

GLOBAL REPORT ON THE EVALUATION OF THE RESEARCH UNITS ON AGRICULTURAL SCIENCES

1 . Evaluation Methods and Scope

1.1 Methods

Like in 1996 and 1999, evaluations were based on written reports prepared in advance by the centres, on-site visits and informal discussions with research leaders and individual scientists. These two last sets of information were the most valuable for the evaluation. The on-site visits lead to a better vision of present situation of infrastructure and equipment, and direct contacts with the scientists provided often more relevant information on the research activities, more relevant than those available in the written reports.

The duration of the visits (2 hours, including on-site visits and discussions) was tremendously short. In addition, the programme included several times, four evaluations per day, which means, in fact, 12 hours of intensive work, with too many interrupted discussions. The Panel recommends that each evaluation lasts at least 3 hours (and even 4 for the largest centres, and to limit the normal number of evaluations at two per day.

There was, like in 1999, a high heterogeneity in report presentation, most of the centres following the guidelines issued by FCT, but with some misunderstanding of some of the terms of references (misclassifications of publications, lack of presentation of the research units, lack of information on the funding sources and levels). It is recommended to improve the standardisation of reports in order to facilitate the work of the evaluation Panel and to highlight the strength of research units.

Some problems also appeared with the description of activities; the model given by FCT (description of programme during each year with objectives and activities), is not relevant for a good presentation of research themes. It is recommended to require a presentation by research areas, with a clear presentation of the objectives for the period, a detailed description of the activities and perspectives, and a better set of information on the team and the personnel, the equipment, the external cooperation, the publications and the funding related to each theme (some centres have adopted this presentation, which facilitated and improved the evaluation).

In some cases, it was not easy to evaluate the part of time dedicated to research activities compared to teaching activities by the scientists included in the list of personnel given in the report. It would be important for the future reports to provide this kind of information.

The introductory oral presentations were important for providing the evaluators with information on the main priorities of each Centre and on the last development of the research activities (especially when the evaluation itself is organised one or two years after the writing of the report). However, it should not exceed half an hour, or a quarter of the total time devoted to each centre by the Panel. The presentation should focus on the most important points and not enter into details, which are usually already provided in the written reports. It should also include two or three main scientific achievements during the period.

The on-site visits should last another quarter of the total duration of the visit to the Centre. It should focus on some laboratories or some large equipment which are under discussions, in relation with the evaluation.

The discussions with the researchers should take half of the time of the visit, including some discussions with the young scientists or PhD students. The Panel has revised several times its first conclusions, after such discussion. They are important for a better understanding of the governance of the Centre, of the level of involvement of young scientists, of the external cooperation (which are often more important than those presented in the written report), etc. The dossiers must be available to the Panel at least one month before the evaluation.

1.2 Scope

The Panel evaluated 23 Research Centres under the umbrella of FCT. Among them, three centres were evaluated without on-site visits, as they were geographically isolated or newly implemented. State laboratories which are not under the FCT umbrella, such as some INIA centres, were not covered by the evaluation. However, due to the fact that several members of the Panel were also involved in the FCT evaluation of calls for proposals (2001, 2002), it was possible to get a more general view of the whole situation of R&D in agriculture, food and animal sciences in Portugal.

2 Structure of Research

The research structure of the evaluated centres can be divided into 3 categories:

- a first category of centres including all University departments related to agriculture, animal and food sciences. That is the case in Faro, Évora, the Açores, and also at the Veterinary Faculty of Lisbon, and for the newly implemented centres in the College of Agriculture of Coimbra and Bragança. This kind of structure did not seem the most appropriate for both the governance of the centre, and for the evaluation. The research centre is supposed to cover a very large scope of themes. It includes all the professors who are present in the related departments, without a real scientific research strategy. These centres have a very limited visibility outside of the University. It is also difficult to evaluate the quality of scientific works carried out in the centre, either because there is no real scientific strategy, or because, the quantitative and qualitative level of research in the various teams of the centre is too variable.
- a second category includes most of the 10 centres which were implemented inside ISA-Lisbon. These centres which are variable in size (sometimes too small), correspond to a single department, and are more organised towards a discipline, than focusing on a scientific thematic area. This situation does not facilitate the interdisciplinary approach, which is now essential in the agricultural sector. This could move progressively towards a more strategic organisation, around scientific thematic areas.
- a third category is related to the new structure adopted in UTAD-Vila Real, with 6 interdisciplinary centres (the Panel visited 5 of them), which are also interdepartmental, even if the core staff of some of them is provided by one department, they all include additional scientists coming from two or three other departments. In addition, these centres seem to reach a critical mass of scientists, which allow them to tackle important questions.

