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**Conference of Directors and Representatives of Agricultural Knowledge Systems (AKS)  
(Agricultural Research, Extension and Higher Education)**

**SUMMARY AND EVALUATION OF MAIN DEVELOPMENTS AND CHANGES  
IN ORGANISATIONAL FORMS OF AND APPROACHES BY THE AKS IN  
OECD MEMBER COUNTRIES**

*This document is submitted for INFORMATION and DISCUSSION to the Second Conference of Directors and Representatives of Agricultural Knowledge Systems under item c) of the Plenary Session No. 1 of the Conference Programme.*

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COUNTRIES**

(Note by the Secretariat)

This paper, prepared by Dr. Denis LUCEY, Vice president and professor of food economics at University College, in Cork, Ireland, is the first in a series of three reports that present a comparative analysis of country notes submitted by Member countries. The other two documents deal with food safety issues and agriculture/environmental interactions as addressed by Agricultural Knowledge Systems.

## SUMMARY AND EVALUATION OF MAIN DEVELOPMENTS AND CHANGES IN ORGANISATIONAL FORMS OF AND APPROACHES BY THE AKS IN OECD MEMBER COUNTRIES

### SUMMARY

1. This paper presents an overview of current trends and key issues regarding the organisation and functioning of Agricultural Knowledge Systems (AKS) in OECD member countries during the 1990s. It is based on a comparative analysis of country reports from 22 OECD member countries. Following an overview of the changing context of public sector management in OECD member countries, the paper contains sections on AKS Organisational Issues; AKS Objectives, Priorities and Outcomes; AKS Relationships and Networking (both External and Internal AKS Co-operation) and, finally, a look Towards the Future.

2. Following decades of government service expansion, the mid 70s to the late 80s became an era of **less government**. However, a new paradigm emerged for the 90s: not **less government**, but **better government**, involving a shift to more enlightened regulation, improved service delivery, devolution of responsibility, openness, transparency, accountability, partnership and “new public management”. It is within this background that the Second AKS Conference can evaluate the strengths, weaknesses, opportunities and threats facing AKS in order to enhance the ability of AKS to be proactive in designing and providing quality services of value to its various stakeholders. Debates should, therefore, be stimulated on AKS engagement with the larger public issues (e.g. food safety, the environment, rural development), on responsive articulation of AKS objectives, on flexibility of organisation to achieve those objectives and on accountability for the outcomes of AKS activities.

3. Governments have tended to bring policy making for research, higher education and development/extension in relation to agriculture and food into closer connection with general public policy for the development and provision of research, education and development services to their society as a whole. This has led to some changes in Ministerial responsibility for components of AKS but, more importantly, in nearly all countries, there is greater formal interaction with general science/technology policy, general higher education policy and general innovation/development policy.

4. Practically all countries report a shift from a unidirectional paradigm of knowledge generation and transfer (knowledge production - enlightenment - adoption) to a paradigm of interactive knowledge networks involving multiple stakeholders who contribute to problem definition, research conception, execution and provision of results to a range of users for whom the research is in some way deemed to be relevant. This has led to the emergence of various forms of peer review and merit review of research, educational and extension programmes. Many countries are endeavouring to develop mechanisms to evaluate research in a way that systematically and even-handedly incorporates societal interests in relation to the orientation of various types of research. There are many unresolved issues in this area. Meanwhile there are many mechanisms being developed for increased involvement of stakeholders, including government, with the focus shifting towards evaluating outcomes and impacts rather than activities. Sometimes, however, the reality does not yet match the new rhetoric.

5. There has been a greater realisation among OECD member countries that investment in research and human capital development give high returns and are key components of competitiveness. Many countries have recently increased their funding of these areas and have introduced a variety of schemes to harness and leverage various private funding for these activities. In general, governments have been prepared to fund all or most of higher education costs in accordance with their general policy of tuition fees. They are generally prepared to fund “basic” or “fundamental” research, even “pre-competitive” sectoral research but economic sectors are increasingly encouraged to fund sector specific research. Responsibility for extension/development work has been increasingly shifted towards the clients, either individually or, in many cases, to their local professional organisations, co-operatives etc. A number of countries have a strong commitment to fund public-good type extension, while many other “extension” workers are more involved nowadays in monitoring and implementing public regulatory schemes than in the more traditionally concerned extension activities.

6. There has been a tendency towards longer term planning of AKS activities. Even in cases where privatisation has occurred, there are numerous examples of 3 to 5 year contracts being negotiated for the services being provided by the new agencies.

7. Governments have tended to move towards funding activities rather than institutions. Initially this shift often involved the funding of individual projects either on a negotiated or a competitive basis. Many countries report that, in view of the significant costs associated both with bidding for and with evaluating small projects, they are now shifting towards funding multi-annual programmes rather than projects. Support for programmes and thematic areas also allows systems to move away from fragmentation of answers and solutions which arises from partial analysis at project level.

8. Many governments have also encouraged components of AKS to co-operate much more with one another in competing for programmes - across types of institution, across disciplines and across territories. Illustrations are available both from small and large countries. There is evidence that market, quasi-market and non market mechanisms for research coordination and funding are now leading to similar outcomes of programme design, multi disciplinary and strong AKS internal cooperation, often encouraged by extra specific funding arrangements.

9. Many countries are somewhat uneasy about the quality of the relationships between AKS and the general scientific and higher education communities of their countries.

10. Most countries see exciting challenges for AKS to contribute strongly to the newly developing societal interests that are wider than traditional agriculture. Mechanisms to encourage, stimulate and reward both institutions and individuals to engage in innovative interactive research, teaching and development work in these new areas still need further development. Many countries, however, identify the limited contribution which AKS has made in recent years to public debate and policy formation as a major weakness which has to be overcome.

11. Finally, many countries feel that AKS leaders and personnel now need to become more involved in convincing public opinion and policy makers that AKS has a comparative advantage in contributing to issues of societal concern and that it should be supported accordingly! The Agricultural Knowledge Systems of OECD Member Countries may, however, as part of this process, need to demonstrate more clearly that their comparative advantage to contribute to these issues in an effective and timely manner really exists!

## A. INTRODUCTION

12. This paper presents an overview of current trends and key issues regarding the organisation and functioning of Agricultural Knowledge Systems (AKS) in OECD member countries. It is based on a comparative analysis of country reports from 22 OECD member countries: Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Hungary, Iceland, Ireland, Italy, Japan, Korea, Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Sweden, Switzerland and the United States.

