5,884                     | 6713                     | 9555          | 25003        | 54256          |
| Other expenditure                    | 4381           | 5,504                     | 5008                     | 4710          | 15266        | 34869          |
| Depreciation                         | 1164           | 1,178                     | 1380                     | 1789          | 2261         | 7772           |
| <b>Total expenditure</b>             | <b>12646</b>   | <b>12,566</b>             | <b>13101</b>             | <b>16054</b>  | <b>42530</b> | <b>96897</b>   |
| <b>Operating Surplus/(deficit)</b>   | <b>156</b>     | <b>119</b>                | <b>388</b>               | <b>483</b>    | <b>218</b>   | <b>1364</b>    |
| <b>Exceptional gains/losses</b>      | <b>-15</b>     | <b>91</b>                 | <b>0</b>                 | <b>-440</b>   | <b>277</b>   | <b>-87</b>     |
|                                      | <b>141</b>     | <b>210</b>                | <b>388</b>               | <b>43</b>     | <b>495</b>   | <b>1277</b>    |

SEERAD research funding as a percentage of total research income ranges from approximately 40% (SAC) to over 80% (Rowett). Amongst the SABRIs (as a subset of the MRPs), MRI has most successfully diversified its sources of funding with only 55% of total research funding coming from SEERAD. In addition to the wide differences in relation to research funding, there are also considerable differences in the extent to which the MRPs have diversified their income streams. In this regard, SAC is perhaps most noteworthy in that it generates over £13 million per annum from consultancy activities. Moving away from reliance on grant-in-aid funding will require that the MRPs seek to diversify their sources of funding, and it is recognised that this presents challenges. However, among the MRPs there already exists a body of “good practice” in this regard.

### **3. Research provision**

#### **3.1 The MRPs provide a distinctive set of capabilities that are likely to continue to be important to Scotland and to SEERAD but they need to be responsive to changing requirements**

The Scottish public sector science base in the areas of environmental and rural affairs consists of academic institutions, some UK Research Council funded Institutes, elements of DEFRA and the MRPs. The mixed ownership or sponsorship of these institutions is, to a degree, the result of historical accident rather than design. A similar situation exists in the UK as a whole, and is currently being reviewed by OST. Among potential gains from such a review could be a rationalisation of the ownership / sponsorship structure, and a greater degree of collaboration and synergy between the various complementary components of the science base. SEERAD should liaise with OST to ensure consistency on a UK basis as far as practicable and appropriate.

Within this definition of the science base, the MRPs fulfil several roles, including interaction with research users through knowledge transfer to end users and communities, to the fulfilment of research requirements which are viewed as inappropriate or unattractive to the academic and private sectors, and the maintenance of strategic research, monitoring and response capabilities.

The MRPs are an important component of the Scottish science base, since as well as making a distinctive Scottish contribution to UK and international science they address research topics of particular interest in Scotland, and there is a limit to the level of expertise and underpinning science elsewhere in the UK to address these topics. Examples of such topics include Scotland's reliance on specific marginal crops which have a lower commercial focus elsewhere in the UK such as soft fruits and barley. Similar issues could potentially arise with regard to the health and welfare of small ruminants and cattle, and environmental issues specific to northern climates. In areas such as these, SEERAD may be seen as having taken a lead for the UK as a whole. It is likely that the Scottish science base will therefore continue to require adequate research capabilities to support the development of relevant policy, as well as sustain and inform the nation and its economy as a whole, although the declining contribution of these activities to Scotland's GDP is a significant background factor.

The main roles of the MRPs are identified as:

- Provision of policy relevant research
- Maintenance of strategic capabilities and resources
- Provision of research which does not sit well within the HEI base

- Maintenance of long term experiments
- Development of new business
- Knowledge and technology transfer
- Collaboration with other research providers

### ***Provision of policy relevant research***

SEERAD’s research policy areas for research in the environmental, biology and agriculture sectors are divided into four research programmes which are shown in Table 4. The programme areas are supplemented by cross-cutting themes concerning response to climate change; the protection of biodiversity; and addressing the environmental, social and economic sustainability of rural Scotland.

**Table 4: MRP capabilities in response to SEERAD programme areas**

|             | <b>Programme</b>                                 | <b>Main research providers by programme</b> |
|-------------|--|---|
| Programme 1 | Profitable and Sustainable Agriculture - Plants  | SCRI, MLURI, SAC                            |
| Programme 2 | Profitable and sustainable Agriculture – Animals | Moredun, SAC, MLURI                         |
| Programme 3 | Environment – Land Use and Rural Stewardship     | MLURI, SCRI, SAC                            |
| Programme 4 | Impacts on Human Health                          | Rowett                                      |

Main Research Providers with secondary capabilities in each programme area are shown in brackets. Source: Strategic Research for SEERAD – Environment, Biology and Agriculture (2004 – 2010); Arthur D. Little

In some instances more than one MRP serves a programme area, reflecting some complementarity and/or overlap in research capabilities. The level of participation within each programme area varies according to the research strengths of each MRP. These strengths were characterised by the BBSRC Visiting Group inspections during 2002 – 2003, where the capabilities of each MRP were assessed in the context of their contribution to the national and international science bases:

- In the context of Programme 3, **MLURI** was considered by the Visiting Groups as an international leader in rural land use, with particular regard to its soil, plant and microbial interactions (SPMI) research capabilities. MLURI’s socio-economic capabilities were also regarded as an area of international excellence
- **Moredun** is focused on Programme 2 and is regarded as the leading global research provider for endemic small ruminant diseases, with particular regard to virology and parasitology. The MRI is in the international top ten of veterinary research institutes and has world class facilities in functional genomics and proteomics

- As the sole MRP provider for Programme 4, **Rowett** is regarded as an international leader in molecular nutrition and is focusing on human nutrition research and addressing preventative approaches to health in order to maintain a strategic research focus. Rowett maintains high class facilities in genomics and proteomics, and has a particular focus on stable isotope technology
- **SCRI** is internationally competitive in crop research at all levels, with particular relevance to Programme 1. Particular capabilities focus on the interactions between plants and their environment leading to innovation and knowledge which, in partnership, leads to products such as new varieties and diagnostics. The institute has a focus on potatoes, barley and soft fruits (specifically blackberries and raspberries). SCRI's land use capabilities were also commended by BBSRC visiting groups as being of international standing, and SCRI makes a valuable contribution to SEERAD's Programme 3
- **SAC** operates in an integrative capacity across Programmes 1, 2 and 3, conducting multidisciplinary research across the Scottish agricultural sector. SAC is reaching levels of international standing in livestock research for Programme 2

***Maintenance of strategic capabilities and resources***

Table 5 shows the capabilities and resources of the MRPs which have been proposed as being of strategic importance to SEERAD and receive effective support within the four programme areas.

**Table 5: Indication of key strategic capabilities of the MRPs**

| Institute | Key strategic capabilities   |
|-----------|--|
| MLURI     | <ul style="list-style-type: none"> <li>• Environmental Change Network: UK wide environmental sampling through two large field sites</li> <li>• Sewage Sludge Network: Investigation of the impact of sewage sludge application to land</li> <li>• Scottish Soil Knowledge and Information Database: Storage of soil maps for Scotland</li> </ul>   |
| Moredun   | <ul style="list-style-type: none"> <li>• Large scale animal facilities used by Roslin Institute and academic institutes</li> <li>• Emergency disease response capabilities with regard to biological events</li> <li>• Scottish Disease Surveillance Network: Moredun operates as a sub-contractor for SAC for this Network for specialist input in the areas of histopathology and virology</li> </ul>  |
| Rowett    | <ul style="list-style-type: none"> <li>• Human Nutrition Unit: The only UK facility capable of studying human calorimetry for the purpose of obesity research</li> </ul>   |
| SCRI      | <ul style="list-style-type: none"> <li>• High health soft fruit germplasm samples</li> <li>• The Commonwealth Potato Collection</li> </ul>   |
| SAC       | <ul style="list-style-type: none"> <li>• Scottish Disease Surveillance Network: SAC is responsible for the second level livestock diagnostic and referral resource for Scottish veterinarians, DEFRA and SEERAD. A dedicated laboratory facility in Dumfries is maintained in reserve for major epidemics and the network is supported by the Animal Science Epidemiology Research Unit in Inverness</li> <li>• The National Dairy Research Centre for Scotland: Scotland's only dairy research centre</li> <li>• The Avian Sciences Research Centre: The UK's only production scale research centre for poultry, with an emphasis on health and welfare</li> <li>• Sewage Sludge Network: Investigation of the impact of sewage sludge application to land</li> </ul> |

Source: Arthur D. Little

Some of these facilities are supported by funding outside the grant-in-aid or the future commissioned programmes.

On a broader level, the maintenance of strategic capabilities such as some of these may be of significant importance to the Scottish science base as a whole. These are considerably less than the total capability that is at present supported by SEERAD. It is anticipated that the appointment of a Chief Scientist will provide an opportunity for a review of SEERAD's future strategic requirements for such facilities and capabilities.

***Provision of research which does not sit well within the HEI base***

The MRPs are concerned partly with research that has not traditionally sat well within HEIs, for a variety of reasons. These include the long time scales of the work, its demands for expensive and highly specialised facilities and for large land areas and its intrinsically applied nature.

The funding time scales for long term agricultural and environmental research have not proved an easy match to the funding scales of HEIs. Academic research priorities are dominated by factors that include the research interest of the individual academic; the strategic direction of the university's research programme; and most significantly, the strategic direction of research funding councils.

Research councils such as the BBSRC allocate research funding to academic institutions in a competitive manner based on their strategic direction and on the excellence of the science in question, and an academic institution heavily reliant on Research Council funding would be reluctant to invest in specialised research capacity that would not be seen as well matched to Research Council funding priorities. Work of an applied nature may not sit well against the assessment criteria of a research council. (A review of the BBSRC's funding arrangements is provided in Appendix 1).

However, the MRPs have, in common with their equivalents in other part of the UK science base, moved into areas of work that make significant contributions to basic research. In this respect they have developed interests that they hold in common with HEIs. At present there is a growing interest in the linkages between the fundamental understandings that arise from academic research and their practical application to questions of public policy. The MRPs, with their close understanding of the policy needs of the Scottish Executive and SEERAD in particular, are well placed to take advantage of this. There is, therefore, considerable potential for the MRPs in developing further linkages with HEIs in knowledge transfer and in collaborative programmes combining academic and problem-oriented research.

### ***Maintenance of long term experiments***

Several of the MRPs are engaged in long term experiments which operate for a period of ten years or more. Universities do not generally have the continuity of staff, concentration of data and availability of long term funding required in supporting such activities optimally and providing high quality long term results. These long term experiments are primarily concerned with data provision, an area which is dealt with exclusively by the MRPs for the environment and rural affairs sectors in Scotland.

An example of such a project is the UK Environmental Change Network (ECN), the UK's long term environmental monitoring programme. Launched in 1992 and managed by the Centre for Ecology and Hydrology (CEH) in Lancaster, ECN receives sponsorship from 14 UK departments and agencies, including SEERAD. MLURI is responsible for the management of two of the twelve terrestrial ECN sampling sites at Glensaugh (near Aberdeen) and Sourhope (in the Borders). MLURI also maintains the Scottish Soils Knowledge and Information Database (SSKIB), the data collection phase of which ran from 1948 to 1988. SAC's Disease Surveillance Network is a long term operation which monitors animal disease outbreak in Scotland and provides data to veterinarians and to national and regional government to enable general disease management and rapid response in case of disease outbreak.

### ***Development of new business***

All the MRPs are investigating the potential for attracting funding from non-SEERAD sources, with varying degrees of success. A common mechanism to achieve this goal is to establish limited companies to offer commercial services to external clients. Additionally, some MRPs are associated with charitable trusts and foundations to fund charitable research connected to the capabilities of the Institute. Further income is obtained through technology transfer: this will be discussed later in the context of knowledge transfer.

The following commercial services are provided by the MRPs:

- **SAC's** Consultancy Services Division is the most successful commercial enterprise across the MRPs, with SAC now generating 50% of income from non-SEERAD sources. The Division offers a full range of agricultural services, with the key offerings of the Farm Business Services and Veterinary Services Networks
- **MLURI** operates Macaulay Enterprises Limited, a subsidiary of the MDT, which offers environmental and analytical services
- **The Moredun Group** operates the Pentlands Science Park, which hosts a range of biotechnology start-up companies, as well as the Moredun Institute itself and its commercial subsidiary, Moredun Scientific Limited (MSL). MSL primarily offers contract research services to the pharmaceutical and biotechnology industries in the area of livestock research
- **SCRI** maintains Mylnefield Research Services Limited (MRS), which manages technology transfer from SCRI. MRS is also involved in the commercial aspect of the delivery of new plant varieties, as well as the management of Mylnefield Lipid Analysis Unit, a commercially orientated service provider

With regard to charitable trusts and foundations, MLURI and Moredun have established the Macaulay Development Trust (MDT) and the Moredun Foundation, respectively. MDT holds the investments of the MLURI Group and supports the aims and activities of MLURI through provision of funds both for research and for PhD studentships. The majority of MDT funds are derived from investment dividends following the sale of part of the Craigiebuckler Estate (although this form of income generation is quite unique among the MRPs) and through gift aid from commercial subsidiaries.

The Moredun Foundation serves as the charitable umbrella organisation supporting the Moredun Group and uses charitable donations to fund research in the Moredun Institute. The Moredun Group also includes VETAID, a charitable organisation which supports animal husbandry research in the third world, and the Equine Grass Sickness Fund, which specifically supports research for this disease.

### ***Knowledge and technology transfer***

Knowledge and technology transfer is a priority for SEERAD and is being responded to by the MRPs via a range of mechanisms. Examples of good practice include Macaulay Research Consultancy Services Limited (MRCS), which focuses on knowledge transfer from MLURI to the public sector and landowners.

The Moredun Foundation is heavily involved in knowledge transfer through roadshows and newsletters targeted at farmers to disseminate research information and obtain feedback for directing future policy, facilitating SEERAD's interaction with the farming base. A Technology and Communication Centre is being established to interact with schools and teachers, as well as institutes of adult and further education. Rowett Research Services Limited (RRS) is the knowledge transfer and technology interaction subsidiary of the Rowett Research Institute, which is noted for the strength of its Intellectual Property (IP) base. Several commercialised technologies have emerged, including Provexis a spin-off company in the nutraceutical field supported by Rowett Research Services which has recently been floated on the Alternative Investment Market.

SCRI hosts regular seminar discussions to disseminate research information, and maintains discussion forums via its website and operates Mylnefield Research Services Limited which specialises in technology transfer from SCRI. SAC's Farm Business Services Network consists of 23 offices around the country and focuses on the large scale dissemination of knowledge to agricultural communities. SAC have expressed to SEERAD that this network will form the future Farm Advisory Service for Scotland as per requirements in the CAP reform.

### ***Collaboration with other research providers***

All the MRPs have a wide range of collaborations to draw on external experience and access new sources of funding. It was recognised by the BBSRC Visiting Groups that there are opportunities to further develop the level of collaboration with other research providers in Scotland, elsewhere in the UK and internationally, and this is being addressed by the MRPs.

Noteworthy collaborations include MLURI's relationship with the University of Aberdeen to form the Aberdeen Centre for Environmental Sustainability (ACES) The Moredun Group is developing a science cluster in its own right at Pentlands Science Park, which has attracted 23 other organisations, as well as providing facilities for the Moredun Institute and its subsidiary companies and charitable trusts. The Rowett Institute has a continuing collaboration with Aberdeen University Department of Applied Health Sciences.

SAC obtains a large proportion of its research funding through collaborative LINK projects, which involve input from industry and the HEI sectors. The Disease Surveillance Network, run by SAC, receives input from Moredun in the areas of histopathology and virology in the form of a subcontracting arrangement.

SCRI is a partner in the cross institute programme on cereal genomics together with the BBSRC Institutes John Innes Centre, Rothamsted Research and the Institute for Grassland and Environmental Research (IGER), and anticipates joining the cross institute programme on soils with the BBSRC and IGER.

## **3.2 The MRPs form a useful part of the wider UK science base**

### ***Positioning of MRPs in the UK science base***

The UK public science base, like the Scottish science base, is made up of several types of institution performing different roles. There is some contention over the role that MRPs play within the UK science base, and this is emphasised by a lack of consensus over the definition of what the science base should include. The official UK government definition of the science base is:

*“...the research and post-graduate teaching capacity of our universities and of Research Council, and some charity, institutes and laboratories”<sup>6</sup>*

<sup>6</sup> The Royal Society, 2005. <http://www.royalsoc.ac.uk>, accessed 19<sup>th</sup> October 2005. Originally laid out in the UK Government White Paper “Realising out Potential” (2003)

This definition excludes in-house government research conducted by organisations such as DEFRA’s Executive Agencies, and also research conducted by the MRPs. In contrast, the MRPs define their capabilities as part of the UK science base differently. As an example, SCRI defines itself as an MRP which, together with the BBSRC Institutes, forms the agricultural and food research service of the UK<sup>7</sup>. As discussed in the section below, the MRPs offer several distinctive roles in the UK science base which require a substantial presence in Scotland. They serve Scottish needs – particularly those of SEERAD – but they are also significant components of the UK science base, with research topics and capabilities that are complementary to those elsewhere in the UK. They have a proven ability to deliver research and knowledge transfer on a UK basis, and could well do so more extensively in the future.

The Executive should ensure that the *different* roles of MRPs, Research Council institutes, universities and others within the Scottish science and innovation system, and within the UK, are clearly understood within Government and among other users, in order that each component can play its optimum role; that unnecessary competition can be avoided and mutually beneficial alliances and partnerships developed; that value for public money is achieved; and that users – including private sector companies – can clearly understand where to go for what science support.

#### ***Unique roles of MRPs within the science base***

The RIPSS report identifies a number of reasons as to why PSREs – including the MRPs – exist. These include the provision of specialist research capabilities, and the alignment of activities to strategic/policy requirements that cannot be met from other providers in the market. The MRPs maintain a range of unique capabilities which are unattractive or financially unviable for research groups in universities or the private sector to provide. Some of these capabilities could in principle be maintained by Research Council Institutes, but require geographical location in Scotland. These capabilities are summarised in

<sup>7</sup> [http://www.scri.sari.ac.uk/SCRI/Web/Site/home/GeneralInformation/General\\_Information.asp](http://www.scri.sari.ac.uk/SCRI/Web/Site/home/GeneralInformation/General_Information.asp), accessed 17<sup>th</sup> November 2005

Table 5 (above) and comprise:

- Scottish components of a national research and monitoring networks
- Core information facilities and databases specific to Scotland
- Unique research facilities within the UK
- Facilities which enable response to an emergency situation in Scotland and across the UK

As examples, SEERAD funding facilitates MLURI's maintenance of two UK wide monitoring networks in the land use sector, including two field sites within the UK Environmental Change Network and a separate site within the Sewage Sludge Network where the impact of applying sewage sludge to land is investigated (SAC maintains a second facility of this nature). This support will continue in SEERAD's proposed new funding regime. MLURI also maintains the Scottish Soil Knowledge and Information Database (SSKID). Although these facilities are maintained by the MRPs, the funding for these facilities has been provided by SEERAD through grant-in-aid; their continued funding will be included within the funding for commissioned research programmes.

SAC, with input from Moredun, is concerned with the Scottish Disease Surveillance Network, providing an information resource for central government and veterinarians and maintaining laboratory facilities in case of livestock disease outbreak (for example, a repeat of the 2001 foot and mouth crisis).

Moredun also maintains rabies containment capabilities, one of only three facilities of this nature in the UK (the others are at the Central Veterinary Laboratory, Weybridge, and at Bayer AG in Newbury). With regard to unique research facilities, SAC maintains the UK's only commercial scale poultry research centre, and Scotland's only dairy research centre.