Therefore, the panel expresses the following recommendations:

- for the first category, with the exception of the Centres newly implemented at Coimbra and Bragança (for which the present structure is a minimum to get a critical mass), it should be very useful to progressively establish smaller, and interdepartmental centres, more focused on thematic areas, following the model

chosen by UTAD – Vila Real. It should be possible to maintain the present structures (ICAM, CIISA, CITA and CDCTPV) as an umbrella, like a Federative Institute, but it is essential to keep under this umbrella, centres which will work on specialised research subjects, in a more cohesive way.

- for ISA-Lisbon, the Panel has issued two recommendations. The first one is to reorganise some of the centres in interdepartmental research units (like the one presently proposed in oenology, or like the Centro de Ecologia Aplicada Baeta Neves), organised around integrated research areas. The second recommendation is to increase the size of these units, as some of them seem really too small to really cover the requested.
- for UTAD – Vila Real, the Panel was impressed by the evolution observed during the last 4 years, and recommends to maintain this orientation. It is however also recommended to maintain ICETA as a federative structure, in order to support some common large equipment and/or become a catalyser for larger research projects.

3 – Resources Utilisation

3.1 – Financing

Like in 1998-99, it seems that funding is not a limiting factor, especially in comparison with State laboratories.

Information on funding level in the different centres was difficult to be appraised as funding comes from various sources and often benefits to several research teams. However, AGRO programmes (from the Ministry of Agriculture) appear to be one of the main sources. Funding from FCT was still relatively small, but is quite useful for the research projects and for equipments. Like in 1998, it was assessed that non-governmental involvement was of little importance particularly from the industry except for services.

European funding was much less important, and in too many cases, inexistent; globally, EC funding from the R/D Framework Programme is much lower than the 3-4 per cent obtained in most of the European countries. In addition, participation of the concerned teams are mostly marginal in the projects. This is due to different factors:

- the absence of organisation for providing logistic and financial support to the scientists who would like to coordinate or even participate in projects proposals.

- weakness in the scientific standard of some research teams, especially in terms of publications in international journals.
- weakness in interdisciplinary approaches, which is now a strong criteria for European projects, including socio-economic aspects.

In some cases like in Évora, there is no more application to the EU programmes, due to the fact that the Centre can not provide the seed money necessary to prepare the proposal. This explanation did not satisfy the Panel, as other research units in other universities can over pass this problem. The real reason seems a lack of ambition as it is easier to get money from local or national sources than to enter in a competition with other proponents.

In several Centres (especially Evora, Açores, Coimbra and Bragança), funding coming from local organisation, both public and cooperative is quite important. This is interesting for supporting research activities of regional interest, but is often mostly devoted to technical studies, expertises, and extension services, rather than research projects, due to the fact that they should respond to urgent questions raised by these partners. If limited to that funding, the risk is to become progressively a kind of Technical Institute, instead of a Research Centre involved in research of national and/or international interest. In addition continuity of research support is particularly important in agriculture and forestry. Even with 3-4 year projects it is difficult to maintain long-term research lines in agriculture. This is specially important with forestry trees, ecosystems, and breeding, where there is a need for keeping experiments running for extended periods of time. It is also important for basic research needed in agriculture, like genomics, or other fields of advanced research.

3.2 Personnel

The Panel noted the high number of senior scientists in most of the centres. However, after the visits to the Centres and the discussions, it appeared that this extra number of personnel includes senior professors mostly involved in teaching activities instead of research activities. For the next evaluation, it could be interesting to get more accurate figures concerning the part of the time of each scientists devoted to research activities versus full time teaching activities. Another point difficult to identify, was the need for technicians and supporting staff. In several Centres there are very few supporting personnel, and in others, the supporting personnel is provided by the Departments, on a part time basis. In many cases, technicians are paid on a short term basis (from the project budget), and are not enough qualified for the use of modern equipment.

The number of young people involved in research is everywhere quite impressive. In most cases young researchers were quite enthusiastic and showed a tremendous potential for producing good research. However, it seems that most of their work is not sufficiently disseminated and known outside of their team. Publishing their results in international journals, before getting their PhD (at least one publication in an international journal) would be an urgent requirement.

There were large differences in staff age between centres, but this is depending on the age of the University. In general, the average age of scientists is not higher than in other European institutions. Centres which are newly implemented in Agriculture colleges, e.g. in Bragança and Coimbra, have mostly young scientists. This is both an advantage because of the enthusiasm of the young scientists, but also a disadvantage due to the lack of experience in terms of programming, evaluation and publication. For over-passing this disadvantage, it is important to integrate as soon as possible, these teams of young scientists in international and European networks.