13. The purpose of the analysis was two fold; (i) to obtain an overview of the development of public policy during the past decade or so regarding the relationship of AKS to agriculture, food and rural issues and (ii) to explore the variety of organisational arrangements which have been developed to give effect to such policies, especially focusing on any arrangements designed to encourage co-operation/co-ordination /integration among the three functions of the AKS (research /higher education/extension). Thus, following this introductory overview of strategic management of public services in OECD Member countries, the paper will contain subsequent sections entitled : (B) AKS Organisational Issues; (C) AKS Objectives, Priorities and Outcomes; (D) AKS Relationships and Networking (both External and Internal AKS Co-operation); and finally, a look (E) Towards the Future.

14. An overview of the evolution of approaches to strategic management of government services in recent decades, as presented recently by an official of the OECD Public Management Service (PUMA), provides a very useful context in which to set the analysis of the evolution of the organisation and functioning of the Agricultural Knowledge System (AKS) in OECD Member countries.

“From the end of World War II to the early 70s, governments grew, took on new roles, provided more services, collected more taxes, spent more money and intervened more in the society and the economy. Market conditions changed in the early 70s, with the oil shock and liberalisation of trade, capital flows sped up and public spending mushroomed, governments became too costly, too big and were deemed too intrusive; debts spiralled out of control while citizens felt they were getting poor services for their money. The mid 70s to the late 80s witnessed the beginning of the revolution of budget reductions, downsizing, privatisations, attacks on the deficits; the era of less government. Another school of thought began to emerge in the 80s and into the 90s; not **less government**; but **better government**. This phase also began to see improvements to service delivery, more enlightened regulation, devolution of responsibilities to lower levels of government closer to citizens, better access to government information and commitment to greater transparency.” [Byrne-Nason, Geraldine. Paper to Conference on “Challenges of Strategic Management of Government in the New Millennium”. UCC Cork, Ireland. Oct 1999. Proceedings forthcoming].

15. Thus, the external public sector forces operating on AKS during the late 70’s and throughout the 80’s were generally those associated with the era of **less government**. The manner in which AKS endeavoured to cope with and respond to those forces featured prominently in the country reports prepared prior to the First Joint Conference on AKS. Already, however, the move from **less government** to **better government** was taking place in many OECD countries leading to concepts of “new public management”, which have become quite widespread throughout the 90’s, presenting AKS with new opportunities and new threats. The pace of these changes has varied from one OECD member country to another; within countries, it has varied across sectors/services and sometimes even within sectors/services. In its aim of helping AKS leaders to review the strengths and weaknesses of AKS in the face of current opportunities and threats, the Second OECD Conference on AKS is therefore quite timely as it will allow policy makers and AKS leaders to focus on identifying and fostering key synergies which, if properly harnessed, have

potential for considerable enhancement of the contribution of AKS to the well being of society in OECD member countries and beyond. It is hoped that Conference Participants will be able to focus on the strengths, weaknesses, opportunities and threats facing AKS and will be able to enhance the ability of AKS to be proactive in designing and providing quality services of value to its various stakeholders in the “new public management” era. Debate should, therefore, be stimulated on AKS engagement with the larger public issues, on responsive articulation of AKS objectives from time to time, on flexibility of organisation to achieve those objectives and on accountability for the outcomes of AKS activities. A number of current trends and key issues include the following.

## **B. AKS ORGANISATIONAL ISSUES**

16. The changing roles of governments, the nature of their growing interactions with various interest groups as well as the increasing public concern with issues which transcend sectors and even national borders are some examples of the forces which have affected the organisation of AKS in many OECD countries. New networks, new relationships, new organisational forms have come into being in many countries. Patterns of responsibility are, in many cases, much more complex than they have been and many of what were originally tried as simple solutions have evolved into more sophisticated forms of relationship-management as part of the quest for ‘better government’.

17. Probably the most fundamental and wide-ranging transformation of public sector activity generally has occurred in New Zealand, in the wake of a change to a more liberalised, market driven focus of public policy initiated by government in 1984 and continued by successive governments since that time. In New Zealand, public sector activity was separated into three basic components: (i) policy formation, (ii) regulatory implementation and (iii) the provision of goods and services. Many of the latter and some of the second of these functions in several areas of the economy, especially agriculture, were progressively commercialised and then privatised. A further aspect of New Zealand public sector reforms was a move away from sector-based policies to economy-wide policies so that agriculture and the AKS are subject to the same set of policies and conditions as are other sectors.

18. These issues have been debated to a varying extent in all OECD member countries during the past decade. In some instances, explicit reorganisations and recombinations/reconfigurations of institutions have occurred. In many others, the changes have been less stark but, nonetheless, maybe equally far-reaching in that the environment within which AKS institutions function has been altered substantially so that, while some institutions may appear to be the same, they have had not only to forge many new partnerships but also to adjust their internal operations as a consequence.

### ***Government Responsibility***

19. Many changes have occurred in the location of responsibility at government level for AKS and its components. The “old” model in which a Ministry of Agriculture had sole responsibility for the funding and operation of agricultural research, agricultural higher education and extension hardly exists intact in any country nowadays. Research policy (and its financing) have often been transferred to a Ministry co-ordinating overall policies for Science and Technology. Responsibility for Higher Education in Agriculture has, in many cases, been moved to the Ministry which oversees higher education generally. Even in cases where the Ministry of Agriculture has nominal responsibility for all three components of AKS, interlocked decision making systems usually link them also with overall research policy and with higher education policy, for example, with special co-ordination mechanisms of some sort being developed.

20. Analysis of the nature of government responsibility for AKS is further complicated in those OECD member countries which have multiple levels of government (central/federal on the one hand and provincial/state on the other with some components being administered at quite a local level). In those countries especially, very many forms of partnership and interlocking networks of responsibility, financing and service provision have emerged to give an organisational mosaic which has become generally more complex and varied throughout OECD member countries during the 1990s, becoming in some instances what one national report describes as a “dense network”. AKS boundaries have become more blurred, with another country report saying that “the hazy outlines of the AKS elude description”!