### ***Differences between MRPs and universities***

There are distinct drivers for the work programmes of MRPs and Universities and differences have developed as a result. Although there are areas of common interest and distinctions are becoming blurred at the margins, in comparison to universities, MRPs typically:

- Undertake “mission-driven” research that addresses end-user requirements
- Have closer links to the community and a wider outreach in community participation (for example, SAC's Farm Business Services Office network)
- Maintain facilities that are difficult for universities to maintain. As an example, in many academic institutions animal facilities have been reduced or eliminated altogether, and several institutions are using MRP animal facilities such as those at Moredun
- Have the capacity to work on long term monitoring and surveillance programmes (such as the Scottish Disease Surveillance Network run by Moredun and SAC) where a discontinuity of staff, lack of concentrated data and shortage of suitable research funding can make this research unfeasible for academic institutions

- Are able to focus on projects intended for the national good rather than a specific research outcome (such as the MLURI SSKIB database), and maintain long-term strategic research capabilities
- Have the capability to work in areas which require unusually high levels of security and facilities maintenance (such as SCRI's facilities and capability in the area of genetic modification in the context of plant breeding)
- Conduct research focused on outcome rather than research quality and standing within the peer community

However, there are increasing signs of synergy between universities and other HEIs and MRPs, e.g. in the sharing of large or costly facilities. There is the growing interest in the link between knowledge and public policy mentioned above (and exemplified by the interest of HEIs in the EU Science Meets Policy series of Workshops). Also the realisation that, at a time when HEI research funders are taking a greater interest in them, integration and interdisciplinarity are better understood in MRPs than in the HEIs. This provides an improved climate for the development of synergies between MRPs and HEIs.

#### ***Differences between MRPs and UK Research Council institutes***

The differences between MRPs and Research Council institutes are more subtle, as they have elements of similarity in their missions and organisational structure. Differences exist around the priorities for research focus; the focus of many Research Council Institutes is that of academic excellence, as assessed by metrics similar to the Research Assessment Exercise (RAE); while the MRPs tailor their research to meet national need in the broader context – particularly serving policy support objectives. The Research Council institutes draw more parallels with the academic community, whereas SEERAD's requirements of the research outputs of the MRPs have been focussed more on relevance and practical application than “quality” (as measured by publication in academic journals). It should also be noted that the SABRIs are generally significantly smaller than Research Council institutes.

However, the differences between Research Council and Departmental R&D providers are not always clear-cut. For example, the Institute of Animal Health, a BBSRC institute, and the Veterinary Laboratories Agency, one of DEFRA's three laboratory-based Agencies, undertake similar work.

### **3.3 The ability of MRPs to compete will depend on alignment with SEERAD's needs and co-operation across institutions and disciplines**

In determining SEERAD's future requirements, it will be vital to identify areas of policy focus at the earliest possible stage. SEERAD accepts this and has established the Strategic Science Advisory Panel to assist with this process. Additionally, consideration must be given to the broad portfolio of SEERAD's research requirements, to ensure that in the future its research funding is focussed on issues that align with the Departmental remit for environment and rural affairs. The future policy relevance of areas of research will be examined. Conceivably, where there is no future policy relevance, this could lead to the end of SEERAD funding of certain specific areas of research.

However, opportunities of placing areas of currently funded research within other departments of the Scottish Executive should be explored. In particular, future rounds of funding for research programmes addressing "Impacts on Human Health" should reflect the cross departmental interests of the Health Department as well as the Environment and Rural Affairs Department, with one or the other taking the lead. As an international example, the US places the responsibility and funding for a number of major centres involved in Human Nutrition within the US Department of Agriculture (USDA).

For the MRPs, the ability to compete effectively for future work packages will require development of research capabilities in areas that are likely to be relevant in the context of emerging requirements. Effective competitions will also require appropriate management structures to ensure that the strongest possible bids for funding are developed. This will include co-ordinating inter- and multi-disciplinary work sourced from a number of players, including each of the MRPs, the University sector and other bodies. Nevertheless, many of SEERAD's future research requirements are likely to continue to retain a distinct Scotland-specific focus, with the MRPs best placed to lead delivery. It is clearly for the MRPs to monitor relevance and quality to ensure that they continue to be well placed to meet SEERAD's continuing requirements.

## **4. A new approach to research procurement**

### **4.1 There are clear success criteria for commissioning of research programmes and the introduction of competition**

The introduction of commissioning of specific research programmes and a move away from grant-in-aid sponsorship of the MRPs are at the core of SEERAD's strategy for environmental, biological and agricultural research. Under the commissioning model, MRPs have submitted proposals to deliver either entire research programmes within a known funding envelope or to deliver specific work packages that contribute to the programme. At the present time, the allocation of work and funding to the MRPs has not been finalised.

The commissioning of research programmes allows SEERAD to purchase only the research relevant to its objectives; its research strategy recognises that work which is no longer required will be identified and funding for such work will cease. SEERAD recognises that arrangements to phase out work that has no relevance to SEERAD's future requirements will be necessary in most cases. Over time, it is possible that the amount of SEERAD funding allocated to an individual MRP will decrease: as the MRPs are already small in scale, there will be a need for them to develop complementary sources of business, to undertake some rationalisation, or in all likelihood a combination of both. Even without the move to commissioning they would be under this pressure.

In moving to commissioned research programmes and in introducing elements of competition, SEERAD's aim is to achieve a position where all six of the needs set out in section 2.1 are met under conditions of organisation and funding that offer both value for money and an acceptably low risk. This will mean that:

- High-quality science influences the formulation and evolution of policy
- Government has access to necessary scientific capabilities (even at short notice)
- New and emerging issues are identified
- End-user needs are met
- Long-term monitoring capabilities continue to be provided
- Strategically important data sets are maintained, enhanced where desirable and made widely available

Several other conditions should also be satisfied:

1. The long term sustainability of the supply against all six needs is assured

2. The requirements of RIPSS and other elements of public policy, including full economic costing, are taken into account insofar as they are applicable to Scotland
3. Appropriate account is taken of the overall impacts of changes on the science base in Scotland, including its future ability to provide the scientific capacity to serve SEERAD. For this capacity to be maintained, it will be important for the MRPs to have access to diverse sources of funding (e.g. Research Council and charity sources) on a “level playing field” with HEIs and Research Council institutes
4. Work is planned on a timescale appropriate to the subject area, to the planning horizon of the Executive, and to the requirements of the research organisations involved in terms of long term planning and sustainability
5. An appropriate proportion of the work is procured on a competitive basis, in order to maximise value for money while ensuring high scientific quality and safeguarding the Department’s long term scientific requirements.

#### **4.2 Competition within the commissioning process can have advantages and disadvantages**

Within the context of an increasing element of commissioned work within SEERAD programmes, there is a basis for introducing a greater measure of competition within the procurement process. Offering work to competitive tender does not necessarily follow automatically from the “programmed” approach, but is generally viewed as good practice, as demonstrated by FRST and DEFRA’s approach allocating funding, which is predominantly through competition at the national level. The conditions that make competition a successful means of delivering best value include the presence of multiple providers (or credible alternative suppliers). This is an important proviso. SEERAD is aware of it and intends to proceed with appropriate caution in relation to the extent of competition to be sought, the geographical scope of this competition (i.e. procurement of research at the national and international levels, and the rate of its introduction.

Internationally, agencies routinely procure scientific research on a contract-by-contract basis. Such a system is common across both the public sector (e.g. DEFRA, USDA, FRST) as well private sector companies (e.g. outsourcing of pharmaceutical R&D) and can result in improvements in the efficiency of investment and in greater innovation, even where the procurement process is non-competitive. FRST in New Zealand procures research in an entirely competitive manner at the national level: however, competition for New Zealand’s research providers is low, with 90% of competitive funding allocated to the Crown Research Institutes (CRI)s.

Consideration of international practice shows the importance for research efficiency of:

- Clear specification of research requirements. The case studies illustrate a range of methods for specifying research requirements. USDA implements research direction through its Research, Education and Economic (REE) Mission Area, which interacts with Congress and USDA research providers to specify research direction. Both FRST and BBSRC maintain overall research Strategy Boards to identify research requirements and publish research requirements, while DEFRA allocates research according to the needs of specific policy divisions, but with a central team headed by the Chief Scientific Adviser to promote cross-fertilisation and sharing of knowledge, and to bring specialist expertise in the commissioning and management of science to bear
- Development of a rigorous approach to meet research requirements: USDA governs its research requirements through legislation at the level of Congress, ensuring that research deliverables are rigorously enforced
- Thorough review of internal cost factors related to contract delivery
- Development of pragmatic performance related milestones with options to terminate contracts. Each organisation featured in the case studies maintains a performance review process to ensure research relevance. Systems of note include FRST's Crown Company Monitoring and Advice Unit (CCMAU) which monitors and evaluates research within the CRIs, providing independent feedback on research provider activity. USDA has adopted a rigorous performance monitoring programme for externally procured research, including five year milestones and annual performance reviews from research providers

Such improved efficiency must be reviewed closely against any increased costs to the procurer in terms of the letting and management of the contract, as well as to the impacts of competition on both the market as a whole and the effects of competition on the pricing of specific contracts.

### ***Competition is not always the right approach***

There are several reasons why more open, competitive processes of procurement may fail to deliver the full benefit expected.

- The risk premium – a supplier will price services in a way that reflects the perceived level of risk. For any business operating in a market in which contracts are awarded through competitive tendering, a “risk premium” will be applied; in other words, the cost of a successful tender will include an allowance for unsuccessful tenders. Where the level of competition is high, or the demands of the tendering process are great, this risk premium may be large, thereby decreasing value for money in comparison to a more restricted tendering process

- Market spoiling, if there really is not enough business to support the number of competitors. If a market is opened to excessive competition, the likelihood of success for any individual player may be such that maintaining a particular capability against a high degree of uncertainty becomes unattractive. One would not wish to open the market to a large number of potential contractors if the volume of business available would only stand one or a very small number
- Procurement delays and cost associated with the competitive tendering process, and often very significant in public sector procurement
- The increased management resource required from SEERAD for competitively sourced work – this should not be underestimated: in earlier work a very rough estimate was a doubling of management resource required in going from directly commissioned work to competitive work, and then another factor of two in going to intensively managed work such as Link programmes. This increased management resource is required both for the procurement process, including peer review of submissions for work packages, and for the continuing management and evaluation of contracts
- Supplier uncertainty – the risk that the Executive would be dealing with suppliers with whom it is not familiar, and who are untried and untested
- The unit cost of research – which will be increased. For service providers, operation in a competitive market will increase aspects of their cost base that may reduce overall value for money because, for instance, suppliers need to cover the cost of a greater proportion of downtime for staff and equipment
- Changed relationships - a competitive environment tends to mean that suppliers are less close to the relevant Department and have a less direct and open relationship with its staff. This can mean that serendipitous opportunities may be missed (because informal, speculative conversations happen less often), and information exchanged less quickly and efficiently. More seriously, it can prejudice instant response in case of an urgent need such as a plant or animal disease outbreak

These factors all tend to increase the cost of research, potentially counterbalancing improvements in efficiency associated with a competitive environment. SEERAD will need to monitor real costs (i.e. including internal management time, costs of delay and ‘bureaucracy costs’) carefully in order that an optimum balance and optimum value for money can be achieved, while competition is introduced where it is appropriate and at a rate that is appropriate.

Overall, a move to competitive procurement will be viable in those cases where the market is sufficiently robust as to withstand the degree of competition. In small markets in which specialised services are provided, such as the provision of scientific research, the introduction of competition may have significant and potentially unintended consequences in specific areas. The example from New Zealand of the impacts of competitive procurement between two small, specialist providers is particularly pertinent in this regard. The award of a large contract to a single party may permanently affect the ability of other providers to meet the commissioning body's future research requirements. Similarly, where the requirements of the commissioner are highly specialised, the ability of alternative suppliers to meet those requirements must be carefully assessed, particularly where changes in long-standing relationships are to be made.

Initially, it is recognised that the main areas of research that will be open to competition will not be the major elements of the research programmes, and this will provide SEERAD with an opportunity to evaluate the capabilities of a range of suppliers. However, working with a range of suppliers within a single programme may also bring with it challenges in the integration of findings across the programme; it may be necessary to tender a co-ordinating role, to encourage research providers to agree on one, or even to develop these capabilities in house if the benefits of all aspects of the research programme are to be incorporated in future policy developments.

#### **4.3 There is time to manage the uncertainty associated with commissioned research**

The initial introduction of commissioned research programmes represents both a significant shift in SEERAD's procurement of policy-relevant research, but is also recognised as a transitional process that will allow the MRPs to adapt to the new funding regime over a period of time. The first round of commissioned programmes have been planned to run for a fixed term of five years, and at this stage there is no competition for funds. The move to commissioned research programmes provides SEERAD with increased flexibility to meet its research requirements, however, such flexibility for SEERAD brings with it potential uncertainty for the MRPs in areas such as:

- Available funding during the course of the programme
- Programme duration
- Introduction of competition

That said, this does not represent a very different degree of uncertainty than MRPs face under current procedures where they are dependent on funding decisions being taken in periodic Spending Reviews.

A similar phase of transition has faced FRST over the last 13 years. In 1992, FRST created the CRIs from its in-house research divisions, and changed the funding of these from strong reliance on grant-in-aid to a competitive funding regime. FRST adopted several strategies during this gradual transition phase, which included:

- Ensuring the CRIs were financially stable position by assigning them their assets and indemnifying staff for two years
- Initially allocating funding in short term programmes, then gradually moving on to longer funding periods of between 3 and 6 years
- Paying the full economic cost of any research undertaken
- Only tendering to national research providers, and allocating funding to international providers only where collaboration with a national provider was possible

#### ***Available funding during the course of the programme***

During the course of the first set of research programmes there will be no year-on-year increases in the amount of funds allocated to MRPs; thus the commissioned model is one of “flat funding”, reflecting the overall funding settlement under SR 04. Funding allocated to all Programmes (relative to grant-in-aid) for 2006-07 has increased between 3% (Programme 4) and 10% (Programmes 1-3) relative to 2005-06, with a further increase of 3% for Programme 4 in 2007-08. Together with assumed efficiency savings of 2% pa, it is expected that the MRPs will absorb inflationary increases of approximately 4% pa over the lifetime of the Programme. Clearly, the ability to absorb these inflationary pressures will, in part, depend on the ability of the MRPs to access alternative sources of funding. They need also to seek efficiencies in their own organisation and by seeking sharing of common services with other partners. Funding allocations from 2008 to 2011 are subject to ratification as part of the next Spending Review.

Within the programme funding allocated to the MRPs, previous allowances for capital expenditure on equipment made under the grant-in-aid funding regime have been incorporated into the annual programme funding allocation. Thus, equipment funding now forms part of the revenue funding for each MRP. Additionally, up to 10% of the programme funding will be used by the MRPs for purposes such as funding new initiatives and “blue skies” research, and giving them increased scope to identify ‘match funding’ for charity and EU projects. This is a positive expression of SEERAD’s support for the continued development of the MRPs.

### ***Programme duration***

The first round of commissioned programmes will be of five years' duration, which, arguably, provides the MRPs with a greater degree of clarity in relation to future funding arrangements than under the previous grant-in-aid sponsorship (under which regime budgets were set for the periods between Spending Reviews). However, even with a move to commissioning, overall funding levels for research programmes will still be considered under the auspices of the Spending Review.

A move to commissioned research programmes will require adequate monitoring of activities against specific milestones. This will require an indication of milestones as part of the tendering process, and at subsequent review points. An appropriate, scientifically well informed review panel will also be required.

Following the initial round of commissioned research, subsequent research programmes should be delivered on staggered timescales in order to meet the policy requirements of SEERAD. It is recognised that a five-year programme may not provide sufficient time for the completion of a long-term monitoring programme, whereas other work programmes may be completed in a shorter time frame. Thus the timescales for any research programme should follow both SEERAD's requirements and the nature of the research required to meet those requirements. Such an approach has been adopted by FRST for the commissioning of research programmes through the Crown Research Institutes in New Zealand.

### ***SEERAD's contribution to MRPs' revenues will decline over time***

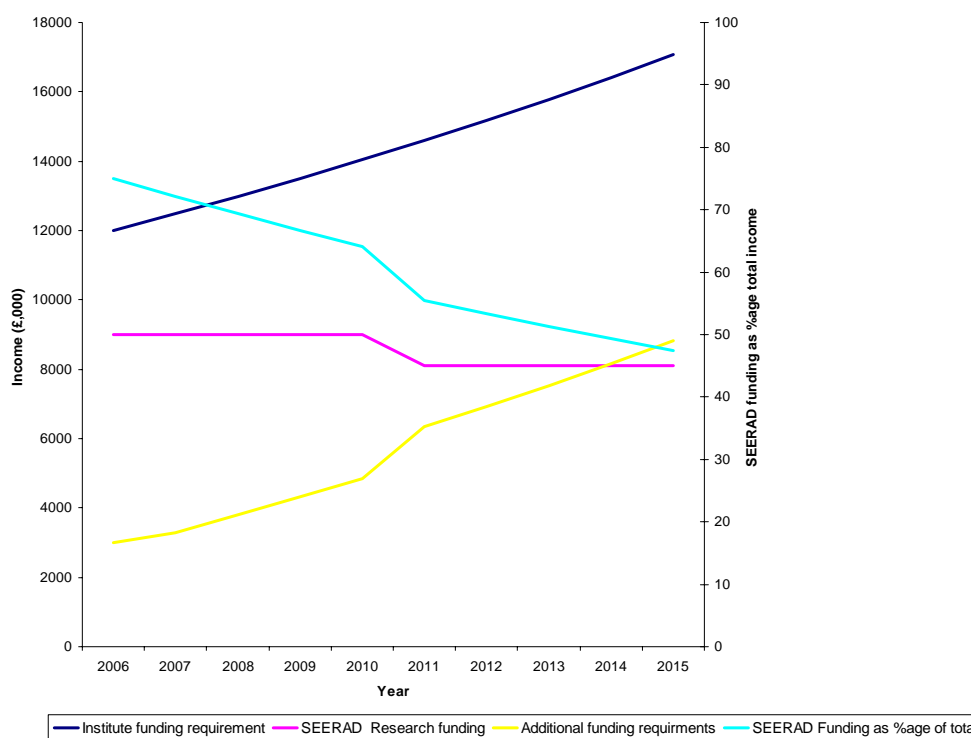
Over time, SEERAD's total research spend may decline, as result of:

- Identification of research that is no longer required, together with a concomitant decrease in funding
- Transfer of research funding to alternative departments within the Scottish Executive (e.g. Health Department and/or Scottish Funding Council)
- Expectation of efficiency savings gained from past experience of research providers working with SEERAD
- Clarity arising from FEC and clear understanding of the cost base

Within SEERAD's overall funding envelope, the funding made available to MRPs following a move to commissioned research will also probably decline. Following an initial 6 to 10% increase in funding made available to institutes in 2006, there will be no subsequent year-on-year increases in funding levels for the duration of each programme; and competition will gradually be introduced to the procurement process from the second round of commissioned programmes. It is anticipated that approximately 10% of the total programme budget will be subject to competition.

Figure 1 provides an illustration of the effects of a move to commissioned research programmes on the financial requirements of an institute with a total income of £12 million of which 75% will come from SEERAD in 2006/07. It is assumed that the institute is subject to 4% year-on-year inflationary pressures and delivers 2% efficiency savings in relation to the SEERAD component of total income; for the second round of commissioned programmes (2011/12 onwards) SEERAD income is reduced by 10% relative to figures for the first round of commissioned programmes.

**Figure 1: Illustrative institute income requirements 2006-2015**



On the basis of such assumptions, during the first round of commissioned programmes, the contribution of SEERAD research funding to total income declines from 75% to 64%; during the second round of commissioned programmes this contribution declines from 55% to 47%.

**Introduction of competition**

The introduction of competition represents perhaps the greatest area of uncertainty for the MRPs in relation to the move to a commissioned programme model of funding. However, SEERAD have made clear their intention not to introduce competition to the commissioning process until the start of the second round of research programmes (2011), although bidding for this funding will take place in 2009/10.