3.3 Facilities

Research facilities are very variable, from very new facilities like in Faro, Évora, at CECA in Porto-Vairão and at CIISA in Lisbon, but other ones like in Vila Real, at Centro de Genética e Biotecnologia, require urgent modifications and maintenance. However, the Panel visited many new buildings in comparison with the previous evaluation, and several laboratories under construction or to be built very soon. One point which is very worrying is the present state of equipment. Most of them were purchased with the EU funded programme "CIENCIA" and are either obsolete or in bad conditions due to the lack of funds for maintenance. It seems that a specific detailed evaluation of the present situation of equipment, for replacing and/or upgrading it has to be carried out, taking into account the possible sharing of expensive analytic equipment between research teams.

Library facilities could not be assessed by the Panel, due to the lack of time. However, the scientists who were interviewed did not complain, and seem to have good access to international data bases through internet.

4 Character and Quality of the Research

4.1 Research profile

In several units, the Panel was surprised by the very low level of publications in scientific journals. Several reasons were identified:

- the inclusion in the scientific staff of professors only partially involved in research activities and therefore not contributing to the increase of the number and quality of papers.
- many young scientists are not encouraged to publish in international journals, before they get there PhD. This situation must be changed to compete with other European and non-European countries, in which a scientist cannot get a PhD without some international publications.
- trend to publish in Portuguese in national Journals or in Proceedings at scientific meetings, instead of presenting papers in international peer-reviewed journals.

Beside the scientific production in international papers, the Panel emphasised its evaluation of the transfer of results to end users : producers, administration, industry, consumers, citizens. It should be recognized that the evaluated research units showed variable modes of knowledge transfer and great differences in intensity and effectiveness. As positive example, a great effort has been made by the Centro de Ecologia Aplicada Baeta Neves, for providing a large public, and especially young scholars, with information on research in ecology, and on results of its works. This orientation is very useful, for defending the role of sciences in the Society, and for getting additional sources of funds. However, it has not to become the only objective of the research. In contrast, the Panel was doubtful about the statement of ICAM-Evora, explaining that the only (or the main) objective of their research works was to solve short term problems for local agriculture or local administration, and not to publish in international journals. Such an orientation is fatal on a long term basis, as a good expertise can not be provided and maintained if it is not linked to good scientific bases.

At the national level, the Panel was also surprised by the very few connections between the evaluated research units and the national Agriculture Centre, INIAP, with the exception of animal sciences or plant protection. It is certainly a problem for INIAP and research units of the Universities, because of mutual interest in sharing scientific expertise and benefit of interaction.

A weak point identified in many units, was the very low access to EU programmes. In some cases this situation is due to the lack of relationship with partners in other European countries. In some other cases, it is due to the small size of the unit. And in one case (ICAM-EVORA), it is a decision taken by the management team, due to the necessity of funding partly the research at the national level for the projects proposed within the EU Framework Programme. The Panel was not convinced by this statement.

In general, the Panel considered that research activities at most centres was too diversified, and noted that centres have not achieved a critical mass in fewer areas. This point is increasing the weaknesses due to a too small size of some unit. In this case, it appears that very few centres will reach a level of excellence at the European and international level. A lack of cooperation between research units in the particular case of animal health within the country has also been observed.

Finally, the panel also regrets to see in most of the cases, the lack of economic and sociologic analysis of research programmes, due to the lack of linkages with socio-economic scientific units. Even at ISA, the Centro de Economia Agraria e Sociologia Rural is working mostly at the demand of external clients (e.g. ministry of agriculture), instead of providing economic component in other areas.

4.2 Strong Areas of Research

The Panel identified 3 strong areas of research, in which the research units are at the international level:

- Forest sciences: the Centro de Estudos Florestais of ISA is one of the best unit evaluated by the Panel in the whole chain of forests production management. The implementation of the "BIOPOL" project (study of wall cell polymers) is a very attractive decision, and will also give opportunities to young scientists to touch the most advanced area of forest and plant sciences. Specific studies on cork oak must be sustained because of their strong originality in the world.
- Genetics and Molecular Biology: a second unit classified in the best ones is the Centro de Genética e Biotecnologia, at Vila Real, which has made the choice of promoting the excellence of research. In a country where it is usual to divide the competencies into several units, this Centre has joined on one site all the expertise in genetics and molecular biology, with common tools applied to human, plant, animal and yeast.