21. Recent experiences in the Scandinavian countries may help to illustrate some of the issues involved:

- (i) In Finland responsibility for Higher Education in Agriculture has resided for many years with the Ministry of Education, while the Ministry of Agriculture and Forestry is responsible for the major part of agricultural research and partly for extension, through the state aid it provides.
- (ii) From 1997, responsibility for the Agricultural University of Norway (AUN) and the Norwegian College of Veterinary Medicine was transferred from the Ministry of Agriculture to the Ministry of Church, Education and Research. The main part of agricultural research is, however, carried out by the AUN, with substantial research activities also occurring in seven other independent research institutes which work closely with the AUN. The way of organising agricultural research is going to be evaluated during the year 2000.
- (iii) In Denmark, AKS responsibilities are shared among several ministries. The Ministry of Research was founded in 1993 and in 1994 and 1998 was given additional responsibilities for IT, telecommunication, research and university policy. Denmark’s 10 universities, including the Royal Veterinary and Agricultural University (KVL) come within its remit but the Ministry of Education is responsible for all educational issues. The Danish Agricultural and Veterinary Research Council advises Government on agricultural and veterinary research and provides public funding for research projects while the Ministry of Food, Agriculture and Fisheries provides about 50 per cent of the total public sector funding for agricultural research and development.
- (iv) In Sweden, the Ministry of Agriculture is responsible for the Swedish University of Agricultural Sciences (SLU) which provides almost all higher education in agriculture, conducts 90-95 per cent of basic and applied research in agriculture and operates a special department for dissemination of its research results. Recent debates in Sweden have been described in the Swedish Report:

“During the last years there has been a discussion about changing the ministry responsible for SLU. It was almost decided to make the move from Ministry of Agriculture to Ministry of Education. One reason for the change was that SLU has increased its education activities. But after further discussion and a special investigation which looked into the responsibility of SLU for the agricultural sectors it was found advantageous to have SLU remain under the Ministry of Agriculture.”

### ***Organisational Structure***

22. A wide variety of AKS organisational structures exists in OECD member countries. Some countries with multiple levels of government, like Italy, Switzerland and the United States, for example, have close partnership arrangements between the Federal/Central and State/Provincial/Regional administrations, each with differing levels of operating responsibility and financial support. In the United

States, for example, strong Federal/State partnerships exist, especially for Research and Extension activities based in the system of State and Land Grant Universities. Higher Education, on the other hand, is a state responsibility also addressed at these and other Universities and Colleges. In these instances, Faculties or Colleges of Agriculture etc. are components of large multi-disciplinary universities.

23. Many other countries have a variety of separate Research Institutes, some highly specialised in a particular crop, for example. Some countries have merged their research and public Extension Services, while in others they are separate with various local groupings such as co-operatives, Chambers of Agriculture, farming groups and private consultants providing extension services. Some countries have specialised universities dealing with higher education in agriculture, while others have Faculties or Colleges which are integral components of multi-disciplinary Universities. In general, the tendency to have specialised units has been stronger in continental European than in other, especially Anglophone, OECD member countries.

24. Structural changes in the past decade have largely focused on developing methods of coordination and priority setting among and within the AKS institutions. Virtually every OECD country now has some link between agricultural research policy and national policy in the areas of science, technology and innovation. These vary considerably. Some countries have outright responsibility to such a Science Ministry or to a Funding Council under its aegis. Other countries have Agriculture Ministry participation in an inter-ministerial committee which allocates total research funding among the sectoral Ministries in accordance with some overview of national research priorities.

25. In general, where Faculties or Colleges of Agriculture are components of multi-disciplinary universities, they are subject to the general system of regulation of higher education of the country concerned, though the Ministry of Agriculture, may fund a significant portion of their activities e.g. research. In some cases, such a Faculty/College is fully funded by the Ministry of Agriculture but this is now rare. It is in relation to specialised agricultural universities that the organisational debate has become more intense. The situation in Scandinavia has already been mentioned. When located in multi-disciplinary universities, agricultural higher education has, at least conceptually, access to and potential for interaction with a wide range of disciplines both in its research focus and in its course design and delivery. Specialised institutions generally have to be more self contained and may have less ongoing active links or partnerships with the general scientific, research and higher education communities of their countries from whom, in some instances, they may become somewhat isolated. On the other hand, they may be able to develop stronger links with the other components of AKS.

26. It is becoming quite clear that both the location of Ministerial responsibility for AKS and the organisational structure chosen for the components of AKS may have a profound influence both on the effective ability of AKS components to co-operate closely with one another on the one hand and with the general scientific, development and educational communities on the other hand, especially since structural changes are usually linked with changes in funding arrangements. There is, indeed evidence from a number of country reports that the achievement of effective co-operation across Ministerial boundaries is not always an easy task!

27. Possibly the most stark organisational change has occurred in the Netherlands where the Wageningen Agricultural University, the Netherlands organisation for Agricultural Research and the Netherlands' organisation for Applied Research in Agriculture were merged in 1998 to form the Wageningen University and Research Centre (WUR). In France it was recognised that some higher educational institutions were too small to have their own high performance. Science faculties, promote intellectual exchange or gain international recognition. Accordingly, many were grouped in to educational research and development poles such as AGRENA in the west of France, ENESAD in Dijon and AGROPOLIS in Montpellier.

28. Similar changes, possibly even more dramatic because of time scale, have been occasioned in Central and Eastern Europe where large numbers of specialised institutions had been in existence up to the end of the 1980s. The Hungarian Parliament, for example, has decided that, as from the year 2000, integrated higher education institutions will be created, to which the faculties of the present agricultural higher educational institutions will be attached in various ways, as part of a system of 12 state universities and 11 state colleges. In the Czech Republic there had been over 40 state research institutions fully funded by the budget of the Ministry of Agriculture; this has been reduced to 9 Institutes and 15 Private entities which are now partly funded by way of state contribution.

### ***Finance and Coordination***

29. Significant changes in the financing of AKS activities have occurred virtually everywhere, usually in line with the particular approach which individual countries have adopted for public service reform generally. The Dutch government, for example, is determined to refer responsibility for development as desired by society as much as possible to those who have an interest in these developments. The Dutch government has, therefore, become a client or a sponsor, *paying for programmes or products instead of institutions.*

30. This tendency to move away from direct budgetary funding of the full costs of AKS institutions towards some form of state contribution, grant-in-aid, programme or project support or purchase of services has been an OECD-wide phenomenon during the past decade. In research, it has manifested itself particularly in the form of bidding for contracts for research projects or programmes as well as encouragement to seek private /industrial funding for research.

31. In higher education, it has appeared in funding formulae related to student numbers, with targeted initiatives to develop new areas or expand particular areas in response to expected labour market needs. Policy in respect of cost recovery in higher education through the payment of student tuition fees varies considerably and is, of course, linked with the various national public systems for student support e.g. grants, loans, personal or family finance.

32. In extension, cost recovery from client fees or producer levies exists at various levels of proportionality. For example, there is now no government funded extension service or agency in New Zealand; extension and technology transfer are wholly in the private sector. Public funding of extension has declined steadily in Finland, going below 20 per cent in 1999. In Austria, on the other hand, extension is mainly publicly financed with a small contribution by farmers. Direct contributions by Dutch farmers for technical extension went from 0 per cent in 1991 to 40 per cent in 1994. It is planned that in 2001, the Dutch technical extension and socio-economic extension services will become a private business. Issues of guidance, regulation and licensing of private consultants arise in such situations. Denmark, for example, has had a long experience of mechanisms designed to foster impartiality of extension personnel and their independence from commercial interests.