## **5. Moving towards the ideal**

### **5.1 A process of steady, managed adjustment is required**

Clearly the position described in the previous section will be attained only after some appreciable period of time. This is particularly so when the likelihood is that SEERAD will need to procure less from the MRPs in the future, but where the MRPs are already small in scale. They will require rationalisation so that the problem of being “sub critical” is not further exacerbated, time to develop alternative sources of funding, or probably both.

The problem of sub critical mass can be alleviated to some degree through sharing of services. For example, it has been addressed in New Zealand by the formation of ACRI, which serves as an overarching organisation across the CRIs and provides support services. Scope for such savings among the MRPs is limited, however, by their geographic dispersion.

Adjustment will need to be conducted without undue delay, but through a steady and managed process. This applies to the move to commissioned programmes itself: it applies *a fortiori* when the introduction of competition is considered, for reasons that have already been outlined in Section 2.3.

To achieve progress towards the desired situation, attention should be given to the issues set out in the following sections. SEERAD have made their position as clear as possible in relation to their view of the long term nature of the capabilities necessary for their programmes – it is for MRPs to address the implications for them.

### **5.2 Collaboration between users should be enhanced**

Under the requirements of RIPSS it will be an expectation that SEERAD and other major users of research institutes contribute to joint strategic planning in relation to research procurement and to take on some element of responsibility for the relevant institutes over and above the role of a simple customer. In practice, it is likely that for any individual institution a ‘lead organisation’ should be identified from the public sector as a prime strategic ally for the institute – either a central body with responsibility for the science base as a whole, or the customer department best suited and best skilled to take on the job. This will not necessarily be the largest funder. Other public sector departments procuring substantial research and related services from the institute will share in strategic planning and direction in the spirit of RIPSS. It would be advantageous if representatives of major end user communities were to join this group.

Experience elsewhere suggests that some element of funding is often left to the discretion of institute directors and it is noted that from 2006 development funding (equivalent to 10% of total SEERAD funding) will be allocated on this basis. More importantly however, will be for the directors to play roles comparable to those of the Chief Technology Officer (CTO) in a large organisation. While the CTOs may have some funding at their direct disposal to look at longer term strategic issues and maintain certain basic items of infrastructure, their more important role will be to make intelligent use of funding from business units, earmarked for specific purposes and on varying timescales, to ensure the core competencies of the organisation are sustained<sup>8</sup>. The CTO may well have a longer term view of those competencies than the customers whose programmes he or she is running, and by means of which the competencies are sustained. A commercial R&D provider, or a corporate group expected to operate as one, will effectively levy a margin on work commissioned by business units in order to pay for this underpinning activity.

### **5.3 The “core funding” issue should be clarified and resolved**

There are many and strongly held opinions on the subject of core funding. We have examined the position of Research Council institutes which receive substantial core strategic grants amounting to perhaps two-thirds of their income: at the other end of the scale we have examined the New Zealand situation for the Crown Research Institutes, the effective level of core funding was reduced to as little as 6% - although the Government now finds that this low level has led to significant difficulties and some reversal is very likely.

We advocate a narrow definition of what is really “core”, though we do accept that a director requires a certain amount of discretionary funding in order to maintain basic facilities and to have the wherewithal to respond to urgent needs and opportunities.

More significantly, we see a need for some “earmarked” funding, associated with longer term activities such as the maintenance of sample collections and long term monitoring, to be funded on a commensurately long term basis. It is also appropriate for this to be non-competitive. Emergency response capabilities may be put into a similar category.

<sup>8</sup> In our experience, resources that are genuinely at the CTO's discretion is minor – perhaps 1-2% of a corporate R&D budget – though larger amounts, perhaps 10%, may be earmarked for longer term and strategic work, with allocation decided by an appropriate Board, Council or panel.

Funding for such capabilities has been included within the initial work programme funding, although not as identifiable work streams; it is recommended that this position is reviewed in subsequent rounds of commissioning and, where appropriate, funding for such activities is separated from the main work streams. In addition to this, it may well be a policy objective for Scottish institutes to access sources of funding that do not cover full costs, of which EC Framework funding is the most obvious and extreme example, particularly where their participation enhances the outcomes of other work by the institutes. If this is the case, it will be necessary to ensure either that “match funding” is available or that work commissioned from the institutes is sufficiently broadly scoped and programmed so that it is possible for it to be adduced as match funding for the purposes of EU and similar proposals.

The difficulties associated with “soft money” diminish once it is recognised that funding for an institute does not consist simply of core funding that is sustained indefinitely and “soft money” that all works on the basis of, perhaps, three year programmes. There will be a variety of timescales associated with the different types of research, with some very short term projects (perhaps more akin to short term consultancy and with a relatively high unit cost) and other work which is programmed on a longer term timescale so allowing longer term planning by the institutes.

It is particularly the shorter term work that is likely to be appropriate for competitive tendering, although some very urgent assignments may need to be sole-sourced simply because public procurement is too slow and unwieldy for any other course of action.

Taking these considerations into account, the pattern of funding we envisage is set out in Section 6.7.

#### **5.4 Access to complementary funding sources should be improved**

In introducing competition to the commissioning of research to players that have access to a wide variety of funding sources – including Research Council and charity funding – it is vital that the MRPs are similarly able to access such funding streams where appropriate. Academic analogue status for Research Council funding is clearly important and any future organisational model should seek to secure this as a priority. It might be useful in this connection to recognise the role played by MRPs in data provision for other researchers, since this is an essential if low-key contribution to science. Additionally, it may be appropriate for MRPs to be considered as complementary providers of some work of the type currently undertaken by Research Council institutes, and the MRPs should certainly be positioned as competitive contractors for R&D procured by DEFRA, other UK Departments, and similar public agencies overseas especially where the MRPs offer skills lacking in the procuring country.

We also believe that there is more scope for industry and private sector funding in parts of the MRP sector. The objectives and performance measures for directors and senior staff should be sufficient to create a suitable hunger for industrial relationships to be forged.

Charitable and EU money requires the matching funding issue to be addressed, but it may well be in the interests of the sustainable Scottish science base to ensure that the Scottish institutes can play a full part in these areas of science, particularly where a strong “public good” case is aligned with the mission of an individual institute. While it would be difficult to quantify how much extra funding could be drawn into Scotland by addressing the match funding issue, we note that most advanced countries consider such participation highly desirable scientifically.

In addition, steps should be taken to address the introduction of Full Economic Costing (FEC) for activities within the MRPs to ensure that the full cost of any research programme is assessed, and that costing procedures acceptable to other research funders are adopted. Again, a “level playing field” is the aim.

#### **5.5 Substantial adjustment time must be allowed**

The present model of relatively broadly-programmed long term commissioned research does allow plenty of time for institutes to adjust, although it will be necessary for change to be signalled well in advance for planning purposes to avoid causing discontent among providers. A Research Council approach would be that a core strategic grant is open to review following a Visiting Group report, but that funding is likely not to change for a year after the Visiting Group’s deliberations. It is anticipated that this is also how SEERAD intend to approach the assessment and development of commissioned research programmes.

The approach taken by SEERAD of specifying overall programmes rather than individual projects is generally sound although, as noted above, the timescales should vary with the type of research rather than be fixed.

## **5.6 The long term sustainability of the research base must be ensured**

In the past, SEERAD's sponsorship of the MRPs has had the effect of maintaining a key element of the Scottish science base in a manner somewhat analogous to the support provided by the Office of Science and Technology (OST) through the Research Councils and by UK Departments of State on the level of the UK as a whole. Within the Scottish Executive, there is at present no function similar to the function of OST and it is not clear that the OST sees a role for itself specifically in relation to a Scottish science base. As a result, SEERAD funding has played a critical role in underpinning some key components of the Scottish and indeed the UK science base. The adoption of a more "arm's length" relationship with the MRPs that may arise from a move to commissioned research will have the effect that this role will change, with possible consequences for the competitive position of the MRPs and for the wider Scottish and UK science base. It also brings into sharper focus the issue of who takes an integrated, holistic view of the Scottish science base – a view that is very necessary if science is to play its full part in the economic and social development of Scotland. This is an area that the new Chief Scientist to the Scottish Executive may wish to consider as a matter of urgency.

At present, there is no obvious body to take on the role of sponsor for MRPs as a part of the Scottish science base. Neither the Research Councils nor OST have expressed any real appetite to assume such a role, and the establishment of a Scottish equivalent of OST is unlikely to meet with any real favour. SEERAD is not well placed to act as such a sponsor, but effective and co-ordinated stewardship of the science base is important to the Department since without a healthy and well managed science base within Scotland, the capacity to deliver SEERAD's policy requirements, and to do so to high standards of scientific quality and value for money, will be placed in jeopardy. Moreover, a continuation of the status quo will also jeopardise SEERAD's long term needs, since institutes that are already sub-optimal in scale will face further reductions in resource.

SEERAD's ability to take on a less close and more appropriate relationship with the MRPs, without prejudicing its long term interests, will be greatly aided by a clear understanding of where responsibility lies for stewardship of the overall national science base and for the implementation and periodic revision of the Science Strategy. All parts of the science base and the various important user communities have an interest in this, and a broader-based body than the current Scottish Science Advisory Committee – one with representatives of science-based industries, the health services, universities, other research providers and policy departments such as SEERAD – may be an appropriate mechanism to articulate a unified view on the Scottish science base. With such a mechanism in place, SEERAD will be in a position to draw on and contribute to a strong science foundation without having to 'own' it: while from an MRP perspective, opportunities to draw together support from different sources in pursuit of shared objectives will be more clearly visible.

That said, SEERAD's relationship with the MRPs is not expected to reduce simply to one of customer and supplier. The consequences of the RIPSS recommendations would be that SEERAD would have a continuing role in relation to the sustainability and fitness for purpose of, though not the day-to-day management of or liability for, those MRPs from which it continues to procure substantial research work. RIPSS recommends that major funders (defined as a contribution exceeding 15% of total turnover) should retain such a joint strategic interest. In considering this SEERAD is likely to wish to start from the position of considering the underlying capabilities necessary to deliver their programme requirements. The Department intends to address questions of capital investment from that point of view.

None of this removes from individual institutions a responsibility for their own strategy and direction. They should be allowed and encouraged to develop their own research and business models<sup>9</sup>, suitable for an increasingly diverse and competitive research environment. SEERAD can assist the MRPs to rise to this challenge by:

- Proceeding with the introduction of competition in a manner which does not force the MRPs to operate at unsustainable prices nor in a manner which is likely to result in market spoiling or the complete loss of strategic capabilities; research should be funded at FEC, although the MRPs must be able to demonstrate that FEC has been calculated accurately

<sup>9</sup> It is recognised that a move to FEC, as recommended by the RIPSS report, raises a problem for SABRIs in relation to universities. HEIs will only be expected to gain 80% of FEC from funding bodies, while meeting the remaining 20% from dual funding sources such as the Funding Council. Steps will be necessary to ensure that the SABRIs are not disadvantaged by lack of access to such dual funding.

- Pressing for academic analogue status for the SABRIs, thereby allowing them access to Research Council and other sources of funding from which they are presently excluded and establishing a “level playing field” with Research Council institutes and universities in relation to sources of funding (SAC is unique amongst the MRPs in that it already has academic analogue status with the BBSRC)
- Encouraging development of asset management and investment plans by the MRPs that relate to scientific strategy and the needs of the future programmes of SEERAD; FEC-based calculations must include elements for asset renewal
- Encouraging and facilitating closer relationships between research providers, whether between MRPs themselves or with universities
- Helping MRPs to maintain a competitive position in the recruitment of high quality science graduates

Ultimately however, the institutes’ future rests in their own hands.

Within the international case studies, several measures to ensure a sustainable research base within a competitive funding scenario can be identified. New Zealand’s FRST only invites national research providers, or collaborating international research partners, to tender. The sustainability of CRIs is further ensured through the Association of Crown Research Institutes (ACRI), which acts as an overarching organisation, representing the CRIs in areas of policy, organisational, relationship and advocacy support.

Additionally, all the organisations discussed in the case studies provide some level of core funding for a variety of reasons, including preparation for future science (such as FRST’s Capability Development Fund) and maintenance of strategic capabilities which would not otherwise be economically viable (such as DEFRA’s specialist facilities at the Central Science Laboratory).

## 6. Implications of the funding model

### 6.1 Alternative operational models to support financial sustainability should be examined

The overarching requirement for SEERAD and for the MRPs is to ensure that a move to commissioned research programmes and the introduction of competition does not adversely affect the sustainability of the Scottish science base and hence, for SEERAD, the Department's ability to meet its science requirements. Equally, SEERAD must allow and encourage the MRPs to diversify their funding base and build upon the excellent work which they are recognised as performing within their chosen niches. Previous reviews<sup>10, 11</sup> have considered a range of alternative structures for the MRPs as a means of building critical mass, reducing unnecessary costs and providing a platform on which to deliver SEERAD's strategic research requirements. These previous studies have not made specific recommendations on the future organisational structures of the MRPs and, indeed, it is beyond the scope of the present report to do so. Nonetheless, there are connections between organisation and funding that need to be borne in mind.

Clearly, there is concern that revised SEERAD research procurement may prejudice the sustainability of the institutes. A similar concern is present on the larger scale of the DEFRA laboratory-based agencies in England. It is recognised by both SEERAD and the MRPs that the current situation is unsustainable and a move away from SEERAD's sponsorship of the MRPs provides an opportunity to review possible organisational structures in the light of a new funding regime. The future organisational structures of the MRPs must ensure that issues of financial sustainability, scientific critical mass and flexibility to meet the needs of a range of customers are addressed through development of robust business plans. The key issues that must be addressed for any reorganisation include:

- Maintaining and building the capability to deliver high quality research, both to SEERAD and to other funding bodies
- Identifying opportunities to build critical mass and to collaborate with most appropriate partners
- Ability to meet future "value for money" criteria in relation to research procurement
- Access to a broad range of funding sources
- Transfer or underwriting of pension and redundancy liabilities

<sup>10</sup> Brian Jamieson & Associates, 2003

<sup>11</sup> PricewaterhouseCoopers, 2005

Previous studies have identified a range of possible alternatives, including:

- Option 1 – Full merger
  - Creation of a single merged institute, with or without relocation to a single site
  - Creation of a new “holding company” to provide improved organisational efficiencies
  - Creation of a single institute that does not involve all parties
- Option 2 – Strategic partnership
  - Establishment of “Centres of Excellence” with co-ordination of activities through a single board
  - “Partial merger” - a strategic partnership with new governance arrangements, but retention of the identity of individual institutes
- Option 3 – Transfer of institutes to university sector

However, the adoption of a “one size fits all” approach to future organisational structures does not adequately address the diversity of research carried out by the SABRIs and SAC nor the relationships between individual MRPs and other players within the wider Scottish life sciences base.

An obvious issue to consider would be the scope for merging MRPs together. The arguments for establishing a merged institute hinge on building critical mass by creating a new organisation of approximately 1500 staff, and on reducing overheads through joint service provision, a smaller estate and, potentially, purpose-built modern accommodation. In our view the potential gains are limited. There is no great advantage associated with geographical proximity. There is limited scientific synergy in most cases, so that the creation of a single institute will do little to build the collective critical mass of the research base: while there are areas of synergy between the institutes at present there is not sufficient overlap in activities to create critical mass at the research programme level. The administrative savings, while worthwhile, would be small compared to the size of the challenge facing the MRPs. Overall, there is little appetite among the Directors of the SABRIs in relation to the establishment of a merged institute although it is recognised that the Board of SAC remains interested in this option.

Perhaps the exception to the picture described above is the relationship between MLURI and SCRI, where although the institutes are at different positions on the “fundamental vs. applied” spectrum, there are distinct scientific synergies. We understand however, that the Board members and senior managers do have some concerns about losing the distinctive character of one or other institutes in the event of some sort of merger or confederation. This is an important consideration, though it should not be one that solely determines future organisation and governance.

Both institutes are concerned with land management and especially plants and soils (though MLURI also has better developed interests than SCRI in water). The focus at SCRI is arable land; at MLURI it is grassland and upland. The soils work at SCRI is mainly physical and microbiological while at MLURI it is broader. Both institutes have interests in biogeochemical cycles - at field scale in SCRI's case and at catchment scale in MLURI's. SCRI systems research is predominantly plot and field scale while that at MLURI is predominantly farm to catchment. The complementarity of these activities is a good starting point from which to explore a bringing together of their interests.

Another general direction for rationalisation will involve realignment with respect to other entities such as universities. Here the position differs from one institute to another. There are excellent synergies between the Rowett and the University of Aberdeen and a general feeling that the future home of the institute is as a unit within the University. MRI, SAC and other partners engaged in animal sciences and veterinary research are investigating the development of a larger confederation – the Edinburgh Bioscience Research Centre (EBRC) – and one can envisage a situation where it will be EBRC, rather than any of its individual components, which could in the future be the contracting entity for SEERAD research.

Closer linkage to relevant Research Councils should also be considered: this would put the institutes on a consistent position with other organisations in the UK. This could take several forms: strategic alliances, central services ‘bought’ from BBSRC for example, opportunities for staff to move more freely between the MRPs and Research Council Institutes<sup>12</sup>, and the possibility of more cross-institute research programmes (already under discussion) which could be developed into broader strategic alliances. However the Research Councils seem unlikely to be willing to “adopt” an institute, even if appropriate arrangements were made to enable the Council to take on the risks involved, if the institute’s main mission was not that of scientific excellence, first and foremost.

<sup>12</sup> Freer movement of staff between elements of the science system is one of the most obvious and overdue improvements that could be achieved for science in Scotland, and indeed elsewhere – embracing the health sector, HEIs, research institutes, science teams within Government departments and agencies, and the private sector. If the MRPs can be party to piloting such a move and encouraging more of UK science to follow suit, they will have performed an invaluable service.

The question of realignment is broader than this and is also under consideration in central government by OST, who see some anomalies in the responsibilities currently assumed by departments for their institutes. Somewhat counterbalancing the strong view expressed by BBSRC about (non) adoption of an MRP, it has been pointed out that the Institute of Animal Health, a BBSRC institute, and the Veterinary Laboratories Agency, belonging to DEFRA, are in fact doing work on much the same pathogens but in different animals. It is likely that some much closer linkage will be put in place between them particularly in relation to those activities co-located at Pirbright. OST do not believe, however, that there is one simple “one size fits all” solution for all public sector research establishments.

In the absence of major scientific synergies or potential for major estates rationalisation, creation of a merged institute should not be seen as a route to sustainable, better value-for-money research procurement.

Overall, it is recognised that no single solution is likely to be applicable to all of the MRPs, and the following sections identify a possible future organisational model for each institution that, based on the outcome of our consultation, is likely to facilitate cost-effective research procurement by SEERAD while meeting the reorganisation criteria noted above and the overall success criteria set out in Section 4.1. The purpose of this section of the report is to provide a review of the flexibility that a move to commissioned research programmes will allow the MRPs in determining an optimal future structure in light of the changed funding regime. The possible structures outlined here are determined principally on the basis of scientific synergies; a robust analysis of the issues involved in each model is outside the scope of the present assignment, and such an analysis could identify factors that either support or run counter to the scientific case.

## **6.2 The Rowett Research Institute could become an Institute of the University of Aberdeen**

The nature of the research conducted at the RRI has evolved from a focus on animal nutrition, to a focus on human nutrition and health. It is recognised that both the current facilities are becoming increasingly unsuited to the nature of the research and the nature of the research itself is such that a greater degree of clinical support is required. Discussions between the RRI and the University of Aberdeen have identified the potential to relocate the RRI to the Forresterhill campus where the University’s medical school, Department of Applied Health Sciences and the Royal Infirmary are located.