33. In France, 1996 legislation conferred responsibility for the management and funding of agricultural development on the industry itself, in partnership with the state. The National Association for Agricultural Development (ANDA) was established to manage, on the basis of joint representation, the resources derived from the governments quasi-fiscal levies on the entire production chain. ANDA provides technical and financial support and relies on the networks for active implementation of development programmes – technical farming institutes and centres at national level and agricultural development services in the Chambres of Agriculture at local level. Many other countries have decided that there is a public good component of extension which they are prepared to fund, either through public agencies or through agencies controlled and managed by the client groups themselves.

34. Debates on the balance between core and programme funding of AKS and its components has been quiet intense in several countries. In Denmark, for example, the Ministry of Food, Agriculture and Fisheries in funding the National Strategy for Agricultural Research now aims to establish a percentage ratio of 60:20:20 between core, commissioned and programme funds, due regard being had for specific institutional interests.

35. Many countries have experimented with various forms of competitive bidding for research projects and programmes in an effort to enhance responsiveness to public policy priorities. Responsiveness has indeed been increased but many countries point to the costs involved in over subjecting institutions to a competitive bidding process, especially at the level of individual research projects. The Czech report, for instance, refers to the generation of "... increased competition among facilities beyond the acceptable level, funding particularly smaller projects and diminishing the state influence upon orienting research and development, diversions from more complex solutions to (a focus on) partial problems".

36. In New Zealand, between 1989 and 1992, government funding of research was removed from departments/ministries and placed in a contestable pool, the Public Good Science Fund (PGSF) operated by a Statutory Foundation for Research, Science and Technology (FRST). Funding was originally organised into 39 output classes covering all areas of science and technology, and bidding was on a contestable basis with bids being reviewed by independent referees before being assessed and prioritised by one of six committees which made recommendations to the FRST board. "Wasteful duplication" of effort soon became a political issue in research funding, so the FRST insisted on greater communication and collaboration among competitive providers. The New Zealand report states that:

"One unintended result was a significant increase in bidding costs as institutions and individuals ensured that all of the correct discussions and communications had occurred before bids were submitted."

37. The Foundation meanwhile has made several moves to reduce the number of output classes and to increase the size of programmes (rather than projects) in an attempt to reduce overhead and administrative costs to all parties. Assessment has moved progressively from independent refereeing of all bids to a process of review of major programme areas. There is a move currently in New Zealand to shift funding to a relatively small number of large research portfolios within each output class which will then be managed by managing entities from within the research providers. In a sense, then, these larger portfolios (each presumably involving cross institutional partners) would compete with one another within the pool relative to an overall priorities framework developed by the Ministry of Research Science and Technology, with input from all interested parties, including government. Coinciding with an industry wide research and development strategy, where such a strategy exists, is a decided advantage in bidding.

38. The Canadian Agri-Food Research Council (ACRC) has been charged since 1995 with leadership in coordinating agricultural research and technology transfer and with consensus building on research prioritisation. The Council's 37 members represent federal government (11 per cent), provincial government (19 per cent), university (14 per cent) and industry (56 per cent). CARC, through its regular updating of Canada's National Strategy for Agri Food Research and Technology Transfer has a powerful influence on the allocation of the 80 per cent of total funding of agro-food research and development which comes from public funds and the growing public-private funding partnerships. CARC fosters collaborations between governments, industry and universities to address issues of common concern and develop collective solutions including accelerated technology transfer to the private sector.

39. In Japan, the annual budget for research and development conducted under the Ministry of Agriculture Forestry and Fisheries has increased by about 50 per cent between 1989 and 1999, allocated

among institutions in accordance with a ten year strategy approved by the Agriculture, Forestry and Fisheries Research Council. Currently about 10 per cent of the allocations are for project-type research proposals.

40. Spain, for example, has a National Plan for Research and Technological Development which includes National Programmes, Sectoral Programmes and programmes agreed with the Governments of most of the 17 Autonomous Communities. Public funding for these programmes has expanded in the past 5 years while increasing amounts of private sector funding have also been attracted to the programmes. The Spanish country report describes the elaborate organic structure which has been developed in Spain for coordination of the organisation, financing and evaluation of the outcomes of research and technological development. At the apex is a Joint Inter Ministerial Commission for Science and Technology, assisted by an Office of Science and Technology which is connected, in turn, with Universities, national institutes and Centres for Technological Development. These bodies exercise strong influence on coordination of thematic foci of research, funding of researchers, and stimulation of partnership among multi-regional and inter-regional programmes, involving consumers and producers as well as researchers in universities and institutes, with encouragement for developing well defined mechanisms for exploitation and transfer of research results. A five year funding cycle is currently the norm.

41. Each year the Belgian Ministry of Agriculture and SMEs earmarks contestable funds for agricultural research which are equal to about half of the budgetary amount which the Ministry allocates to its own scientific establishments. Grants from these funds are made on the basis of agreements, following a selection procedure taking into account factors such as research priorities, the scientific value of the project, its economic impact and the scope for putting the findings into practice. An Evaluation Committee, with members from academia, farming organisations and the Ministry of Agriculture and SMEs, submits funding proposals to the Ministry. The agreements are generally drawn up for a two-year period, but most projects take a total of around six years to complete. Some 80 projects are selected every year. As a rule, they must be co-financed. The projects are usually carried out in the Faculties of Agricultural Science or Veterinary Science, but also in the Ministry's own scientific establishments, in various other centres and even in private firms.

42. The results of the current position reached in New Zealand in relation to allocating funding for research may not, therefore, be as different as might appear at first sight from that reached, albeit through different routes, by other OECD countries which have engaged in various forms of dialogue, discussion and co-ordination of research goals, desired outputs, institutional or programme differentiation and funding of programmes related to priorities emerging from their particular forms of dialogue.

43. These examples of apparently diverse developments in the financing and coordination of agricultural and food research in recent years provide a fascinating area of study. It would appear that we are now approaching a **convergence of outcomes** from what, at first sight, appear to be quite different systems of finance and coordination! Various forms of market, quasi-market and non market mechanisms for finance and coordination of research are tending to produce outcomes involving a shift of emphasis from projects to programmes and, more recently, to themes, where there is considerable stakeholder involvement (government, industry, research institutions, universities, consumers, food industry, farming and other rural/environmental interest groups) in priority setting, programme selection and evaluation of outcomes, where planning is multi-annual, where more funding contracts are of 3-5 years duration, where inter institutional cooperation is increasingly fostered to achieve critical mass, where dissemination/development is more frequently an integral part of the research design and where the links between higher education and research are being strengthened as a key component of human capital development for the agriculture, food and rural sectors. These sub themes will again be referred to in later sections of the paper.