Options for the establishment of the RRI as a university institute present a range of benefits, including:

- Closer collaboration with university researchers and opportunities to build critical mass of researchers in the field of human nutrition and health
- Synergies between continuing research programmes within the RRI and the University, and improved opportunities to develop inter- and multidisciplinary programmes
- Access to clinical support for experiments involving human volunteers
- Release of existing assets on the present site which would allow reinvestment in new facilities

In establishing the RRI as an Institute of the University of Aberdeen, a decision must be made by the Board of the RRI and the University on the level of independence that the RRI wishes to retain within the university setting. We would expect that the institute would be “ring fenced” within the university and would retain its own identity, research programmes and management team, and would function in an appropriately autonomous manner – common services and facilities should be maximised to ensure cost savings. Academically, such a move will help build critical mass, strengthen existing synergies, and provide opportunities for research undertaken at RRI to contribute directly to the University’s RAE assessment. Clearly, consideration must be given to the various longer term options for the relationship of the RRI as an institute within a university and the degree of independence that it maintains. These will be impacted by a number of factors, including:

- Proportion of staff employed by the university and institute
- Nature of research undertaken and the mix between policy relevance and more basic science
- Implications for maintenance of charitable status
- Convergence or divergence of university and RRI research over time
- Management of pension and redundancy liabilities
- Scope for cost sharing

Following the establishment of the RRI as an Institute within a university, it would be expected that new staff would be hired by the university – on university terms and conditions of employment – and seconded to the institute. Existing staff of the RRI could either be transferred to the university under TUPE regulations, and conditions of employment would remain unaltered (with the exception of pension provision, for which transferred staff would be offered “broadly comparable” arrangements), or remain as employees of the RRI as an autonomous institute within the university on the same terms and conditions.

A number of alternative options exist for the liabilities in relation to existing staff and pensioners:

- Liabilities are underwritten by SEERAD, and existing staff are offered “broadly comparable” pension arrangements following establishment of RRI as ring fenced institute within university
- Liabilities are transferred to the new employer: however, such an arrangement is likely to be extremely costly not least because pension payments made by SEERAD under existing arrangements are made from current taxation, rather than from an accrued pension fund
- Liabilities transferred to RRI as part of a deal brokered to finance new infrastructure and involving sale of existing estate

Under this model, it would be expected that some of RRI’s funding from SEERAD may be transferred to the Scottish Executive Health Department (Chief Scientist’s Office) or another part of the Executive as appropriate in the second and subsequent rounds of commissioned programmes.

RRI’s position within a university would provide a distinct advantage in securing private sector funding from, for example, the biotechnology, pharmaceutical and functional food sectors. At the same time, establishment as a “ringfenced” organisation within the wider university setting would present a number of benefits, including:

- Clear allocation of SEERAD funding to specific research programmes and the avoidance of undue university overheads or “top slicing” of funds
- Maintenance of the specific scientific focus of RRI whilst improving cross-discipline interactions. It would also allow for policy relevant research to continue on a “parallel track” to university research programmes for which outputs may be more geared towards RAE requirements
- Facilitate a distinction between institute staff and those engaged in “mainstream” academic departments. Such a difference in roles is clearly and successfully demonstrated by, for example, the Warwick Manufacturing Group within the University of Warwick’s Department of Engineering

In our opinion, these factors will make “ringfencing” an essential feature not only of the suggested future role of Rowett, but of any future assimilation of an MRP into the HEI sector.

### **6.3 Funding for SAC's educational activities could be transferred to the Scottish Funding Council**

SAC occupies a distinct space in the Scottish science and education base. It has a three-fold remit of education, research and consultancy, activities that are common to many higher education institutes, is a member of Universities Scotland, and operates as an HEI except in respect of its funding route. It is therefore somewhat anomalous that SAC's education provision is funded through SEERAD, rather than the Enterprise and Lifelong Learning Department (SEETLLD). At the present time, educational activities account for approximately 20% of SAC's annual turnover of £42 million; the majority of funding (85%) for educational activities comes from SEERAD. While it could be argued that funding for an HEI whose remit lies in the agricultural and rural affairs domain should be provided by the government department that address such issues it is not clear why this is the only sector which takes this approach. A greater degree of "joined up governance" could be demonstrated through the provision of funding under the remit of SEETLLD, with funding being transferred to the Scottish Funding Council (SFC).

SAC is currently in discussion with SFC in relation to the transfer of funding for education to the SFC and such a move is to be encouraged. However, it is not currently clear if SEETLLD propose to assume responsibility for the funding of research at SAC. This is subject to further discussion. Given the relationship between teaching and research funding in the HEI sector, our recommendation is that SAC should be funded in a similar fashion to other HEIs, and that appropriate arrangements be made to allow it to access alternative sources of funding on the same basis as other HEIs. In the medium term, it is to be expected that SAC will continue to deliver non-competitive research programme elements funded by SEERAD; in the longer term it may well compete for SEERAD work along with other providers including SABRIs. In the spirit of RIPSS, SEERAD should continue to have an important role in agreeing its strategic direction.

Such a move would require the reallocation of budgets between departments in the Executive, and access to funding for the relevant pension liabilities at SAC would have to be addressed as part of this arrangement. Over time, a decision would be required as to how research at SAC would be funded – through the funding of major programmes of commissioned research from SEERAD, university R&D funding made available from SEETLLD through SFC, or most likely a mix of the two. Under such a model, SAC would be able to compete for funding from a variety of sources across its entire range of activities, and as an HEI funded through the SFC may become a more attractive partner for collaboration within the HEI sector. These developments would help SAC, guided by its Business Transformation Plan, to successfully address the challenges of operating as a sustainable enterprise albeit one with relatively small size and specialist focus.

It is nonetheless essential to recognise the relevance and importance of SAC's work, including its research, to the agricultural and land-based communities in Scotland, and the significant role which SAC plays in the delivery of Scottish policy objectives, especially in remote and disadvantaged areas, and the role of SAC's Disease Surveillance Network which is contracted to the SEERAD Veterinary Policy Division. It would be possible for SEERAD to continue to fund activities such as these. For example, since some of the relevant research would be unlikely to prosper under an RAE-led approach, the Department would probably need to fund it directly (with or without competition) in order that policy requirements can be met.

A preferred model, therefore, might be one that sees SAC primarily as an SFC-funded HEI, but with a "ringfenced" programme of research, knowledge transfer and other services provided under contract to SEERAD and guided by a system – perhaps an advisory board or consultative forum – that enables the various user and stakeholder groups to articulate their views.

#### **6.4 Moredun's role in the Edinburgh Bioscience Research Centre could be developed**

The MRI is one of several parties exploring the establishment of a collaborative venture – the Edinburgh Bioscience Research Centre (EBRC) – with the aim of improving synergies between animal research facilities located near Edinburgh. Establishment of the EBRC would involve the development of new infrastructure and the relocation of several organisations, namely:

- Roslin Institute
- Neuropathogenesis Unit of the Institute of Animal Health
- Animal science groups from the University of Edinburgh and SAC
- Royal (Dick) School of Veterinary Studies

In addition, MRI will be a member of the EBRC, but will not relocate to the proposed site at Easter Bush, given its close proximity to the MRI's existing location.

The development of EBRC will bring together some 500 scientists engaged in the field of animal health, thereby enhancing critical mass and creating a multidisciplinary centre of excellence. MRI has a vital role to play in the establishment and operation of the centre.

The establishment of EBRC should be seen as a positive development that, through collaboration, should allow each of the parties involved to access a broader range of funding sources and exploit research synergies. As a result, each member of the Centre should generate increased income relative to its current position. In addition, the establishment of EBRC may go some way to reduce the level of competition for future rounds of SEERAD funding in the animal health domain as a result of the collaborative nature of the centre, and could, potentially, become SEERAD's point of entry into the animal science research base in Scotland.

The benefits to MRI of entering into such a strategic alliance are broadly similar to those presented by the adoption of an MRP as a ringfenced institute within a university. In the future, it could be attractive for EBRC – should it be established as a distinct legal entity – to be a body from which SEERAD might commission research. However, we acknowledge the concerns of senior MRI staff that

- The identity of the Institute, and the link between MRI and the end-users in the Moredun Foundation, should be maintained
- That SEERAD funding remains focussed on animal science rather than being merged with biomedicine and comparative medicine
- That others involved in animal bioscience in Scotland, namely the Universities of Glasgow, Stirling and Aberdeen should not be discouraged from maintaining collaborations in this area

#### **6.5 SCRI and MLURI exhibit synergies across a number of areas of their activities that could be exploited further**

Of the MRPs, SCRI and MLURI arguably demonstrate the strongest synergies in specific areas of their respective research bases. Given this relationship between their activities, the case for developing closer relations could be made. This could take one of several forms ranging from an informal alliance through to a merger of the two institutes. A careful analysis of the degree of synergy and congruence of mission would be required and the respective managements and Trustees should address this; critical mass will only be established in areas of research synergy, such as in the soil science domain, and in those areas in which collaborative research will be undertaken as part of the first round of commissioned research programmes.

A strong case can also be made for each of the institutes developing critical mass through collaborative endeavours with other players in the Scottish science base, rather than either a move towards establishment as a university institute. The nature of the research conducted at MLURI and SCRI is such that it is unlikely that any single university would form an ideal partner for either institute (cf. RRI), and indeed, links between Dundee University and SCRI have concentrated the university's plant sciences research base at SCRI rather than the university, while the university campus develops its standing in the biomedical sciences. Both SCRI and MLURI are pursuing agendas of collaboration with other partners across the life sciences base in Scotland. These include plans for the formation of the Aberdeen Centre for Environmental Sustainability (ACES) a collaborative venture between MLURI and Aberdeen University, for which the Scottish Funding Council have allocated £1.2 million funding for the University of Aberdeen to establish enable 3 jointly-funded posts including a Research Director, and firm plans for SCRI's participation in collaboration with HEIs involved in research pooling bids including plant sciences, microbiology and environment.

The research pooling exercise, co-ordinated through SFC, has been devised as a means of boosting the critical mass of the Scottish science base across a number of disciplines. Proposals for research pooling in the life sciences field are currently being developed: however, previous initiatives in other fields have resulted in significant funding being made available in addition to the "QR" funding that is at the core of university research funding. SFC has indicated that the research pooling exercise in the life sciences will be opened to the MRPs where synergistic collaboration with the HEI base can be demonstrated. This would allow the MRPs access to additional funding which could cover:

- Contribution to running costs of equipment and facilities found within the MRPs and not in the university base that are used for collaborative research
- Research studentships held jointly between an MRP and a university
- Expertise within an MRP that provides synergistic benefits with the university research base

MLURI and SCRI seem particularly well suited for participation in the research pooling exercise; however, issues relating to the extent of funding that could be made available to the institutes through the research pooling exercise and the longer term sustainability of this funding must be addressed.

In moving to a more arm’s-length relationship, consideration must also be given to the ownership of SCRI’s land and buildings. These are currently in the ownership of Scottish Ministers, rather than being owned by the institute itself (as is the case for the other MRPs). Making over the estate to SCRI would give the institute’s management greater autonomy in terms of future development of the site and could, through rationalisation, generate additional income. Such a move would probably be accompanied by a transfer of liabilities from SEERAD to SCRI.

## 6.6 Introduction of commissioned research programmes should include measures for risk management

The introduction of commissioned research programmes brings with it a set of risks to both the MRPs and to SEERAD; the appropriate management of those risks both in the short term and over the long term will be important if the contribution of the MRPs to the Scottish science base is to be maintained. It is recognised that the current financial and organisational position of the MRPs is no longer viable. They are small providers of specialist research, much of which is unlikely to be undertaken by any other research organisation. The MRPs are faced with challenges of building critical mass and ensuring their financial sustainability, and sections 6.1 to 6.5 above outline possible options by which this could be achieved. Nonetheless, the MRPs will face significant challenges as a result of a move away from grant-in-aid. Risks that face the MRPs, the impacts of their occurrence and possible mitigating measures are summarised in Table 6 below. These are not necessarily new risks as a consequence of a change in funding regime, but such a change does bring them into sharp relief.

**Table 6: Risks, impacts and mitigation measures for MRPs in relation to the introduction of commissioned research programmes**

| Risk   | Impact of occurrence  | Mitigation measures  |
|--|---|--|
| Inadequate funding over course of research programme       | Loss of financial sustainability of operations; quality of research does not meet SEERAD’s requirements; future policy development adversely affected | Initial funding levels represent 6-10% increase over 2005/6 position; funding levels include allowance for inflationary increases, but with the expectation of annual efficiency savings to be delivered |
| Research programme funding reduced at next spending review | Loss of financial sustainability; inability to deliver research programmes  | Scope of research programmes reduced to accommodate funding reductions; discontinued work to be phased out   |

| Risk  | Impact of occurrence  | Mitigation measures   |
|---|---|---|
| SEERAD's future policy requirements change and cease to be aligned to MRPs' areas of activity | Ability of MRPs to compete effectively for research funding decreased; market opened to greater degree of competition   | Use of development funding to ensure new developments are identified early; compliance with RIPSS guidelines on relationship between PSREs and public sector funders to ensure future alignment   |
| MRPs remain unable to access Research Council and charity funding                             | Over-reliance on SEERAD for research funding going forward  | Institutes to become "academic analogues" of Research Council institutes  |
| Move to commissioned funding does not cover future infrastructure investment requirements     | Decline of MRP estates over time and loss of competitive ability  | Funding packages for research programmes includes capital investment; MRPs must develop estate/asset management plans; additional SEERAD funding may be available for "one off" projects; establishment of institute "development fund" with contributions from major funders |
| Inability to cover pension and/or redundancy costs  | Loss of financial viability; widespread anxiety among staff   | Clear arrangements for the future management of these liabilities with SEERAD assistance; move to amended conditions of employment in the longer term   |
| Excessive time or financial commitment required to bid for SEERAD funding                     | Staff diverted from research activities for prolonged periods during bidding with result that research quality is compromised; administrative burden increases cost per unit of research and value for money declines | Streamlined tendering process with appropriate timescales   |
| Winding up of research programmes following interim review                                    | Loss of research funding; impacts on financial sustainability   | Appropriate milestones developed that are realistic and achievable within confines of programme funding; development of alternative research programmes for remaining funds   |
| Excessive competition introduced; or competition introduced too quickly                       | Inability to compete effectively, resulting in decreased funding and inability to maintain or develop core competencies over time   | SEERAD to introduce competition at a level that is appropriate to the market; MRPs to identify opportunities for collaboration  |

## **6.7 In the medium term, a general model for MRP funding is likely to be made up from a number of sources with varying timescales and degrees of competition**

Leaving aside for the present the differences of detail between the MRPs, it is useful to envisage a general model for research institute funding once a period of transition has taken place. Broadly, it comprises a mix of funding elements varying in the timescale over which they are programmed, and in whether they are directly commissioned or subjected to a competitive process. Qualitatively, these elements are likely to be present at most research institutes: it is in the relative size and absolute timescales of the various elements that institutes will differ. They are:

- A. Long term funding for programmes and capabilities of strategic importance to Scotland or of a unique and significant character.** Examples might include stewardship of a valuable germplasm collection; long term environmental monitoring; continuing disease surveillance; or a body of expertise available instantly in case of urgent need. Typically, these will be planned on a long term basis (say 5-10 years) and independently reviewed every few years to ensure quality, fitness for purpose and cost-effectiveness. Some such programmes and capabilities might be subject to competition, but this will be the exception – most will be unsuitable either because one party physically has the relevant samples or sites, or because the capability is too important to leave to competition. If a country wants to prepare for an emergency, say avian flu, it wants to systematically find the best possible experts in avian flu and engage them, not leave the choice to the partially arbitrary outcome of a public tendering and procurement process. The funding will be provided by the obvious customer, if there is one (e.g. SEERAD for animal disease surveillance); by several customers through an agreed partnership orchestrated by the body responsible for Scotland's science base; or directly by that body if the capability is strategically important across a wide sweep of science (e.g. an advanced, multi-use analytical capability)

- B. Funding for investment in, and maintenance of, institutional infrastructure and basic services** (e.g. the fabric of the buildings and common services such as libraries and administrative services). An arbitrary split between capital and revenue, which often obstructs necessary flexibility, should be avoided. Periodic independent review should be carried out to confirm the effectiveness and efficiency of these services, including explicit costing of ‘administration’ so that private sector best practice in terms of efficiency can be insisted upon. This is inappropriate for competition. Funding will be programmed and provided on a long term basis (say 5-10 years) with review every few years. It should be provided by the agencies involved in proportion to their projected levels of procurement<sup>13</sup>.
- C. Programme and project funding**, varying in timeframe depending on the nature of the research. There should **not** be an arbitrary ‘standard timescale’: some sorts of research are naturally planned six months ahead, others five years. Broadly, the nature and scope of the programmes will be planned – as in SEERAD’s new system – some years ahead, with a review at mid-term after which funding levels may change subject to perhaps a year’s notice. Within each programme there will be a portfolio of projects, some planned in at the outset of the programme and others developing with time. Good R&D portfolio management practice<sup>14</sup> should be applied to the set of projects, some of which will be short and others longer term, up to the full length of the programme with possible continuation into a future programme. The programme may well include some ‘underpinning’ elements (for example, genomic characterisation capabilities) that support multiple projects within the programme. Care should be taken to ensure that the conditions attached to programme funding allow it to be adduced, where appropriate, as ‘match funding’ for purposes such as EU Framework applications. Costing should include an allowance for the ‘downtime’ of staff and equipment that is inevitably associated with a competitive, uncertain business environment, and for the generation of a surplus to allow the MRP to build up funds for future development. Where MRP income is obtained from commercial sources, inclusion of a profit margin should be favourably considered.

<sup>13</sup> This implies that departments will have to extend their research strategy to project long term needs: which would be a good thing to encourage.

<sup>14</sup> See PA Roussel, KN Saad and TJ Erickson, *Third Generation R&D*, Arthur D. Little Inc. / Harvard Business School Press, 1991, ch. 6, for a classic explanation.

- D. **Discretionary funding** available to the institute Director, who will be accountable for its use. It is unwise to eliminate this entirely, as to do so would unnecessarily restrict the freedom of action of Directors and their ability to respond to new issues and opportunities. As section 5.2 suggests, one might draw a comparison with a CTO's discretionary funding 'pot' or with the 'discretionary time' allowed to R&D staff in some corporate environments (most famously 3M). Funding sources will be along similar lines to item B.
- E. **'Top-up' funding** specifically made available to encourage institutes to conduct work that is not fully funded – e.g. EU or charity-funded work – where it is seen as strategically desirable that there should be Scottish participation in such work. Funding is justified by criteria related to exploiting and strengthening Scotland's science base. It need not bring the total funding level up to FEC – as in private industry there is, in some cases, justification for a degree of marginal costing.

It is obvious that the closer an institute gets to full economic costing for its work, the smaller will be the need for separate funding for B and D. They will, in effect, be paid for as an overhead included, quite legitimately, within the costing for projects, programmes and services (i.e. A and C), just as in a private sector R&D provider.

For a Research Council institute, its core strategic grant can roughly be seen as paying for B, D and E, and some of A and C. Funding for commissioned programmes to be provided by SEERAD can be seen as addressing A, B, C, and D. However, the position in relation to "top-up funding" (E) under commissioned programmes requires further clarity; in some cases the necessary matched funding may be available by classing funding for existing activities within a work package as such, i.e. element C. It should be stressed that none of these categories of funding need come solely from SEERAD.

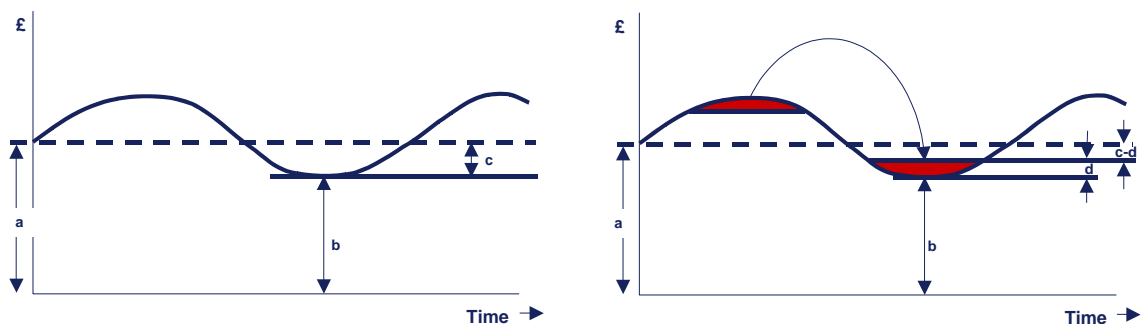
#### ***The place of 'core funding'***

SABRI Directors maintain that some element of guaranteed core funding is needed, in order to cover A, B, D and E, together with long term non-competitive elements of C. The view has been expressed, at least implicitly, that this should be sufficient to maintain a viable Institute (i.e. in essence keep the institute running) even in the absence of competitively-won funding from SEERAD or other sources.

This is an unnecessarily conservative position, for the following reasons.

Taking a very simplified view for the sake of illustration, suppose the minimum income necessary to sustain a viable institution is 'a' (Figure 2). In practice, competitively won income will not fall to zero (unless the institute is seriously scientifically deficient): it will vary from year to year leading to a varying institute income as indicated schematically by the curved line in Figure 2. Suppose the minimum plausible figure for a bad year is 'b'. Then the 'core funding' requirement to maintain viability is 'c' (where  $c = a - b$ ).

**Figure 2: The place of 'core funding'**



Moreover, freed from the artificial need to avoid carrying over surpluses, a good finance director will be able to 'smooth' variations from year to year, in effect using some of the income from a good year to tide the institute over a bad one – indicated by a shift from the upper to the lower shaded area in Figure 2, to the extent of topping up income in a poor year by 'd'. Hence, the 'core funding' requirement is only (c-d). This will cover those elements of A, B, D and E that are not defrayed by an appropriate overhead component incorporated into project and programme costs. If variations from year to year are modest and carefully managed, '(c-d)' may well reduce to zero.

Finally, this core funding requirement is a maximum – in most years, the competitive income position will be better than the minimum required to sustain the institution – and as noted above, the closer an institute gets to a regime where funders pay full economic costs, the smaller will be the requirement for core funding.

## 7. Conclusions and recommendations

SEERAD's research strategy for 2005-2010 outlines its commitment to move away from grant-in-aid for the MRPs towards the commissioning of research programmes aligned to policy requirements. Such a move must be managed carefully – by both SEERAD and the MRPs – to ensure that benefits are maximised and risks minimised. In moving from its current position, SEERAD's "ownership" role of a critical component of the Scottish life sciences base will be much reduced. This brings into sharp focus the need for an appropriate body to exercise clear stewardship of the Scottish science base of which the MRPs form an element.

The move to commissioned research will allow SEERAD to:

- Focus research requirements in terms of policy relevance
- Minimise "cross-subsidy" of areas of research that lie beyond the bounds of policy relevance
- Provide the MRPs with a greater degree of autonomy and independence
- Introduce a degree of competition into the research commissioning process

The move to commissioned research programmes is generally to be welcomed. However, for it to be successfully introduced – both in terms of securing high quality research outputs and ensuring the maintenance and development of a Scottish science base able to meet SEERAD's and others' requirements on a continuing basis – certain conditions must be met.

### 7.1 Overall conclusions

- The MRPs make distinctive and significant contributions to SEERAD's policy needs and, more broadly, to science in Scotland and the UK. There is room for a better understanding of the **different roles** of MRPs, Research Council institutes, universities and others within the Scottish science and innovation system, so that complementarity between them can be exploited and appropriate relationships and alliances forged.
- A move to commissioned research programmes is both feasible and appropriate, provided that
  - The **timescale** for the introduction of change allows the MRPs time to adapt to the new funding regime. It is recognised that the initial round of programme funding broadly aligns with the existing research activities of the MRPs providing a degree of security of funding for the period to 2005 to 2010

- During this period, the MRPs deliver **efficiency** savings and identify new **funding opportunities**. They should also consider the principal strengths they have, the match these have to the likely future requirements of a range of users of research and expertise, and the implication this has for expertise and capacity within the MRPs in the future
  - Long term, non-competitive funding streams are developed for the **maintenance of specific infrastructure**, this could be provided either by a single customer or by multiple beneficiaries of the infrastructure
  - MRP Boards continue to accept and fulfil a clear **responsibility** for the direction and strategic development of the Institutes, and Directors for leadership, strategy implementation and day-to-day management. Neither SEERAD nor any other central body should absorb these responsibilities
- The commissioned research programmes will need to offer a sufficient degree of **flexibility** in terms of their required outputs, such that the MRPs are able to maintain their core competencies over time whilst developing new competencies and capabilities. The move to commissioned research programmes must reflect the requirement of the MRPs to maintain long-term capabilities while delivering shorter-term objectives
  - In parallel with moving to commissioned research programmes, the MRPs must be able to **access a more diverse funding base**. This should include access to Research Council and charitable sources of funding on an “academic analogue” basis; as well as contract research with other funding bodies
  - Funding bodies should adopt **the principles outlined in the RIPSS report** in relation to their responsibilities to the MRPs they fund. Institute Directors should have access to future **development funds**; these could be provided either through full economic costing, or through *pro rata* contributions to a specific fund that lies outside the direct remit of the research programme funded
  - The **duration of** research programmes should reflect the nature of the science they fund: there should not be a ‘standard’ programme duration. Research programmes should incorporate **milestone review** to allow progress towards objectives to be monitored and revisions to be made if necessary.
  - The introduction of **competition should ensure value for money** by avoiding inappropriate levels of competition in small markets; minimising procurement delays and the costs of tendering; ensuring that levels of management resource are appropriate for the outputs. The **extent** to which competition is introduced, and the **rate** of its introduction, should be appropriate for the market

- For the MRPs, the ability to compete effectively for future research programmes will require the **continuing development of research capabilities** in areas that are likely to be aligned with emerging requirements, as well as the appropriate management structures to ensure that the strongest bids for funding are developed

## 7.2 Recommendations

In order to implement the change to commissioned research programmes successfully and proceed with the introduction of competition, we make the following recommendations:

### *For SEERAD*

- SEERAD must identify future research requirements early so as to facilitate planning by the MRPs and allow time to develop collaborative bids where appropriate
- Some “earmarked” funding, associated with longer term activities such as the maintenance of sample collections and long term monitoring, should be provided on a long term, non-competitive basis. Emergency response capabilities may be put into a similar category. Funding for such activities and capabilities, while included within the initial work programme funding, should in the future be clearly identified and separated from the main work streams
- The extent of competition and its rate of introduction should be carefully judged to reflect the ability of the market to sustain such competition; this will need to be determined on a programme-by-programme basis, taking account of the factors discussed in this report
- SEERAD should consider allocating some funding to MRPs as a contribution to the costs of increased business development activity, directed to securing additional income and diversifying their customer base
- SEERAD should monitor real costs (i.e. including internal management time, costs of delay and ‘bureaucracy costs’) carefully in order that an optimum balance and optimum value for money can be achieved in the commissioning of future research programmes

### ***For SEERAD in conjunction with other departments***

- In changing its funding model over time, SEERAD should work with other departments of the Scottish Executive (and wider stakeholders such as DEFRA) to ensure that common interests are served in a co-ordinated way and value for money achieved. For example, opportunities to co-fund certain areas of work with other policy customers should be explored
- SEERAD's contribution to the total funding package of the MRPs must be consistent with SEERAD's need to ensure that it continues to have access to reliable sources of policy advice over the long term, while recognising that it is for institute Boards, not SEERAD, to take ultimate responsibility for their organisations. The recommendations of RIPSS and other elements of public policy, including the desirability of funding with full economic costs, should be taken fully into account
- There is a need for a coherent, strategic overall view of the Scottish science base, for responsibility for this to be clearly assigned by Ministers to a suitable body, with the involvement of all key stakeholders including the private sector. SEERAD are not the right body to take on this stewardship role in relation to the MRPs, but have an interest in its being fulfilled since without it, Scotland's ability to deploy high quality science in support of policy and competitiveness in areas of concern to SEERAD will be jeopardised. SEERAD should therefore work with other parts of the Executive to ensure that this stewardship role is clearly identified and executed
- Accordingly, SEERAD should also work with other interested parties (in Government, the research community and the private sector) to ensure that the impacts of the changes in SEERAD research procurement on the Scottish science base are recognised and assessed. Advice and inputs from all relevant stakeholders, in the public sector, in the academic and research community, in business and elsewhere should be taken into account
- In order that Scottish environmental and agricultural science benefits from access to as wide a range of funding sources as possible; SEERAD or Scottish Ministers should make appropriate representations to ensure MRPs receive Research Council "academic analogue" status and are able to compete on a level playing field for research funding
- In addition to this, it may well be a policy objective for Scottish institutes to access sources of funding that do not cover full costs, of which EC Framework funding is the most obvious and extreme example. SEERAD and other interested parties (e.g. SEETLLD) should consider whether this is the case. If so, it will be necessary to ensure either that "match funding" is available or that work commissioned from the institutes is sufficiently broadly scoped and programmed so that it is possible for it to be adduced as match funding for the purposes of EU and similar proposals

### ***For the Main Research Providers***

- In moving to commissioned research programmes, and in the introduction of competition, MRPs should undertake a process of steady, managed adjustment, including appropriate monitoring and risk management and mitigation measures
- MRP Boards must consider how to address their need to sustain ‘critical mass’ in an environment where science is increasingly competitive and costly
- MRPs must seek opportunities to develop complementary sources of business, to undertake some rationalisation, or in all likelihood a combination of both as a means of moving their businesses to a more sustainable footing
- MRPs should increase their efforts to secure private sector contract work and funding from customers outside Scotland, in some cases in collaboration with other parties such as universities
- As a working principle, MRPs should cost their activities on a full economic cost basis
- In order to address issues of future sustainability, MRPs must consider alternative organisational structures. In the absence of major scientific synergies or potential for major estates rationalisation, creation of a merged institute should not at this stage be seen as a route to sustainable, better value-for-money research procurement, but no single solution is likely to be applicable to all of the MRPs. Where MRPs move to closer relationships with, or inclusion within, the academic sector, “ring fencing” of their activities should be provided for, so that an orientation towards policy-relevant research can be safeguarded
- A number of alternative options should be considered in greater detail. By way of illustration, consideration should be given to options such as:
  - The Rowett Research Institute could become an Institute of the University of Aberdeen
  - Provision of SAC’s education funding could be transferred to the Scottish Funding Council
  - Moredun’s role in the Edinburgh Bioscience Research Centre could be developed
  - SCRI and MLURI exhibit synergies across a number of areas of their activities that could be exploited further; in addition, the ACES grouping in Aberdeen could be further developed

## **APPENDIX 1: Case studies**

Arthur D. Little has drawn on examples of international best practice to support its recommendations. These case studies include:

- United States Department of Agriculture (USDA)
- Foundation for Research Science and Technology (FRST) in New Zealand
- The Biotechnology and Biological Sciences Research Council (BBSRC)
- Department of Agriculture, Food and Rural Affairs (DEFRA)

Each of these examples addresses the mission, funding structure and funding strategy of the organisation in question. Specific top level issues within each organisation are also addressed, including:

- Liability minimisation
- Relevance of research to government policy
- Access to sufficient quality and choice of providers
- Sustainability of competition between research providers
- Contribution of research providers to the national science base

Additionally, FRST and USDA are examples of funding bodies which have undergone, and are anticipated to undergo (respectively) a change in funding strategy towards a competitive procurement process. Issues arising from these transitions are identified separately.

## **United States Department of Agriculture (USDA)**

**Key feature of this case study: A large network comprising both in-house and external research capabilities is maintained**

### **Key points:**

- USDA has a wholly in-house research agency, and also allocates funding to external research providers
- Most external work is undertaken by the land research institutes, which receive both statutory (core) and competitive funding. Statutory funding is allocated on a state-by-state basis. A wide range of grants are available, but organisations in receipt of federal grant funding often have to match the amount they receive with a non-federal funds
- External research providers are heavily regulated by legislation to ensure they are capable of providing research of an acceptable quality
- The relative insignificance of competitive external funding in the land research institutes raises questions of policy relevant research. Research direction is mostly governed by legislation rather than strategic input
- Significant focus on collaboration between different organisations, both nationally and internationally

### **Mission and objectives**

USDA funding priorities and research requirements are dictated by seven core mission areas. The mission area concerning government funded research is the Research, Education and Economics mission area (REE).

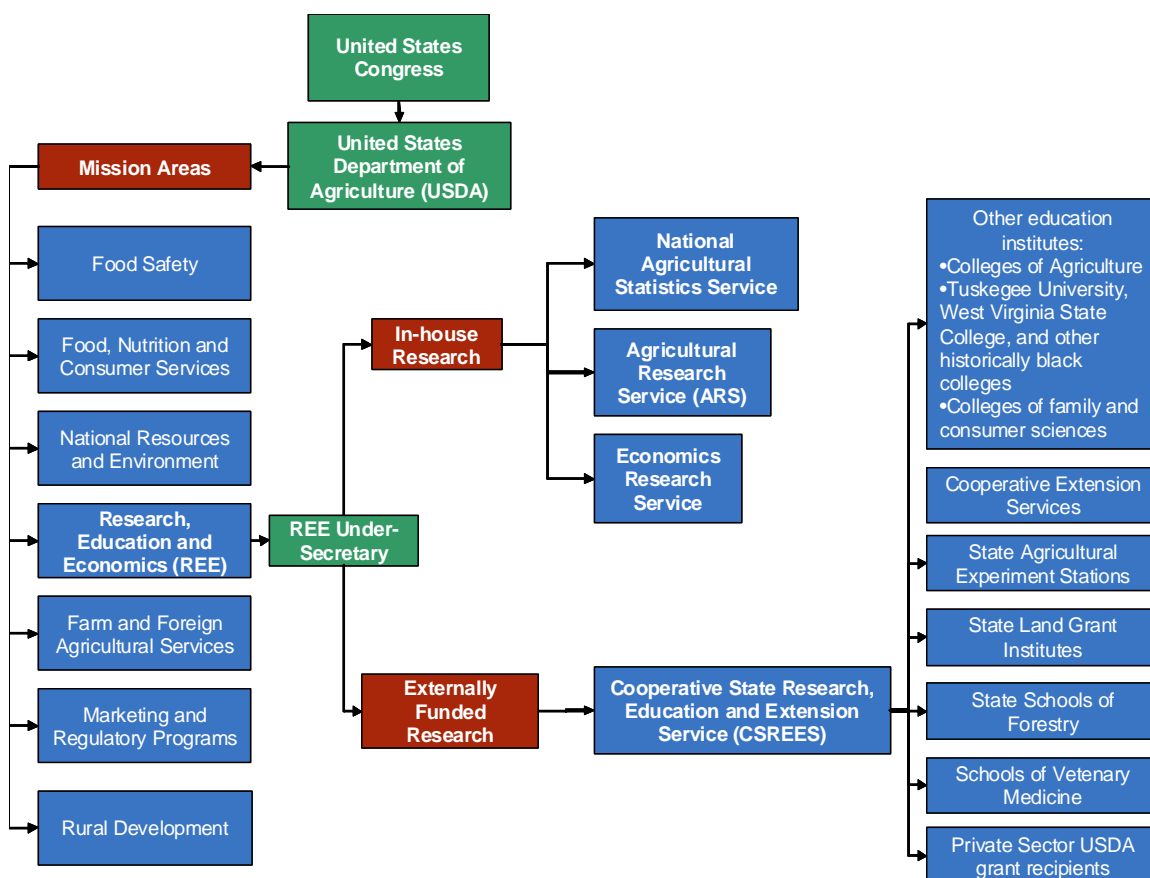
The REE missions are:

- Enhance economic opportunities for agricultural producers
- Support increased economic opportunities and improved quality of life in rural America
- Enhance protection and safety of the nation's agriculture and food supply
- Improve the nation's nutrition and health
- Protect and enhance the nation's natural resource base and environment

## USDA research structure

The structure of the USDA's research capabilities and pathway for the transfer of funding is shown in Figure 3.

Figure 3: Structure of the USDA's research capabilities



Source: Arthur D. Little

Within the REE mission area, four agencies are responsible for conducting research:

- The Agricultural Research Service (ARS): This is the principal in-house USDA research agency for the natural and biological sciences
- The Cooperative State Research, Education and Extension Service (CREES): Responsible for the allocation of external funding to a range of organisations
- The Economics Research Service (ERS) (not discussed)
- The National Agricultural Statistics Service (NASS) (not discussed)

### ***The Agricultural Research Service (ARS)***

ARS is the in house USDA research agency and also hosts the National Agricultural Library (NAL). ARS consists of around 100 facilities across the US. The mission of this organisation is to develop solutions to agricultural problems of high national priority and provide information access and technology transfer to:

- Ensure high-quality, safe food, and other agricultural products
- Assess the nutritional needs of US citizens
- Sustain a competitive agricultural economy
- Enhance the natural resource base and the environment, and
- Provide economic opportunities for rural citizens, communities, and society as a whole

### ***The Cooperative State Research, Education and Extension Service (CREES)***

The CSREES mission is to advance knowledge for agriculture, the environment, human health and well-being, and communities by supporting research, education, and extension programs in the land research institutes and other partner organisations.

CSREES is the federal partner in external research projects. It is a very small organisation consisting mostly of external panels derived from academia and the sponsored institutes. It manages a broad portfolio of 59 programmes. Those programmes are organized in 11 National Emphasis Areas:

- Agricultural & Food Biosecurity
- Agricultural Systems
- Animals & Animal Products
- Biotechnology & Genomics
- Economics & Commerce
- Families, Youth & Communities
- Food, Nutrition & Health
- Natural Resources & Environment
- Pest Management
- Plants & Plant Products
- Technology & Engineering

The programmes are administered by National Programme Leaders (NPLs) who serve as the federal partners in any research funded by CSREES. There is a strong focus on collaboration through Multistate Research Committees. These include researchers from ARS, land research institutes and agricultural experiment stations. As the federal partner, a CSREES staff member sits on each of these research committees.

CSREES is responsible for the allocation of external grant funding to a range of organisations, including:

- 130 colleges of agriculture (some of which are land research institutes)
- 59 agricultural experiment stations (one or more in each state, often affiliated to land grant institutes)
- 57 cooperative extension services
- 63 schools of forestry
- Tuskegee University, West Virginia State College, and the other 16 historically black colleges and universities
- 27 colleges of veterinary medicine
- 42 schools and colleges of family and consumer sciences
- 32 Native American land-grant institutions
- 17 Alaskan native-serving and Hawaiian native-serving institutions
- Over 160 Hispanic-serving institutions
- Other private grant recipients

CSREES is partnered with the Land-Grant University System and much of the work commissioned by CSREES is carried out by the land research institutes which make up this system. Both basic and applied research is supported by CSREES and research direction is aimed to support the US holistically rather than focused on policy relevance.

## **USDA funding strategy**

Funding for each of these four agencies is assigned independently at the level of Congress under the umbrella of the REE mission area. This involves an extensive period of dialogue between the agencies and Congress, where each agency works with USDA officials and state partners to develop an annual budget proposal. Substantial negotiation takes place at each stage. Representatives from each agency then appear before the Senate and House appropriations subcommittees to request a budget. An appropriations bill is then produced by Congress, which is then approved at Presidential level. The structure of budget allocation for the four agencies within the REE Mission Area is shown in Figure 4.

All USDA research is documented on the Current Research Information System (CRIS) database for continuing agricultural, food and nutrition, and forestry research. CRIS contains over 30,000 descriptions of current, publicly-supported research projects conducted by USDA funded agencies and institutes.