44. In general, an overview of the financing of AKS activities in OECD member countries tends to suggest the following broad patterns of funding behaviour:

- (i) Governments are generally prepared to fund all or most of the costs of Higher Education in Agriculture, on a similar basis to higher education generally, often with tightly squeezed or declining allocations per student and with varying targets for cost recovery through student tuition fees.
- (ii) Governments are generally prepared to fund basic or fundamental research while arguing that applied research of benefit to a specific sector should be funded to a much greater extent than heretofore by that sector either in the form of quasi-fiscal levies or direct financing and actual engagement in research by proprietary enterprises. Some countries have been prepared to provide special funding for pre-competitive research in the agricultural and food sector where the results are of benefit to the sector rather than exploitable exclusively by an individual firm. As governments increasingly realise the benefits of moving towards an information driven society as a means of promoting innovation and competitiveness, increased funding has become available in many countries both for innovative research programmes often of an interdisciplinary nature and also for developing the human capital to achieve the desired competitiveness. Increased emphasis on investment in human capital is highly considered with the result of a recent OECD study which concluded that “Human Capital seems to offer rates of return comparable to those available for business capital.” [OECD/CERI. Human Capital Investment. Paris 1998. P70]
- (iii) Responsibility for extension or development work has been shifted to a greater extent towards the clients who actually benefit from technical or business advice, either again through quasi-levies or by direct charges. In some countries the government has withdrawn from any involvement in this kind of extension/development work but may still be involved in licensing of private consultants. A number of countries have a strong commitment to fund public-good type extension activities in such areas as environmentally sustainable resource management programmes, food safety and rural development. Many former extension personnel have been redeployed to implementation of the increasing complex regulations in relation to environment, or food safety and the various income support schemes which exist in several OECD member countries.

#### **AKS ORGANISATIONAL ISSUES – Key Trends**

- many new networks, new relationships and new AKS organisational forms; often quite complex
- increased formalised stakeholder involvement in AKS decision making/evaluation
- greater linkage with Ministries responsible for Science/Technology policy and Ministries responsible for Higher Education
- considerable institutional reorganisation, mergers etc. both in older and newer OECD member countries
- tendency for governments to pay for programmes rather than institutions
- competitive bidding is moving from projects towards programmes and, in some cases, more recently towards research themes
- longer term planning and more multi-annual funding of programmes
- convergence of outcomes from different market, quasi market and non market research coordination, funding and evaluation mechanisms
- greater cost recovery for extension of a production nature
- commitment to public good extension especially related to a wider rural agenda public funding of agricultural higher education in line with general higher education

### C. AKS OBJECTIVES, PRIORITIES AND OUTCOMES

45. Policies on the nature, scope and role of AKS as well as on its main objectives have developed enormously during the past decade. A paradigm shift in the role of agriculture has occurred in most OECD countries. This is aptly described, for example, in the Korean Report:

“Basically, the concept of farming system in few decades ago was relatively simple. The major thrust of agricultural policy and farming was to increase productivity. Past farming technology handled by agricultural research and extension services have been mainly concentrated on the enhancement of productivity of small farmers, and solving their problems, as well as addressing the needs of all segments of the rural communities. However, the present agriculture is challenged with a new mission to be commercially competitive in the local and international markets while sustainability is at the same time in the whole horizon of the industry.”

46. Food markets have generally changed from being supply-driven towards being market-driven though some food chains are still supply-driven or technologically driven. This can vary from chain to chain and from country to country as can be illustrated by the varied development of organic food chains. Similarly, the technical-industrial society has generally been changing towards a knowledge society and concepts of welfare have evolved towards concepts of well-being with greater emphasis on ethical and ecological values. Ministries of Agriculture and AKS institutions, in this dynamic situation, have therefore been examining and redefining their focus, often in association with general strategic management initiatives being adopted on a government-wide basis. Many mission statements have been refined and title changes at Ministerial level have also reflected the new agenda.

47. Movement towards consumer-driven food markets has led to an increased AKS focus on the entire food business chain, food processing technology and value added activities. Issues of food safety have also prompted a concern with the entire food chain and the integrity/traceability concerns aimed at guaranteeing quality assurance right through the supply chain.

48. Environmental concerns have received increased attention during the past decade, so the focus has also moved laterally to a concern with the sustainability of various uses of natural resources in rural space, land, forest and water. Agricultural policy in the past served to govern rural areas. This is nowadays impossible in most OECD member countries as most countries have a complicated mix of interests affecting their rural areas. Rural policies and rural development have increasingly come to the fore with a focus on an area and its people as opposed to any single sector. Multifunctionality is an active concern in many countries, as also are issues related to pluri activity of rural households and small enterprise development.

49. Thus, today, we have, for example, a Ministry of Agriculture and Forestry in Austria, a Ministry of Agriculture and Small and Medium-Sized Enterprises in Belgium, a Ministry of Food, Agriculture and Fisheries in Denmark, a Ministry of Agriculture and Regional Development in Hungary, a Ministry of Agriculture and Food in Ireland, a Ministry of Agriculture, Nature Management and Fisheries in the Netherlands and a Ministry of Agriculture and Food Economy in Poland.

50. A variety of broader policies towards AKS and objectives for its components has evolved in the past decade. In Austria, for example, natural protection is a task which falls within the competence of the Provinces which, in co-operation with various Federal Ministries and NGOs, have completed a National Environmental Plan in 1995. As a consequence, the objectives of Austrian agricultural research place man in the centre of interest - on the one hand as a consumer and buyer of agricultural products and on the other hand as a part of the inhabited environment with the responsibility of safeguarding Austrian society's basis of existence. The Federal Ministry of Agriculture and Forestry has, since 1993, been participating in the

development of a new research priority "Sustainable Development of Austrian Cultural Landscapes", which focuses on elaborating scientific bases for their protection, responsible use and development. Austria's University of Agricultural Sciences regards its foremost tasks as "...to secure the basics of life for future generations, to ensure a sustainable and environmentally compatible use of natural renewable resources through an alliance of nature and technology and to conserve and maintain the beauty of our land" - a far cry indeed from the conception of agricultural higher education during the sixties and seventies!

51. The Agriculture, Forestry and Fisheries Research Council of Japan established a ten-year research plan in 1996, with seven foci:

- (1) Strengthening of the structure of agriculture, forestry and fisheries in Japan.
- (2) Development and utilisation of bio-functions for generating new industries.
- (3) Upgrading of processing and distribution systems for agriculture, forestry and fisheries products.
- (4) Revitalisation of rural communities and enhancement of multiple functions of agriculture, forestry and fisheries.
- (5) Conservation of the environment and appropriate management of natural resources for sustainable development of mankind.
- (6) Contribution to the development of agriculture, forestry and fisheries from international perspective.
- (7) Development of cross-cutting basic research strategies.