**Figure 4: Structure of budget allocation – REE mission area**

| <b>Research, Education, and Economics<br/>Program Level<br/>(Dollars in Millions)</b> |                        |                          |                        |
|---|------------------------|--------------------------|------------------------|
| <b>Program</b>  | <b>2002<br/>Actual</b> | <b>2003<br/>Estimate</b> | <b>2004<br/>Budget</b> |
| Agricultural Research Service:  |                        |                          |                        |
| Research and Information.....   | \$970                  | \$958                    | \$987                  |
| Buildings and Facilities.....   | 51                     | 15                       | 24                     |
| Homeland Security Supplemental:   |                        |                          |                        |
| Research and Information.....   | 9                      | 23                       | 0                      |
| Buildings and Facilities.....   | 0                      | 50                       | 0                      |
| Trust Funds.....  | 20                     | 20                       | 23                     |
| Total, Agricultural Research Service.....   | 1,050                  | 1,066                    | 1,034                  |
| Cooperative State Research, Education, and Extension<br>Service:                      |                        |                          |                        |
| Research and Education Activities.....  | 572                    | 552                      | 514                    |
| Extension Activities.....   | 440                    | 418                      | 422                    |
| Integrated Activities.....  | 43                     | 45                       | 63                     |
| Native American Endowment Fund and Interest.....                                      | 9                      | 9                        | 11                     |
| Outreach for Socially Disadvantaged Farmers.....                                      | 3                      | 3                        | 4                      |
| Community Food Projects.....  | 5                      | 5                        | 5                      |
| Initiative for Future Agriculture and Food<br>Systems.....                            | <u>a/</u>              | <u>a/</u>                | <u>a/</u>              |
| Total, Cooperative State Research, Education,<br>and Extension Service.....           | 1,072                  | 1,032                    | 1,019                  |
| Economic Research Service.....  | 67                     | 73                       | 77                     |
| National Agricultural Statistics Service.....   | 114                    | 141                      | 136                    |
| Total, REE.....   | <u>\$2,303</u>         | <u>\$2,312</u>           | <u>\$2,266</u>         |

a/ Mandatory funding for this program is blocked.

Source: CSREES Funding Mechanisms (2005). <http://www.csrees.usda.gov>, accessed 20<sup>th</sup> September 2005

**ARS funding**

Funding allocation to ARS is decided at the level of Congress following the development of a budget proposal by ARS. There is no competitive element for the funds provided, and 100% core funding is provided to support research and maintain buildings and facilities. A separate provision is made for research into homeland security to ensure emergency preparedness. The funding structure has very low flexibility.

Strategic direction and allocation of this budget to ARS departments is dictated by the USDA National Programme Staff, which has organised ARS research into 22 National Programmes. These are long term funding programmes lasting up to six years which are constantly monitored using a peer review process by the Office of Scientific Quality Review. ARS funding allocation is shown in Figure 5.

**Figure 5: Structure of budget allocation – ARS**

| <b>Program Level<br/>(Dollars in Millions)</b>           |                        |                          |                        |
|--|------------------------|--------------------------|------------------------|
| <b>Program</b>   | <b>2002<br/>Actual</b> | <b>2003<br/>Estimate</b> | <b>2004<br/>Budget</b> |
| <b>Research and Information:</b>                         |                        |                          |                        |
| Soil, Water and Air Sciences.....                        | \$92                   | \$102                    | \$102                  |
| Plant Sciences.....                                      | 314                    | 346                      | 355                    |
| Animal Sciences.....                                     | 160                    | 177                      | 191                    |
| Commodity Conversion and Delivery.....                   | 164                    | 177                      | 180                    |
| Human Nutrition.....                                     | 74                     | 77                       | 77                     |
| Integration of Agricultural Systems.....                 | 37                     | 39                       | 41                     |
| Information and Library Services.....                    | 22                     | 22                       | 23                     |
| Repair and Maintenance.....                              | 18                     | 18                       | 18                     |
| 2001 Earmarks not continued in 2003.....                 | 34                     | 0                        | 0                      |
| 2002 Earmarks not continued in 2003.....                 | 55                     | 0                        | 0                      |
| <b>Research and Information.....</b>                     | <b>970</b>             | <b>958</b>               | <b>987</b>             |
| Homeland Security Supplemental.....                      | 9                      | 23                       | 0                      |
| <b>Total, Research and Information.....</b>              | <b>979</b>             | <b>981</b>               | <b>987</b>             |
| <b>Buildings and Facilities.....</b>                     | <b>51</b>              | <b>15</b>                | <b>24</b>              |
| Homeland Security Supplemental.....                      | 0                      | 50                       | 0                      |
| <b>Total, Buildings and Facilities.....</b>              | <b>51</b>              | <b>65</b>                | <b>24</b>              |
| <b>Trust Funds.....</b>                                  | <b>20</b>              | <b>20</b>                | <b>23</b>              |
| <b>Total, ARS.....</b>                                   | <b>\$1,050</b>         | <b>\$1,066</b>           | <b>\$1,034</b>         |
| <b>RECAP:</b>  |                        |                          |                        |
| Ongoing Appropriations for Research and Information..... | \$970                  | \$958                    | \$987                  |
| Ongoing Appropriations for Buildings and Facilities..... | 51                     | 15                       | 24                     |
| Trust Funds.....   | 20                     | 20                       | 23                     |
| Homeland Security Supplemental.....                      | 9                      | 73                       | 0                      |

Source: CSREES Funding Mechanisms (2005). <http://www.csrees.usda.gov>, accessed 20<sup>th</sup> September 2005

ARS buildings and facilities and research and information budgets are allocated separately. However, around 4% of the research and information budget is usually allocated to the maintenance of buildings. Much of this funding is allocated on accumulative basis and can be spent when required. Additional major modernisation funding is occasionally available, which must be spent on the year of appropriation.

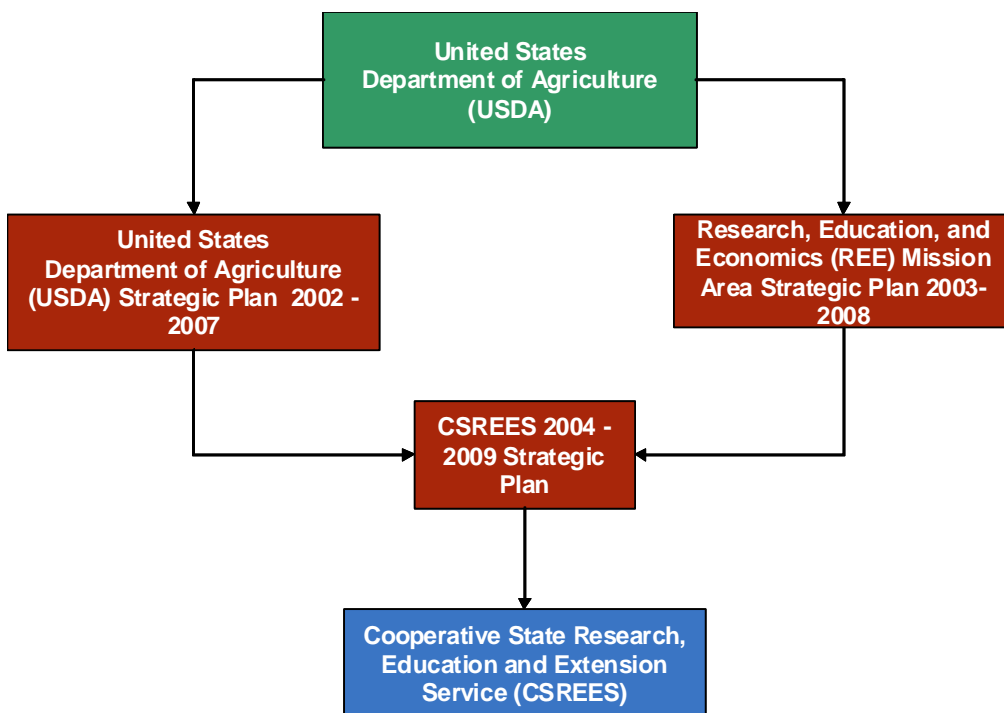
### **CSREES funding**

CSREES makes funding available through the following channels:

- Competitive funding
- Statutory formula funds (non-competitive)
- Special line item grants
- Congressionally directed funding

Allocation of CSREES funds is governed by the CSREES 2004-2009 Strategic Plan, which is compatible with the goals of the USDA Strategic Plan and REE Mission Area programmatic policies. CSREES funding is allocated at the level of Congress following submission by the CSREES budget office of their segment of the President's Budget Request. This is illustrated in Figure 6. CSREES budget allocation is shown in Figure 7.

**Figure 6: USDA research strategy for external research procurement via CSREES**



Source: Arthur D. Little

**Figure 7: Structure of budget allocation – CSREES**

| <b>Cooperative State Research, Education, and Extension Service</b> |                        |                          |                        |
|---|------------------------|--------------------------|------------------------|
| <b>Program Level</b>  |                        |                          |                        |
| <b>(Dollars in Millions)</b>  |                        |                          |                        |
| <b>Program</b>  | <b>2002<br/>Actual</b> | <b>2003<br/>Estimate</b> | <b>2004<br/>Budget</b> |
| Formula Grants:   |                        |                          |                        |
| Smith-Lever 3 (b&c) Formula.....                                    | \$276                  | \$276                    | \$276                  |
| Hatch Act.....  | 180                    | 180                      | 180                    |
| 1890 Research and Extension.....                                    | 66                     | 66                       | 68                     |
| Cooperative Forestry.....   | 22                     | 22                       | 22                     |
| Animal Health.....  | 5                      | 5                        | 5                      |
| Total, Formula Grants.....  | 549                    | 549                      | 551                    |
| National Research Initiative Competitive Grants (NRI).....          | 150                    | 240                      | 200                    |
| Selected Integrated Activities:                                     |                        |                          |                        |
| Water Quality.....  | 13                     | 13                       | 13                     |
| Food Safety.....  | 15                     | 15                       | 15                     |
| Rural Development Centers.....                                      | 0                      | 2                        | 2                      |
| International Science and Education Grants.....                     | 0                      | 1                        | 1                      |
| Critical Issues.....  | 0                      | 1                        | 3                      |
| Pest Control/Management Activities.....                             | 26                     | 24                       | 24                     |
| Sustainable Agriculture Research and Extension.....                 | 5                      | 13                       | 13                     |
| Higher Education Programs.....                                      | 27                     | 29                       | 30                     |
| Native American Endowment Fund and Interest.....                    | 9                      | 9                        | 11                     |
| Indian Reservation Extension Agents.....                            | 2                      | 2                        | 2                      |
| 1890 Facilities.....  | 4                      | 14                       | 14                     |
| Extension Services at 1994 Institutions.....                        | 3                      | 3                        | 3                      |
| Expanded Food and Nutrition Education (EFNEP).....                  | 59                     | 59                       | 61                     |
| Homeland Security.....  | 0                      | 0                        | 16                     |
| Other Research Grants .....   | 131                    | 23                       | 23                     |
| Other Extension Programs.....                                       | 32                     | 13                       | 13                     |
| Federal Administration .....  | 39                     | 14                       | 15                     |
| Outreach for Socially Disadvantaged Farmers.....                    | 3                      | 3                        | 4                      |
| Community Food Projects.....  | 5                      | 5                        | 5                      |
| Subtotal, Programs.....   | 1,072                  | 1,032                    | 1,019                  |
| Initiative for Future Agriculture and Food Systems.....             | a/                     | a/                       | a/                     |
| Total, CSREES.....  | \$1,072                | \$1,032                  | \$1,019                |

a/ Mandatory funding for this program is blocked.

Source: CSREES Funding Mechanisms (2005). <http://www.csrees.usda.gov>, accessed 20<sup>th</sup> September.2005

### ***Competitive Funding***

Research opportunities are initiated by Congressional policy, which dictates the levels of funding available for different research areas following a request for funding by the CSREES Budget Office. CSREES has input into this process by reporting on emerging research trends and on the impact of funded research. The Planning and Accountability Unit of the CSREES Office of the Administrator is responsible for publishing CSREES strategic and evaluation plans. It is also engaged in liaising with the USDA, land grant institutes and the REE mission area.

The Office of Extramural Programmes within CSREES prepares a request for proposals. Proposals received following the tender period are evaluated and ranked by an external peer review committee. These panels review each application, evaluating it based on its scientific merits and how well it addresses the research priorities determined by Congress and CSREES, as well as the quality of the facilities and researchers who would conduct the project.

External research groups including Universities have to follow stringent guidelines in the development of proposals and in their methods of conducting research, to prove that they are capable of conducting the appropriate research. Such guidelines include Office of Management and Budget Circulars and the Code of Federal Regulations.

Funding recipients are required to file annual reports and document their spending to CSREES, which are then reviewed by scientific staff and put in the public domain. National program leaders and other scientific staff visit research sites to monitor research progress.

An example of a CSREES managed competitive funding programme is National Research Initiative (NRI), the main source of USDA competitive funding. NRI budget allocation in 2004 was around \$180 million. The NRI is open to competition to all sources, including statutory grant funded institutes, the forest service, the private sector and the ARS. Despite this, around 75% of NRI funding goes into the land grant institutes.

### ***Statutory formula funds***

Core funding within USDA is allocated on a non competitive basis and is referred to as a statutory formula fund. These fund allocations are calculated on an annual basis. Examples of statutory formula funds include Hatch Act Formula Awards and Smith-Lever Act Formula Awards.

### ***Smith-Lever Act Formula Awards***

The Smith-Lever Act of 1914 establishes core funding available to land grant institutes, which receive the majority of CSREES funding as illustrated in the table above. These institutes were created in 1862 (aimed to provide agricultural education), 1890 (targeted at the then-segregated Southern states and including Tuskegee University) and 1994 (targeted at the Native American tribal colleges). There is at least one in each state or territory in the US.

Formula supporting Land Grant Institutes are statutory and worked out on a state-by-state basis. The amount required by each land research institute is calculated and requested from Congress at the budget proposal stage.

### ***Hatch Act Formula Awards***

Hatch Act funding is awarded to agricultural experiment stations. A 100% non-federal match is required for all recipients of these grants, except Insular Area institutions, which must provide a 50% non-federal match. 25% of these funds are allocated to multi-state research funding. There are no regulations concerning how this funding should be spent, and each agricultural experiment station receives the same amount of funding.

Some examples of current CSREES projects resulting from this type of funding include the Expert Integrated Pest Management (IPM) Decision Support System; Global Change, UV-B Monitoring; IPM and Biological Control; Minor Crop Pest Management; Minor Use Animal Drugs; National Biological Impact Assessment Program; and Pest Management Alternatives.

### ***Special line item grants***

Special line grant items are added by individuals within congress for policy specific research. These specify a particular research institute and research outcome with a specified amount of time allocated for the fulfilment of the research.

### ***Congressionally directed funding***

Each year Congress directs CSREES to fund and administer certain state or commodity-specific programmes through the Special Grant and Federal Administration appropriations accounts. These funds may be awarded to individual investigators at universities or consortia of universities or further distributed on a competitive basis by the recipient institution. In general, the Executive Branch does not support the inclusion of these programs in its annual budget submission to Congress.

### ***Change in funding allocation strategy***

Hatch Act Formula Awards currently constitute 100% core funding. However, this funding strategy is anticipated to change to a system where 50% of funding is allocated on a competitive basis. The competitive funding scenario is being heavily resisted because:

- The agricultural research stations were not consulted about this change in funding structure
- The proposed rate of change to a competitive scenario is too rapid to allow the land grant institutes to adapt
- Heavy staff redundancies are anticipated
- The land grant institutes will struggle to maintain adequate facilities to remain competitive when bidding for research in the absence of core funding

In response, USDA is proposing the following strategies to implement a competitive funding scenario:

- A strategic shift within the structure of the land grant institutes to make them more specialised both to certain regions and to scientific areas, thereby creating Centres of Excellence
- Allocating 25% of total funding towards collaborative projects, encouraging the land grant institutes to work together
- Implementing a points system, whereby a land grant institute is looked upon more favourably if collaborating with another one. For example, Cornell University is viewed as being more competitive than Alabama University owing to differences in expertise, facilities and reputation attracts more external funding. Should Cornell bid for competitive funding under the new system and do this in collaboration with Alabama, it would be looked on more favourably by the CSREES review panel than if it were to bid alone. This has benefits in terms of the science base, since most modern science is multidisciplinary and requires a range of different specialities
- Funding will only be allocated to the land grant institutes and not to external or international research providers

### **Top level issues**

Top level issues are identified for CSREES, since this organisation draws the closest parallels with the organisational structure of SEERAD and the MRPs.

### ***Liability minimisation***

USDA has relatively low liability for external organisations since these are established academic institutions to which it provides statutory funding and makes some competitive grants available for specific research areas. Each of these institutions has its own governance.

### ***Relevance of research to government policy***

Relevance of research is ultimately governed by national legislation, with input from the agencies of USDA with regard to success of previous research programmes and trends in future research directions. Funding allocation for ARS versus CSREES is governed at Congressional level rather than by USDA. Within CSREES, funding is allocated by a multistage process in response to internal strategy published by the Planning and Accountability Unit of the CSREES Office of the Administrator. Budget allocation is governed by a peer review process and potential research groups are heavily governed by federal legislation to ensure they are capable of conducting the research.

### ***Access to sufficient quality and choice of providers***

Quality: Researchers have to report annually on how their budget has been spent. CSREES sends team members to visit research facilities. For the land grant institutes, five year plans must be established, identifying milestones which need to be met. These milestones typically have an outcome or impact of the research.

Choice: Wide range of alternative research providers in each state. CSREES favours fund allocation to multi-state, multi-disciplinary groups within the Multistate Research Committees which are overseen by National Programme Leaders. The majority of funding is allocated to Land Research Institutes. Some international funding is also available but again the focus is on collaboration with US research organisations rather than externally allocating the entire research project.

### ***Sustainable competition amongst research providers for funding***

Since the majority of funding to land research institutes is allocated on a core funding basis, competition is for a comparatively low level of funding for specific areas of research. However, this will change significantly if core land grant institute research funding is made competitive. Strategies for ensuring the land grant institutes remain sustainable are described above.

### ***Contribution of funded Institutes to the national science base***

Land Research Institutes have a heavy contribution to the national science base since there is at least one in each state or region, forming a comprehensive network. Likewise, there is an agricultural research station in each state.

The main focus within USDA is that of policy relevant research. However, USDA recognises that for research to be conducted adequately, an appropriate science base is required to fulfil policy relevant science.

## **New Zealand Foundation for Research Science and Technology**

**Key feature of this case study: Has recently undergone a transition from core funding to competitive programme funding**

### **Key points:**

- Crown Research Institutes (CRIs) are funded by FRST on a competitive basis and were formed in 1992 from in-house government research capabilities. When CRIs were formed:
  - The New Zealand government ensured they were in a financially stable position, assigned the CRIs their assets and indemnified staff for two years
  - Funding was initially allocated in the short term but is now long term, lasting between 3 and 6 years
  - FRST pays the full cost of any research undertaken
  - FRST does not tender to companies or institutes outside New Zealand to maintain the national science base
- FRST observed that the biggest factor in changing the funding strategy the reluctance of researchers to adapt to the new competitive framework and meet profit targets
- The competitive funding situation has proved to be successful and ensures that high quality, policy relevant science is rewarded. One CRI (a small social science institute) has gone under due to lack of critical mass
- However, it is important to stress that there are very few competitors working in the same areas as CRIs in New Zealand. This would be very different in the UK, where there are much larger research institutes working in the same areas as Scotland's MRPs

### **Mission and objectives**

The main objective of FRST is to invest in public good RS&T. Investment direction is guided by:

- The government's high-level goals for RS&T such as the Growth and Innovation Framework which aims to use RS&T to help return New Zealand to the top half of the OECD
- FRST's Statement of Intent – a document which sets out the contribution that FRST will make in creating wealth and well-being for New Zealand. The Statement of Intent is produced by the FRST Board with external input from a Strategic Advisory Panel

There is a particular focus on areas where private funding is unlikely and on policy relevant research. FRST also invests in personnel training (research studentships, travel bursaries, etc.) to contribute to the New Zealand science base. Knowledge management and the dissemination of results is also a key priority. FRST engages a wide range of stakeholders to address these priorities and provides policy advice to the Government on RS&T issues, as well as providing policy advice to the Government on the evaluation of the evaluation of RS&T purchasing performance, the setting of scientific priorities and the implementation of new Ministerial level schemes.