Additional emphasis has been given in 1998 to "assurance of food safety and quality" and the research plan is in course of being refined to sharpen its focus.

52. In the United States, with the assistance of a series of national and regional stakeholder sessions sponsored by the Kellogg Foundation, a comprehensive planning exercise in 1996 by the USDA and its partner institutions has settled on five common goals:

- An agricultural production system that is highly competitive in the global economy.
- A safe, secure food and fibre system.
- A healthy well nourished population.
- Greater harmony between agriculture and the environment.
- Enhanced economic opportunity and quality of life for Americans.

These five goals are being addressed in the requirement of the 1998 Farm Bill that institutions receiving federal formula funding submit Plans of Work (POWs); to describe how information from stakeholders will be obtained and used; how research and extension programmes will be organised; and how outputs and outcomes will be reported annually to the Federal partner. The Farm Bill also requires 25 per cent of the Federal formula funds to be used for multi-state activities; a further 25 per cent for integrated activities (i.e. research and extension), and has a specific allocation for multi-disciplinary research.

53. The Netherlands, for example, in 1995 reported that research was more directed towards nature management and land use, general rural development, technology assessment, food technology, logistics and non food use of agricultural commodities. In 1999 issues like competence and knowledge for sustainable production and shaping multifunctional utilisation of land became more important.

54. Earlier in this paper, the evolution of the range of elaborate mechanisms which OECD countries have adopted for research prioritisation, programme funding and outcome evaluation has been discussed in

considerable detail. Several countries have reported on evaluation of research outcomes. The Netherlands, in particular, has reported on evaluations conducted by their National Council for Agricultural Research (NRLO). One NRLO study on 'Evaluation of Agricultural Research' attempted in 1998 to provide systematic information regarding the embedding and performance of research programmes within the social environments that were relevant to each.

55. In attempting to evaluate scientific research in the context of societal demands the Dutch group drew heavily on the idea that research programmes develop in mutual transactions with a relevant societal environment. The success of a research programme depends on the ways in which researchers manage to connect to themes in that environment, and on the ways in which that environment absorbs ("uses") and further develops the results of the research. Thus some programmes develop primarily in connection with the international scientific community (often a disciplinary community), others are more oriented towards networks in which general policy questions are at stake, while others collaborate with professional entities (public, private or cooperative) in a context of application.

56. It is clear that large segments of research, especially in the AKS areas, are not only directed towards scientific advance in the narrow sense, but develop in tandem with related social sectors. Methods are therefore being sought and developed to evaluate research in a way that systematically and even-handedly incorporates the relevant societal interests. Even-handedness implies that the orientation of each research programme is taken into account. Thus 'peer review' and 'objective' indicators of quality (e.g. bibliometrics) may provide inadequate assessments unless integrated appropriately with user analysis and other comparative feedback.

57. There is obvious scope for considerable and increasingly sophisticated work in this area of evaluation of outcomes from various types of research programmes. In fact, the earlier described elaborate stakeholder review mechanisms for evaluation and funding could usefully be regarded as attempts by governments in OECD countries to build consensus or even-handedness in assessing research potential and outcomes related to differing society contexts of the various programmes being developed or reviewed!

58. Similarly, the programmes in higher education institutions have broadened to address the wider agenda, to attract a wider range of students, to afford them interdisciplinary, problem-solving experiences and to prepare them to develop a much wider range of career options than those formerly open to traditionally trained agricultural graduates.

59. Following initial declines in student enrolment in the early 1990s with the perceived decline in career prospects for traditional production operated agricultural graduates, about half of the OECD countries which provided data now report that as a result of programme diversification in agricultural higher education, enrolment numbers have increased significantly during more recent years. In the Swedish University of Agricultural Sciences for example, the intake of students has increased by 50 per cent during the last five years and will soon reach the objective of an 80 per cent increase. The Agricultural University of Norway has similarly increased its student intake by about 60 per cent between 1990 and 1998.

60. In the Netherlands, however, first year registrations in the agricultural university are dramatically low. The present enrolment in the agricultural university is regarded as "...insufficient to supply the replacement demand in food, agricultural and rural work in the future". At present, a structural shortage is also observed for graduates of the non-university agricultural Colleges. Similarly, Switzerland reports that the number of diplomas conferred in the Department of Agriculture and Food Sciences at the Federal Institute of Technology (ETH) has declined by about 25 per cent since the early 1990's. It is interesting to explore the extent to which this may be caused by negative public opinions on agriculture or by low public perceptions of challenging or inspiring perspectives within higher agricultural education.

61. A number of countries report significant increases in student numbers at postgraduate level, especially in cases where an interdisciplinary research focus has been developed and wider research issues are being addressed. Examples from Denmark and Ireland illustrate this feature, often attracting into the agricultural and food postgraduate area a number of graduates from a variety of natural and social science disciplines.

62. Extension and development work has similarly undergone many significant changes in orientation. Practically all countries report a shift from the provision of technical/economic solutions towards developing understanding of problems and opportunities as well as the skills to solve the problems and grasp the opportunities. In relation to publicly funded extension/development work, the Italian country report describes a recent major recommendation:

“The need was felt to steer the agricultural sector towards new objectives based on quality rather than quantity; the farmer was no longer considered as a mere producer of commodities, but rather as a producer of services. The solution to the problem of balancing out the different areas of the territory was no longer sought in evening out diversity, but rather in the need to enhance local peculiarities and differences; the approach based on sectoral development was gradually abandoned in favour of strategies for the integrated development of rural areas, of decreased environmental impact, of a balanced reconversion of production surpluses.”

63. Several countries report a substantial withdrawal of publicly funded extension from individual farm production activities towards public good activities in relation to the environment, food safety, rural development and even the culture of the countryside. Local specificity has also increased in line with devolution outwards from central to local government. Central government activities thus have tended to be supportive in terms of material production, in service training of extension personnel and often acting as “bilingual brokers” between extension personnel, higher education personnel and researchers.

64. In Switzerland, the cantons bear most of the expenditure of the advisory service. Currently, the Federal Office for Agriculture and the cantons are drawing up new guidelines for output-oriented financial support of the cantonal advisory services. Federal public spending will be limited to services which are in the public interest of the Swiss Confederation. The Swiss Association for Advice to Agriculture (SVBL) has two information centres which support the advisors and also provide feedback to researchers. The Federal Office for Agriculture funds SVBL on the basis of a 4-year contract. SVBL’s members are the cantons and agricultural organisations. Thus, Switzerland has provided the information centres with greater autonomy and entrepreneurial scope under the “new public management” while, at the same time, guaranteeing multi-annual funding.

65. Life long learning and continuing education, either formal or informal, have grown in importance. Poland, for example, has established about 50 agricultural centres for continuing education which are expected to play a particularly important role in organising activities aimed at reducing unemployment in rural areas, including those related to learning how to look for and find employment and alternative sources of income outside agriculture.

66. Many countries report an increasing use of the internet for communication purposes to various client groups. Norway, Sweden, Austria and Canada, for example, have reported on their experiences to date. Several countries are exploring the scope of internet communication as a means of adjusting to diminished public funding for dissemination/development work. A number of countries have also mentioned their interest in exploring the possibility of developing an international AKS network among OECD member countries as an outcome from the AKS Conference.

67. In general, AKS as a whole has had limited systematic contribution to agricultural and food policy formation. Databases and specific policy oriented research have been influential, however, in some countries. Individuals within AKS have, of course, been frequently consulted by official policy makers and often sit, in a personal capacity, on various policy-oriented committees. AKS contributions to public understanding of policy issues and to the political debates about the environment, food safety, biotechnology/rural development and multifunctionality have generally been sporadic, at best. Many country reports identify this as a major weakness in information flow from the AKS.

#### **AKS OBJECTIVES PRIORITIES AND OUTCOMES – Key Trends**

- wider agenda – environment, sustainability, safety, rural development etc.
- concern with entire food chain, food processing, value added etc.
- many five year or ten year plans with elaborate goals
- funding drives multi-area, multi-discipline and multi-institutional programmes
- search for mechanisms for systematic and even-handed evaluation of proposals for and outcomes of various kinds of research programmes in their particular societal/environmental contexts
- agricultural higher education numbers expanding where undergraduate programmes diversified and where postgraduate programmes designed to attract graduates with a range of initial degrees
- shift from unidirectional flow of knowledge paradigm towards understanding problems and developing skills to find situation specific best solutions
- “new public management” leads to greater devolution and entrepreneurial scope
- more multi-annual funding arrangements and various attempts to balance core and programme funding
- greater emphasis on lifelong learning and continuing education
- increased awareness of internet and great interest in its potential
- limited contribution to policy making
- sporadic contribution to public debate

#### **D. AKS RELATIONSHIPS AND NETWORKING**

##### *Networking with the General Scientific Community*

68. In the course of AKS orienting itself to its newer wider agenda, the process of interaction with the general scientific/educational communities has raised several issues in many countries. On the one hand, new networking opportunities have emerged and greater access to more general research funding has been possible as well as opportunities to courses to a wider range of students interested in the broader agenda, while extension/development personnel have had the opportunity to widen the scope and diversity of their particular contributions. However, the preparedness and ability of AKS institutions and personnel to address the wider perspectives has varied, sometimes due to attitudinal problems in either direction, difficulties in adopting more comprehensive viewpoints or problems in becoming partners in contributing to decision-making processes in production and in policy development rather than prescribing optimal solutions!

69. In similar vein, many other scientists, educators and interest groups are now contributing to research education and public information provision in the new interactive cross sectoral areas. In some cases they may even be taking the lead relative to AKS personnel.

70. The position in which AKS finds itself in this regard has been expressed in very stark terms in the United States report:

“The Agricultural Knowledge System has found itself to be distanced from the core scientific community of the United States. Agriculture is fearful that it has been marginalised as not being part of science.

There is growing concern that something needs to be done to bring the US AKS into the general scientific and educational decision making body. But there is, as yet, no consensus on how that should be done.”

71. The extent to which this concern is widespread throughout OECD countries could be addressed by the Conference. Is the situation potentially more acute in countries with specialised Agricultural Universities and specific research institutes? Do the experiences of large and small countries differ in this regard? What specific measures can be taken to bridge the perceived gaps?

### *Internal AKS Networking*

72. Relationships and networking within AKS itself have been receiving increased attention in most OECD countries. Increasingly the unidirectional flow of knowledge model is being abandoned in favour of interactive knowledge networks involving a range of stakeholders in identifying problems and contributing to processes of decision-making. Many countries are insisting that research proposals have within them the actual processes and budget for dissemination of results, not just to the next user along the chain but to wider networks.

73. Ministries of Agriculture have generally had more success in coordinating research and extension than in linking either of them strongly with higher education. Several country reports identify this as a serious issue, partly attributed to differing ministerial responsibility for higher education than for the other AKS functions. It is often difficult to cross ministerial boundaries. Similarly, cooperative or voluntary arrangements between AKS institutions which receive their funding from different sources have had limited success, especially in times of curtailed core or discretionary funding. Internal AKS cooperation is, in fact, often due to personal relations, mutual respect, common interest and goodwill among personnel in the different organisations than to the stated official positions of the agencies involved.

74. In Portugal, for example, there is an elaborate coordination mechanism described in the country report. Yet, however, the President of the National Institute of Agranda Research (INIA) states in the country report that:

“Despite the structure of the national scientific system described above, the coordination mechanisms have not functioned effectively. Indeed, the different sectors do not have institutional connections sufficiently strong to provide co-ordination for the work they do so. Therefore Higher Education, particularly the Universities, with the independence their status allows them, are clearly separated from State organisations”.

Nevertheless, Portuguese universities are reported as collaborating in 48 per cent of INIA projects and it is acknowledged that “in establishing cooperation and collaboration, the individual initiatives and personal connections are important between technical staff, professors and researcher.”

75. Many Ministries or funding agencies, as mentioned earlier, have endeavoured to rectify this weak cooperative situation by encouraging joint funding bids from AKS partners. In Ireland, the Department of Agriculture and Food launched a non-commissioned food research programme for which bids would, in general, only be accepted on a joint basis from Teagasc (the Agricultural and Food Research and Development Authority) and one or more of the Irish Universities. Several joint projects were funded

between Teagasc and the Faculty of Food Science and Technology at University College Cork. Other projects involved Teagasc and the Faculty of Agriculture in University College Dublin. This initiative has been regarded as a major success by all those involved. It provided additional funding, stimulated real partnership in developing and implementing programmes of relevance for policy analysis and for precompetitive results of relevance to Ireland's food industry, whose representatives had an active role in the relevant Steering Committees. The partnership has also financed about 100 postgraduate students in Irish universities, often with joint supervision and substantial periods of research work in Teagasc facilities. These partnerships, though successful to date, are still fragile. This scheme provided a basis which can lead to much greater cooperative effort on a sustained basis with suitable nurturing. Adequate and proper sharing of the credit for the success to date is an essential requirement for partnership sustainability.

76. There are several examples of individuals being encouraged to cross AKS component boundaries. Some countries have explicit joint appointments. Other countries stress that interchange of personnel is the most effective way of promoting cooperation across AKS components. Some countries have elaborate mechanisms for individual involvement across the AKS system. In Korea, for example, 148 university professors concurrently hold research or extension appointments in institutions operating under the aegis of the Rural Development Administration (RDA), while 85 research and extension personnel have been appointed as faculty members in Korean universities. RDA staff also provide visiting lecturers in various agricultural universities.