### **FRST research structure**

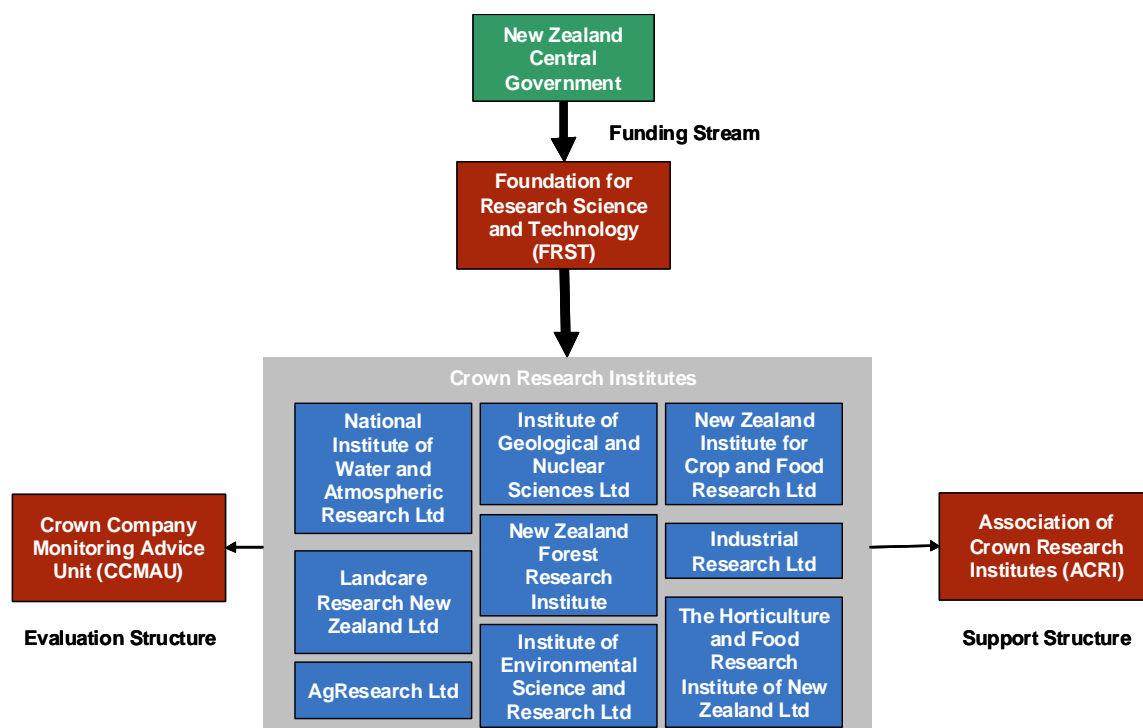
FRST is responsible for investing and managing the funding for specific RS&T projects across all technology sectors, including research into environmental and rural affairs. FRST receives funding from Ministry of Research, Science and Technology (MoRST), the New Zealand Government Ministry responsible for allocating funds for research in the environmental and rural affairs sectors. Fund allocation within the New Zealand Government is conducted using a series of funding packages (termed “votes”).

In 1992, the government’s research departments were restructured into Crown Research Institutes (CRIs). CRIs are owned by the New Zealand Government, with the two shareholders being the Minister of Finance and the Minister of Crown Research Institutes. They operate as sustainable and independent companies and focus on the provision of science for different “sectors” rather than being discipline based. The eight CRIs are listed below:

- AgResearch Ltd
- Industrial Research Ltd
- Institute of Environmental Science & Research Ltd
- Institute of Geological & Nuclear Sciences Ltd
- Landcare Research New Zealand Ltd
- National Institute of Water & Atmospheric Research Ltd
- New Zealand Forest Research Institute (SCION)
- New Zealand Institute for Crop & Food Research Ltd
- The Horticulture & Food Research Institute of New Zealand Ltd

Figure 8 shows the inter-relations between the government and CRIs, and depicts the reporting and support structures available to CRIs.

Figure 8: Inter-relations between the government and CRIs



Source: Arthur D. Little

The CRIs are all members of the Association of Crown Research Institutes (ACRI), which provides a CRI support structure. ACRI aims to help optimise New Zealand’s innovation system for strategic and applied science, as well as providing leadership capabilities. Roles of ACRI include supporting the work of members through speaking on behalf of CRIs on collective matters. Their overall structure under ACRI facilitates joint ventures, the borrowing of funds, the formation of joint ventures to maximise flexibility of operations, making their operations more flexible.

The CRIs are overseen by the Crown Company Monitoring Advice Unit (CCMAU) to ensure that government investment is managed as appropriately as possible. Rather than supporting the CRIs, CCMAUs role is to monitor and evaluate CRIs and other Crown owned companies and provide advice to shareholding Ministers on Crown company performance and ownership issues.

**CRI example: AgResearch Ltd**

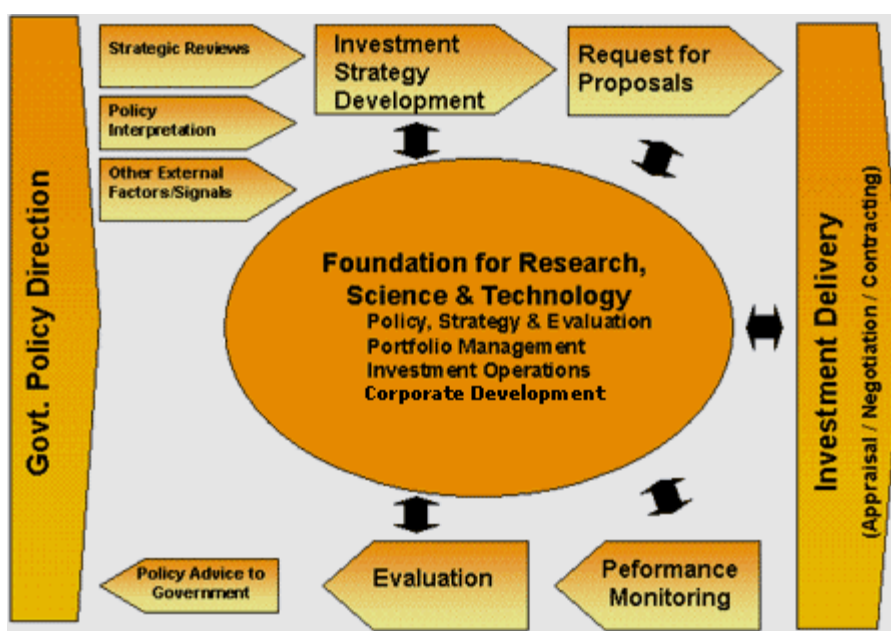
AgResearch is the largest CRI. It is an independent, Crown-owned research and development company. Objectives focus on adding benefits to the people of New Zealand through science-based discovery, product development and commercialisation.

Since formation as an independent CRI, AgResearch has developed a Commercial Services Group which facilitates the development of revenue from third party commercial clients and the transfer of intellectual property to third parties through licensing or sale. It also manages the development of any technology platforms identified as likely to be commercialised. The Group has formed six spin-out subsidiaries, including AgVax Developments Limited, BioPacific Ventures, EnCoate, Clone International, Time Capsule, Grasslanz and Farmax.

### FRST funding strategy

Figure 9 shows the FRST funding allocation strategy. FRST research funding is allocated on the basis research programmes, rather than specific projects. These programmes are referred to as portfolios, and there are 26 strategic portfolio outlines with specific target outcomes. There are no fixed funding sources for each portfolio, and this means that variable amounts of funding are assigned to each of the 26 themes depending FRST and governmental strategy.

Figure 9: FRST funding allocation strategy



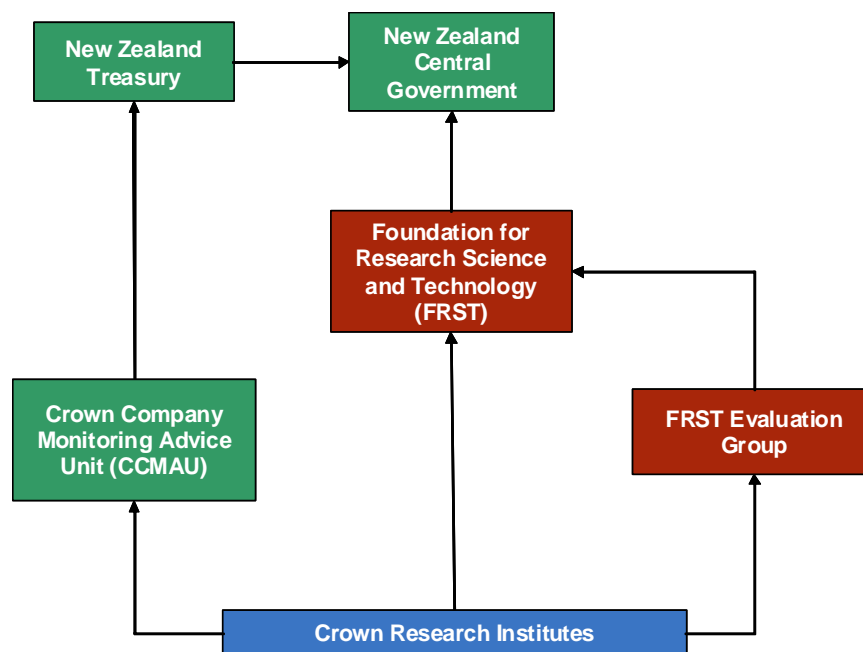
Source: Foundation for Research Science and Technology, 2004. <http://www.frst.govt.nz/about/investmentprocess.cfm>. Accessed 26th September 2005.

Strategic advisory panels of external experts called Reference Groups are responsible for allocating funding at the portfolio level. The Reference Groups take into account FRST and core governmental research strategy, and consult with industry and research groups to establish the best methods of investing funds into research.

The Reference Groups are also responsible for the peer review of research proposals and advise the FRST Board on its research investment. The allocation of research funding involves an annual request for research proposals, which are then assessed by the Reference groups. Funds are ultimately allocated by the Investment Operations Group following contract negotiation and approval by the FRST Board.

FRST maintains a well defined performance monitoring process, as illustrated in Figure 10. Each year the holders of research contracts are required to report on their performance against the contracted objectives to CCMAU. These reports are collated into a report to the government shareholders each year. FRST also has an internal Evaluation Group which ensures research investments have a benefit to New Zealand. The Group evaluates strategic portfolio outcomes to identify benefits and areas for improvement. These evaluations are not set against a regular timeframe.

**Figure 10: Research quality reporting system**



Source: Arthur D. Little

### Change in funding strategy

The CRIs were originally formed in 1992 from in-house government research providers. Initially, around 70% of overall funding for the CRIs came from FRST. Other funding came from commercial sources and government contracts, such as the Police for Public Science and the Ministry of Health for Public Health Science. The CRIs are now becoming more commercially astute and bidding for external contracts.

FRST contracts were initially made on a yearly competitive bidding basis. As time progressed, the funding became more long term, as the need to drive down overheads increased and FRST better understood the capabilities of the CRIs. Currently, most of the funding is in three or six year tranches. This has been a key mechanism in making the CRI's sustainable by making the funding certain for a longer period of time. When the funding is cut, the CRI's are given three years notice to accommodate this (funding is reduced by a third each year over a three year period. FRST pays the full economic cost of any scientific research undertaken.

Each CRI receives approximately 10% of its FRST funding as a fixed "capability development fund". This is intended to prepare CRIs for the science of the future. CRIs are required to make a profit equivalent to the average weighted cost of capital (around 10%). FRST tenders its other projects to other private entities, but not outside of New Zealand. Consortia of industry and CRIs are currently favoured.

Other than the capability development fund, no grant funding was made available to the CRIs when they were established in 1992. However, the New Zealand government ensured that they were left in a healthy state by the following mechanisms:

- The government paid off as many liabilities as possible, such as accumulated annual leave
- The CRIs were assigned their assets which were valued in a conservative manner, and a 30% debt on these assets
- The government indemnified the staff of some CRIs for two years to ensure that the new CRIs had a chance of becoming self sufficient. This meant that the government would remain liable for any costs if weaker parts of the new businesses failed
- The government remained the owner of the land and buildings on which the CRIs are built
- Capability development funds were implemented to prepare for the science of the future

As a result of these strategies, all the CRIs are still in operation with the exception of the Institute for Social Research and Development, which went out of business in 1994 owing to its low critical mass and lack of capability to handle large national research projects.

## **Top level issues**

### ***Liability minimisation***

The New Zealand government is the main shareholder within each Institute, and remains the owner of the land and buildings associated with each CRI, although each CRI's assets were assigned to them when they were initially formed. The government guaranteed indemnity against job losses through unsuccessful business units within each CRI for the first two years. This means that the government still carries a sizeable proportion of the risk involved in the operation of CRIs and would sustain financial losses should a CRI fail. However, as will be discussed later, public sector competition for the government's policy relevant research is not significant. Additionally, CRIs remain highly dependant on government funding to sustain their existence despite their capacity to bid for private sector work.

### ***Relevance of research to government policy***

Strategic research direction is governed by the Reference Groups which take into account the government's high-level goals for research outcomes such as the Growth and Innovation Framework and FRST's Statement of Intent. The Reference Groups are involved in consultations with the private sector and CRIs to ensure research remains relevant. The Reference Groups are also responsible for the peer review of research proposals and advise the FRST board on where to allocate funds.

The quality and policy relevance of research is assessed by the FRST Evaluation Group, which assesses the relevance of portfolio funding to governmental requirements. Further evaluation is conducted by CCMAU, which operates at a higher level and in conjunction with the national treasury to feed back to governmental shareholders.

### ***Access to sufficient quality and choice of providers***

Quality: Following the annual request for research proposals, FRST appointed Reference Groups carry out a peer review programme to assess the scientific quality of the proposed research project. Additionally, recipients of funding are required to report to FRST annually to update on research progress. This is in addition to CCMAU and FRST Evaluation Group quality control monitoring. FRST commissioned research is therefore of a high quality, and the quality of research has a significant impact on the future allocation of funding to individual research groups.

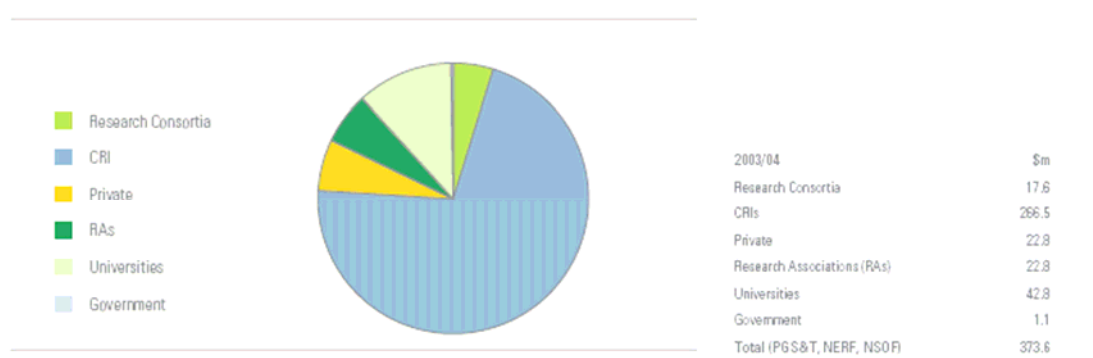
Choice: FRST only tenders to New Zealand based research providers, but targets CRIs as well as private commercial entities, research consortia and universities. However, as discussed below, the national science base of alternative research providers is quite limited, with the CRIs covering most of the government's research needs and therefore receiving the lion's share of available funding. Since the CRIs remain owned by the government, the government has significant potential to influence research direction, and as a result, CRIs have adapted significantly since their formation to take into account governmental needs. A key feature in the choice of research providers is that FRST aims to sustain New Zealand's science base by awarding funding only to national research providers, or to international providers who are collaborating with a national provider.

### ***Sustainable competition amongst Institutes for funding***

The sustainability of CRIs in a competitive environment is assisted by the ACRI, which as its key objective assists CRIs in providing policy, organisational, relationship and advocacy support. There is a specific focus on the encouragement of joint projects and collaborations between the CRIs to ensure the needs of FRST and external funding sources (other government departments and the private sector), increasing the flexibility of CRIs and improving their likelihood of winning competitive research funding. In this way the CRIs are a dynamic group of organisations capable of responding to governmental research needs.

A balance has been struck between the sustainable development of the CRIs through the provision of core funding, and the development of a competitive funding structure through open competition for research portfolio funding. Currently, FRST is tending towards sustainable development rather than developing a competitive marketplace for research funding. This is demonstrated in Figure 11, which illustrates how investment is divided between CRIs, private research organisations, research consortia, academia and in-house government research.

**Figure 11: Total investment by research provider type (2003-2004)**



Source: FRST Statement of Investment Outcomes 2003-2004. <http://www.frst.govt.nz/publications/corporate/downloads/index/SAP-2004.pdf>, accessed 29 September 2005

The graph shows that the vast majority of FRST funding is allocated directly to CRIs, despite funding being open to competition from private sources. It is important to emphasise that funding is only made available to New Zealand research providers, with international funding only available for international providers if they are in collaboration with a New Zealand provider. This suggests that the New Zealand science base is relatively small, and CRIs make up a large part of this. The size of the national science base will now be assessed.

#### ***Contribution of funded Institutes to the national science base***

Owing to FRST only tendering research to national research providers and the limited presence of private sector competition, the CRIs make up the vast majority of the New Zealand science base. The research providers other than CRIs which are capable of carrying out environmental and rural affairs research which have historically been awarded FRST funding are listed below.

#### ***Academic institutions***

- University of Auckland
- Victoria University of Wellington
- Lincoln University
- University of Canterbury

#### ***Research associations***

- The Cawthron Institute (marine biology)
- Lincoln Environmental Research (groundwater contamination)

*Private entities*

- The Agribusiness Group (strategic advice for the agriculture industry)
- Other companies generating under \$250,000 in revenues

This illustrates that the New Zealand national science base for environmental and rural affairs related research is comparatively small, and that the CRIs cover the majority of core research requirements. This situation has arisen because the CRIs were originally created by the government to serve its scientific research requirements. The interdisciplinary and collaborative structure created by ACRI means that CRIs can respond to most governmental research requests by conducting joint research within the CRI community. As a result, the majority of government funding is still directed to CRIs. Therefore, the CRIs make a significant contribution towards the national science base, which assures their continued existence in some form.

## **The Biotechnology and Biological Sciences Research Council (BBSRC)**

**Key feature of this case study: established sustainable structure comprising a Research Council and independent research providers**

### **Key points:**

- Each institute operates independently under its own board
- Both core and competitive funding is available for research. The majority of funding to institutes comes from core BBSRC funding
- Institutes are highly specialised in their core functions
- Significant collaboration between institutes and companies is in place (for example, the John Innes Centre and Syngenta)

### **Mission and objectives**

Several key features of the BBSRC mission differ from that of SEERAD. The BBSRC puts more of a focus on the development of post-graduate training and knowledge in order to support the needs of the UK science base. Additionally, basic and applied research is supported in addition to strategic research relevant to governmental policy. Similarities within the mission include a focus on knowledge and technology transfer, and there is significant focus on the role of BBSRC Institutes as service providers for potential clients.

### **BBSRC research structure**

The BBSRC is the UK's principal funding source for basic and strategic biological research. The BBSRC obtains most of its budget from the UK Government Office of Science and Technology (OST) and uses this to fund research and research training in British universities and BBSRC sponsored Institutes, which comprise:

- Institute of Grassland and Environmental Research (IGER)
- Rothamsted Research
- John Innes Centre (JIC)
- Institute of Food Research (IFR)
- Roslin Institute (RI)
- Babraham Institute (BI)

- Institute for Animal Health (IAH)
- Silsoe Research Institute (SRI)

### **BBSRC funding strategy**

BBSRC funded Institutes operate as independent companies limited by guarantee and as registered charities. The BBSRC has no involvement in the operations of the Institutes. The BBSRC Council contains a Strategy Board, which consists of research committees and strategy panels which determines funding allocation to the Institutes in response to Government requirements.

Strategy panels are in place to ensure delivery of delivery of the BBSRC Ten-Year Vision and Strategic Plan. These panels are accompanied by peer research committees, who review funding proposals and identify new research opportunities in line with overall strategic requirements. The BBSRC interacts with funded Institutes via the Institute Strategic Committee concerning scientific developments, knowledge transfer and innovation and public dialogue, as well as financial and human resource aspects affecting business development.

Furthermore, Institute Business Plan Meetings take place between the directors of sponsored Institutes and the BBSRC Chief Executive and Executive Director to ensure management and safe governance of their respective institutions.

BBSRC Institutes are funded by four main mechanisms:

- Core Strategic Grants specific to the funding of BBSRC Institutes. These are set to increase at 3% per annum
- Responsive Research Grants (competitive). The proportion of research funding allocated by this method is set to increase by 4% per annum. These grants are being made available to new organisations (such as Warwick Horticultural Research International). The number of rounds of funding by this route is set to increase to four a year from June 2005 to promote this method of funding
- Infrastructure Funding specific to BBSRC Institutes. This is also set to increase
- Funding from external customers, including other government departments

The following trends have been observed in Institute funding structure:

- Core Strategic Grant funding to Institutes is intended to increase by an average of 3% per annum over the period 2005-2008
- An interim Full Economic Cost (FEC) grant is to be made available to Institutes
- A charity partnership is to be introduced to underpin Institute financial sustainability

- A ten year estates infrastructure plan is intended to be used to modernise BBSRC Institute facilities. An investment in excess of £200 million will be required to facilitate this. This is already being manifest through the BBSRC's investment of £23 million into the development of the £121 million project concerning the redevelopment of the Pirbright Laboratory of the Institute of Animal Health

The quality and strategic relevance of the Institutes is in the process of being assessed in the 2005 Institute Assessment Exercise (IAE).

Funding structure and allocations for the BBSRC supported Institutes are shown in Figure 12. For BBSRC sponsored Institutes, the vast majority of funds come from Core Strategic Grants. U university research funding is mostly competitive.

**Figure 12: Funding structure and allocations for BBSRC supported Institutes**

| Research Funding – Analysis of Gross Expenditure |               |                              |                      |               |
|--|---------------|------------------------------|----------------------|---------------|
| (£M)   | Universities  | BBSRC – sponsored Institutes | Other Organisations* | TOTAL         |
| Responsive Research Grants                       | 100.18        | 5.68                         | 3.83                 | 109.69        |
| Core Strategic Grants                            | -             | 58.43                        | -                    | 58.43         |
| Research Initiatives                             | 26.07         | 3.81                         | 5.06                 | 34.94         |
| Equipment and Facilities                         | 10.63         | 4.44                         | 0.23                 | 15.30         |
| Capital and Buildings                            | -             | 15.17                        | 0.56                 | 15.73         |
| Training Awards and Fellowships                  | 31.23         | 1.95                         | 0.49                 | 33.67         |
| <b>TOTAL</b>                                     | <b>168.11</b> | <b>89.48</b>                 | <b>10.17</b>         | <b>267.76</b> |

\*Includes other Research Councils

| Institute Funding (£k) |               |                     |               |                            |                        |                  |               |                      |                       |
|------------------------|---------------|---------------------|---------------|----------------------------|------------------------|------------------|---------------|----------------------|-----------------------|
| Institute              | BBSRC CSG     | BBSRC Other Funding | Defra/FSA     | Industrial Contract Income | Other Research Income* | EC International | Other Sources | TOTAL REVENUE INCOME | BBSRC CAPITAL FUNDING |
| BI                     | 9,534         | 2,137               | -             | 253                        | 2,372                  | 311              | 2,557         | 17,164               | 1,000                 |
| IAH                    | 8,111         | 2,710               | 9,627         | 846                        | 1,817                  | 1,621            | 5,974         | 30,706               | 6,611                 |
| IFR                    | 8,738         | 799                 | 1,515         | 780                        | 130                    | 1,453            | 690           | 14,105               | 776                   |
| IGER                   | 4,547         | 479                 | 8,167         | 1,392                      | 824                    | 545              | 1,439         | 17,393               | 1,161                 |
| JIC                    | 10,906        | 4,513               | 813           | 157                        | 632                    | 1,843            | 3,304         | 22,168               | 2,440                 |
| RI                     | 3,965         | 1,352               | 1,661         | 3,379                      | 623                    | 518              | 1,147         | 12,645               | 426                   |
| RRES                   | 9,548         | 3,251               | 6,355         | 2,242                      | 864                    | 1,236            | 1,737         | 25,232               | 2,303                 |
| SRI                    | 3,085         | 639                 | 1,765         | 1,065                      | 674                    | 165              | 1,171         | 8,564                | 451                   |
| <b>TOTAL</b>           | <b>58,434</b> | <b>15,880</b>       | <b>29,903</b> | <b>10,114</b>              | <b>7,936</b>           | <b>7,692</b>     | <b>18,019</b> | <b>147,977</b>       | <b>15,168</b>         |

\* Including Charities and Government Departments

Source: BBSRC Annual Report and Accounts 2004 – 2005. [http://www.bbsrc.ac.uk/about/pub/policy/bbsrc\\_annual\\_04\\_05.pdf](http://www.bbsrc.ac.uk/about/pub/policy/bbsrc_annual_04_05.pdf). Accessed 21/09/05.

## **Top level issues**

### ***Liability minimisation***

BBSRC liability is minimised because the funded Institutes operate as separate companies, each with its own board of directors. Investigation of the funded Institutes indicates that these have well structured divisions according to research interest and policy direction. Regular meetings with the BBSRC at executive level ensure these remain in place. The BBSRC is removing funding from the Silsoe Research Institute in 2006, the Foundation will close down and expertise will be transferred elsewhere.

### ***Relevance of research to government policy***

The BBSRC Strategy Board is responsible for deciding the overall research direction for the BBSRC. Research committees within this Board subsequently select projects in line with this strategy which will be funded individually using Responsive Research Grants. However, for Institutes, funding from Core Strategic Grants is significantly higher than Responsive Research Grants (which are applied more in the university setting).

According to the BBSRC Annual Report and Accounts 2004 – 2005, maintaining a good UK science base takes priority over the relevance of research to policy with the objective of attracting new business to funded institutes and moves the focus of funding away from government input.

### ***Access to sufficient quality and choice of providers***

Quality: Peer review is in place within the BBSRC strategy board for research programmes. Review of institutes is also underway in the form of the 2005 Institute Assessment Exercise (IAE).

Choice: the BBSRC has adopted a strategy to maximise choice whilst still sustaining the Institutes and the UK Science Base. The majority of Institute funding comes from Core Strategic Grants. Other funding is used to promote collaboration with other countries with the aim of achieving mutual benefit for the UK science base and the science bases of other countries. This will be manifest through the establishment of strategic alliances with international organisations, in preference to simply commissioning a research programme by a foreign Institute. This funding comes from a variety of sources such as the International Scientific Exchange Scheme (ISIS) and the China Partnering Awards and Japan Partnering Awards.

An example of such an alliance is that between the DEFRA Wheat Genetic Improvement Network and the Mexican International Centre for Wheat Improvement.

***Sustainable competition amongst Institutes for funding***

Institutes predominantly receive funding from Core Strategic Grants, whilst a lower amount comes from Responsive Research Grants. More information is required as to how these Core Strategic Grants are allocated by the Strategy Board.

***Contribution of funded Institutes to the national science base***

According to the BBSRC Annual Report and Accounts 2004 – 2005, maintaining a good UK science base takes priority over the relevance of research to policy. The objective is to maintain the UK's world leading research, attract new business to the UK (and the Institutes themselves) to move the focus of funding away from government input.

## **Department for Environment, Food and Rural Affairs (DEFRA)**

**Key feature of this case study: In-house research procured on a competitive basis**

### **Key points:**

- DEFRA's scientific research is conducted by its Executive Agencies which are a wholly owned component of DEFRA
- The majority of this research is procured on a commissioning basis through open competition
- DEFRA provides some core funding its Executive Agencies to cover research which would otherwise be economically unviable, and for the maintenance of large facilities in respect of depreciation

### **Mission and objectives**

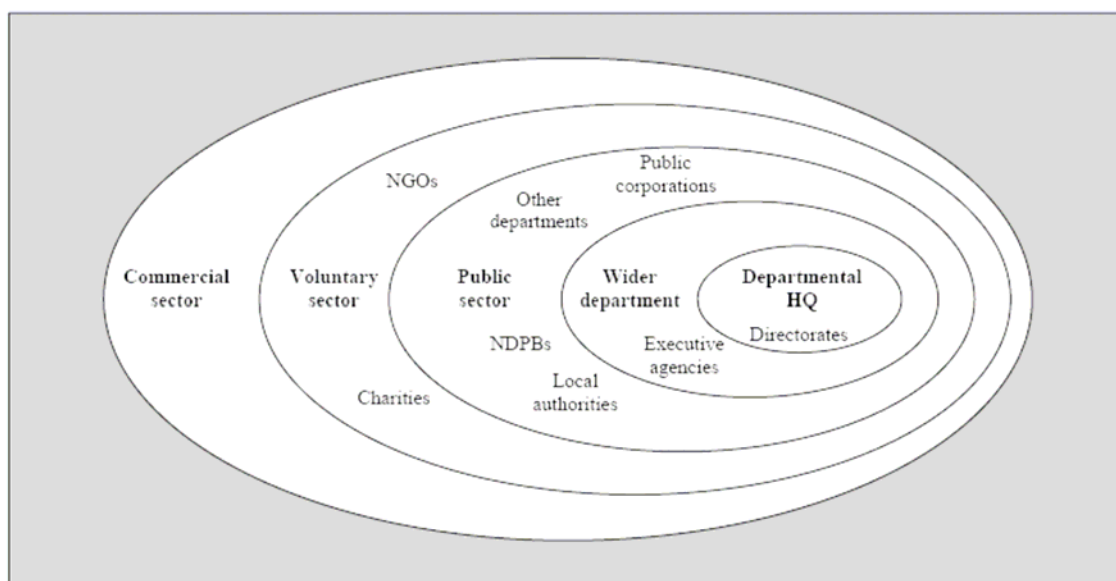
DEFRA is a large and highly complex organisation. The key objectives of DEFRA are to promote sustainable development and ensure preparedness for emergencies. These objectives fall under five strategic priorities:

- Climate change and energy
- Sustainable consumption and production
- Protecting the countryside and natural resource protection
- Sustainable rural communities
- A sustainable farming and food sector including animal health and welfare

### **DEFRA research structure**

An overview of DEFRA's organisational structure is shown in Figure 13.

Figure 13: Overview of DEFRA's organisational structure



Source: DEFRA Landscape Review (2002). NDPB: Non-departmental public bodies (for example, the Environment Agency); NGO: Non-governmental organisation

DEFRA maintains a number of Executive Agencies, as defined in Figure 14. Executive Agencies are clearly designated units which are responsible for undertaking some executive functions of that department, and give some limited policy advice. Whilst Executive Agencies have freedom to manage and design their own delivery to customers, their activities must remain in accordance with ministerial objectives. The functions of DEFRA's Executive Agencies include regulatory guidance, rural payments and scientific research.

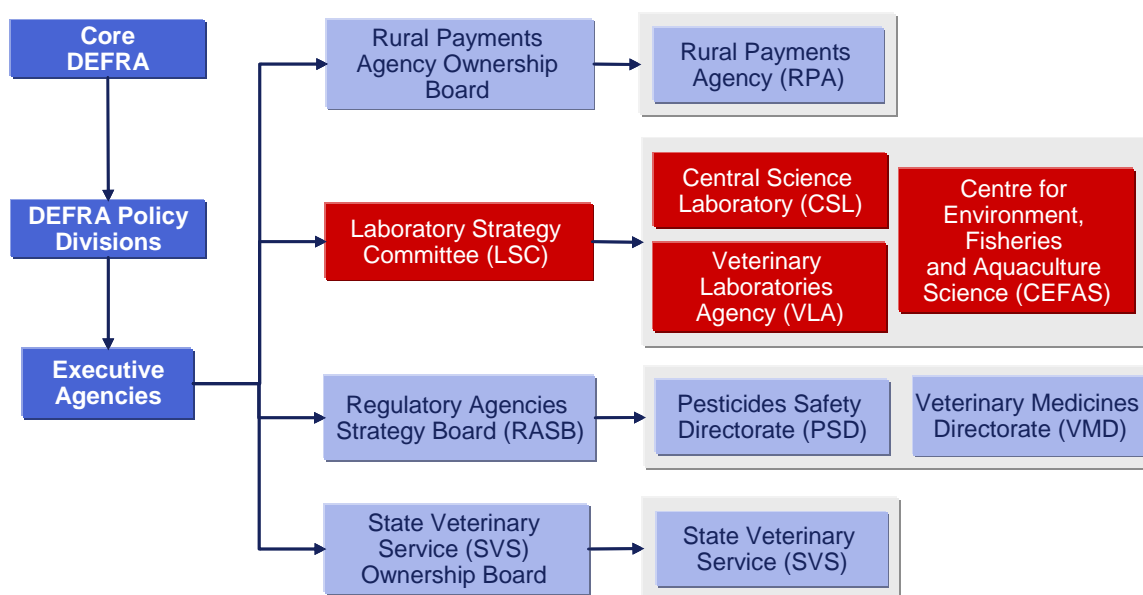
Executive Agencies were created to deliver executive functions within the Civil Service and are therefore wholly part of a department. They have been given freedoms and responsibilities to design and manage delivery to customers more effectively within a clear framework of defined Ministerial objectives. Agencies are headed by a chief executive who is accountable directly to the government for the day-to-day running of the organisation.

Scientific research is conducted by the following three Executive Agencies:

- Central Science Laboratory (CSL)
- Centre for Environment, Fisheries and Aquaculture Science (CEFAS)
- Veterinary Laboratories Agency (VLA)

Ultimate accountability for the Executive Agencies lies with the Secretary of State for DEFRA. However, each Executive Agency remains individually accountable within DEFRA.

**Figure 14: Structure of DEFRA's in-house research capabilities**



Source: Arthur D Little

## DEFRA funding strategy

### ***The Central Science Laboratory (CSL)***

CSL is DEFRA's land based scientific research Executive Agency. The majority of work carried out by CSL involves the provision of advice to aid policy development, technical support, policy enforcement and surveillance. CSL is funded through both core and competitive funding and is both authorised and encouraged to tender for research projects external of government requirements.

The majority of CSL's funding is allocated by DEFRA's Policy Divisions, such as the Arable Crops Division, the Horticulture and Potatoes Division and the European Wildlife Division. These Policy Divisions are staffed exclusively with DEFRA personnel. The Chief Executive of CSL submits to the Secretary of State annual bids for resources to cover the next financial year, which includes the net running costs of work done for all customers as well as any capital or exceptional expenditure.

DEFRA's Laboratories Strategy Committee (LSC) is responsible for advising the government on strategic research direction. The LSC consists of external panellists and both DEFRA and CSL staff. The LSC is not known to have a direct link with DEFRA's policy divisions, and feeds its strategic recommendations back to central government. The delivery of DEFRA's policy relevant and strategic requirements by CSL is supported by DEFRA's Delivery Strategy Team (DST) which works across all functions of DEFRA, including Executive Agencies, public bodies and in-house delivery bodies and offers operational advice.

Incoming funding for CSL is illustrated in Figure 15. DEFRA's funding arrangement with CSL is both core and competitive, where DEFRA effectively serves as CSL's major client despite CSL employees ultimately remaining civil servants and employees of DEFRA. CSL recovers the full economic cost of any operations commissioned by DEFRA or private clients.

### *Core funding*

DEFRA provides the following core funding for CSL, as illustrated in Figure 15:

- DEFRA facilities maintenance: DEFRA is responsible for maintaining a separate payment structure for the maintenance of specialist facilities which are used exclusively by DEFRA and is budgeted for separately. The maintenance of these facilities is not commercially viable, therefore additional support is required. An example of this is the greenhouse facilities and associated human resources involved in conducting field trials. In 2004, this was estimated at around £7 million
- DEFRA capital charge: As a component of facilities maintenance, DEFRA provides around £2.5 million annually to cover the depreciation of CSL's buildings as CSL owns a very large site. DEFRA maintains ownership of CSL's buildings. Ultimately, DEFRA will aim to relinquish responsibility for these holdings
- DEFRA commissioned basic research: This element of core funding is facilitated by a memorandum of understanding between DEFRA and CSL. This was £6.25 million in 2004, and is expected to be reduced next year

To sustain the asset base of the Executive Agencies, DEFRA has delegated three year baselines for capital expenditure on the asset base to ensure the Agencies can deliver DEFRA's research needs. The majority of capital investment in each agency is used for investing in scientific equipment and IT facilities.

Additional funding has also been provided for projects of major scale which cannot be sustained within the above parameters. Within the DEFRA science base, this involves an investment of £56 million over three years to redevelop the headquarters of the Veterinary Laboratories Agency.

### ***Competitive Funding***

In addition to DEFRA owning and maintaining its scientific Executive Agencies, the department still procures scientific research from external sources, including the private sector, research institutes and international sources. CSL received £10.29 million of policy relevant research funding in 2004, competing for a large proportion of its budget. CSL also attracts competitive funding from other areas of DEFRA such as public bodies, other government departments, European Union commissioned research and the private sector.

**Figure 15: Central Science Laboratory turnover**

| <b>Turnover (£ million)</b>                           | <b>2004 – 2005 Budget</b> |
|---|---------------------------|
| DEFRA facilities maintenance and capital charge       | 7.67                      |
| DEFRA commissioned basic research                     | 6.25                      |
| DEFRA commissioned policy relevant research           | 10.29                     |
| Other DEFRA contracts                                 | 4.73                      |
| DEFRA public body contracts (e.g. Environment Agency) | 0.80                      |
| Other Government departments                          | 2.75                      |
| European Union  | 1.27                      |
| Other Income  | 9.01                      |
| <b>Total</b>  | <b>42.81</b>              |

Source: Central Science Laboratory Annual Report and Account (2004-2005)

### **Top level issues**

#### ***Liability minimisation***

DEFRA remains fully liable for CSL and the other Executive Agencies.

#### ***Relevance of research to government policy***

The competitive component of DEFRA's funding ensures that research conducted by Executive Agencies remains policy relevant. Since the Executive Agencies remain part of DEFRA, research direction is closely tied in with government requirements.

***Access to sufficient quality and choice of providers***

DEFRA tenders internationally for the procurement of scientific work, within both the public and private sectors. The quality of Executive Agency output is overseen by DEFRA's Delivery Strategy Team. As the Executive Agencies remain components of DEFRA, there is substantial interaction between the organisations to ensure research remains policy relevant. The competitive component of DEFRA's funding ensures that research conducted by Executive Agencies remains policy relevant.

***Sustainable competition amongst Executive Agencies for funding***

Since both core and competitive funding is provided, the Executive Agencies remain sustainable. However, core funding is being gradually reduced. Since DEFRA procures research through entirely open competition (including the private sector) this could ultimately result in an unsustainable situation. CSL as an Executive Agency receives the full economic cost of procured research.

***Contribution of funded Executive Agencies to national science base***

According to the government's definition of the UK Science Base, in-house government research is not classified as a component of the science base. However, the Executive Agencies are a vital component of policy relevant research, since they conduct research which is uneconomical and unattractive for the commercial and academic sectors to provide.