77. These examples suggest the more general emergence and support for the development and strengthening of various forms of partnership both among institutions and, as will be developed later, across the components of AKS. A vivid example of this pattern emerges from the United States Report which points out that the US AKS is a Federal-State Partnership with responsibility shared, especially to date in research and extension, between the USDA and partner universities in a process characterised by open dialogue, joint planning and shared credit.

78. The Executive Summary of an April 1999 Report of the United States Presidential National Science and Technology Council (NSTC) contains the following assessment:

“The NSTC finds that the partnership is sound and continues to serve the nation in important ways. The NSTC identified a number of areas in which the partnership can be strengthened and will take action in three areas. *First*, the NSTC is issuing a proposed statement of the principles of the partnership to clarify the roles, responsibilities, and the expectations of the parties and provide a framework for the development and analysis of future policies, rules, regulations, and laws. The principles will be finalised, in consultation with universities and other interested parties, including the Congress, within twelve months from the date this report is issued. *Second*, the NSTC reaffirms the importance to the nation, to the research enterprise, and to the future scientific and engineering workforce, of the linkage between research and education. The NSTC will take action to strengthen this linkage, and urges universities to do likewise. *Third*, the NSTC, through the Federal agencies that fund university-based research, will implement a set of actions to help make the partnership more effective and efficient. *Finally*, the NSTC will establish a mechanism to provide for ongoing review of partnership,” [April 1999].

79. Programmes of research and educational cooperation in the European Union require partnership between applicants in at least two member states or one member-state and one of the applicant states or EFTA states. This has been a tremendous stimulant for transnational AKS cooperation within Europe. Paradoxically, however, the rewards for seeking transnational partners have been greater than those for forging partnerships with other AKS components within one's own country!

### **AKS RELATIONSHIP AND NETWORKING – Key Trends**

- concern about adequacy of AKS interaction with general scientific community
- increased focus on greater networking/cooperation among the AKS components
- more success in linking research to extension than in linking either of them with higher education
- several schemes to encourage research institutes and universities to be partners in research proposals
- more emphasis on linking research and higher education for human capital development partnerships

## **E. TOWARDS THE FUTURE**

80. In the face of all the opportunities, challenges and threats, the country reports suggest generally that AKS institutions can and should respond in a pro-active strategic manner to the changing focus of society in OECD member countries. On balance, the opportunities are seen to outweigh the threats though a number of countries emphasise the difficulty of performing in the new wider agenda of society at a time of budgetary restraint. The challenge may not be “to work harder” but “to work differently”, to develop new images and identities, probably to diversify further and, almost certainly to co-operate further with institutions outside the old AKS boundaries. The French country report says that a major challenge will be to train people for the strategic economic, social and environmental roles that they will be playing in multifunctional agriculture.

81. Many country reports stress the potential of new information technologies, especially the internet, to open up a broad field of direct, timely and world-wide information. However, this supply of information goes hand in hand with the necessity for increased and well-aimed processing and feeding in of information in this medium to ensure that information can be converted to accessible knowledge of relevance and use to end users. The Swedish University of Agricultural Sciences is reporting good experiences so far in using Internet for communication between researchers and different client groups. Other countries may wish to share experiences.

82. Almost invariably, the Country Reports emphasise the desirability of greater co-operation among research, education and extension personnel. Some say it is essential if AKS is to have a future. Yet there is ample evidence that such co-operation has not yet reached desired levels, especially in the links involving higher education. How is it to be further encouraged? Country Reports cover a wide range of attempts. Tentative conclusions suggest that, where Ministries/funding agencies reserve some funding for joint projects involving partnership among AKS institutions, real co-operation is encouraged and the funds can even be used to lever other resources for further collaborative work.

83. Mutual professional respect, open dialogue, clear focus and a fair sharing of credit for the successes flowing from internal AKS co-operation would appear to be among the essential elements of successful partnerships. All partners must gain something from the synergy. Models of good practice are being developed in several countries as a result of their experience to date.

84. The rapid change of framework conditions like the WTO discussions, EU Agenda 2000 and the new agenda of safety and sustainability will, in most OECD member countries make increased demands on research, higher education and extension. As suggested by the Austrian report, AKS as a whole needs to be able (i) to follow and anticipate the next stages of the changing framework conditions, (ii) to have approaches to solutions prepared in time and (iii) to develop and support interactive thinking. How best can this be achieved? One possibility is that flexible networks appropriate to particular problems could be developed and then dissolved when individual problems are resolved and the knowledge successfully applied, with AKS intellectual capacity being redeployed to current or anticipated topics rather than remaining with obsolete ones.

85. Dialogue and co-operation with private firms appears set to increase and AKS will be increasingly affected by private requests and associated financing. Issues of access to proprietary information will, of course, affect AKS. The implications for perceived AKS objectivity need careful consideration.

86. It appears that AKS and its public funding bodies will have increasing difficulty in attempting to balance AKS activities devoted to the public good (e.g. support for sustainability) with AKS activities which have a more immediate economic return.

87. There will be increasing pressure on AKS as it endeavours to keep abreast of rapid scientific knowledge and technological developments, e.g. in genomic research. Links with the general scientific community are increasingly seen as crucial in this regard and many countries are seeking ways to strengthen these links.

88. Further education, continuing education or lifelong learning is expected to become of increasing importance to several OECD member countries. Significant opportunities are seen for AKS to be in the forefront of this development, based on its comparative advantage and ability to expand beyond traditional farming topics.

89. Many countries feel that AKS itself should take a lead in internationalisation of its activities in response to globalisation issues and the rapid emergence of other issues which transcend national borders.

90. Many Country Reports emphasise the need for AKS to become more proactive in increasing the level of public awareness of its role and function and valuable contribution. Two quotations are appropriate to end this synthesis.

91. The first is from the United States:

“Heretofore, strenuous efforts have been made in the United States to build a “firewall” between science and politics. Many in the science community have now come to recognise that this “firewall” has created difficulties in communicating the benefits in investing in the US AKS, and considerable discussion is now being directed at how to better influence political decisions that provide the money to support AKS.

We anticipate in the next decade considerable greater efforts will need to be made in winning friends and favourable decisions within the US Congress if federal support for AKS is to remain constant and hopefully increase.”

92. The second is from Canada:

“Finally, communicating the importance of agriculture and food research to the general economy and to the health and well being of all will be key to ensuring continued investment in research and technology transfer. The scientific process will need to be conveyed to a broad community including consumers, media, nutritionists and educators to ensure that the agri-food research sector will continue to receive financial support in the future.”

93. Are we up to the challenge?