- At ISA-Lisbon, the Centro de Botanica Aplicada à Agricultura is also a centre which can bring Portugal at a level of excellence at the European level. The implication of young scientists, the development of multidisciplinary approaches, and the organisation of transfer activities are very positive elements. The only weak point is the limited number of scientists, which should be compensated by focussing research works on a limited number of more integrated projects.
- Environmental sciences: natural resources management, sustainability of agriculture, quality and safety of agriculture products are three main priorities for agriculture development in Portugal. Several research projects are contributing to solve problems in these areas. The first area is very well integrated by the Centro de Ecologia Aplicada Baeta Neves, which has developed a multidisciplinary approach for the study of biodiversity, wildlife and landscape management and fire ecology. The second and third ones are objectives achieved by the Centro de Ciência e Engenharia Rural at Vila Real, through the development of integrated approaches, starting from the studies on the use of organic wastes, the development of integrated pest management, irrigation improvement and finally, studies on secondary metabolism, on fruits and vegetables. The Unit of Química Ambiental at ISA is also very well positioned on problematic which are priorities for Portugal (and even European countries). Some other centres such as Centro de Estudos em Gestão de Ecossistemas at Vila Real, should try to limit the number of projects and to increase their interdisciplinary approaches.

4.3. Good Areas of Research

In several areas, the research units evaluated by the Panel are at a good level and have some potential for reaching a level of excellence, under certain conditions.

- Animal health and production: the Panel was impressed by the efficient coordination of original research on numerous topics at CIISA –Veterinary School in Lisbon. The level of research is high and the publications are of particular interest. However, it seems that this Centre should move towards two directions. A first one is to divide CIISA into 2 or 3 sub-centres, around one thematic. A second one is to give to CIISA a new mission of coordination of veterinary science in Portugal, in order to improve the quality of research in other centres (especially CECA at Vairão, in Porto, CECAV at Vila Real and IISA at ISA-Lisbon), to better link this research with INIA, and to avoid double lines of research between teams.

- Food Safety and Quality: Portugal can not be competitive, for most of its agriculture products, with countries exporting commodities (rough products). It has to develop a policy of quality, like most of the European and Mediterranean countries, in order to catch a more profitable market of quality products. Unfortunately, research in this area appeared quite limited. The Centro de Microbiologia e Indústrias Agrícolas is the most advanced centre in this field, but has not a critical mass to cover the various aspect of this problem. It should concentrate in the future on plant products, and should also cooperate with some scattered teams in other universities. Taking into account its new facilities and new young scientists, a mission of coordination should be given to this Centre. A new denomination of this unit, providing a better description of its priorities (quality and safety of processed plant products), is also recommended.
- Rural Engineering and Water management: in this important area of research for Portugal (especially in the field of water management), there are two centres which are quite impressive in terms of innovation : the Centro de Estudos de Engenharia Rural, at ISA-Lisbon, and the CETAV at Vila Real. However A better linkage with other research teams (in biology, and especially in socio-economic sciences) should be recommended, in order to assess the relevance of several research works, which seems sometimes the case. It was also pointed out that most of the individual teams in these centres are more a juxtaposition of small groups than an integrated team of scientists. Finally, it is not very clear that a long term research programme can be presently implemented.
- Grapes and Wines: Portugal is exporting a large amount of wines, and pay a great attention to the improvement of quality of these products. This justifies a new research unit implemented at ISA, the Centro de Quimica e Tecnologia Enológica. The main problem encountered by the Panel, was the too large dissemination of efforts in various places, without a general orientation, and with insufficient connections between the teams. In comparison with other countries in Europe (Spain, France Italy) and outside of Europe (USA, Argentina, Australia), where integrated and multidisciplinary centres are created, Portugal requires a critical mass to be competitive on a scientific bases. The Panel recommends for this area, to find a system of coordination, and even a better integration of the different research programmes in the country, under the coordination of this Centre.
- Plant sciences: Portugal has specific conditions in terms of plant production. The research unit have to identify these specific conditions, and to try to reach a level of

excellence in the “niches” identified. In this manner. The Panel has appreciated such an effort made by CDCTP at Faro, with the formulation and the preparation of a global project for 2003-2005,: “Towards the new agriculture”. It has now to develop more integrated projects to meet the proposed objectives. This recommendation applies also to IISA at ISA, which has to focus on a more limited number of subjects, taking into account the limited number of scientists..

- Pedology: this discipline was one of the poles of excellence in Portugal, especially because of the huge amount of research carried out in tropical areas. Presently, this unit has developed a new line of research in micrometeorology. The Panel agrees with the opening of this new area for research, but Portugal has to maintain a good scientific expertise in Pedology, to answer to many specific questions concerning soils evolution and erosion.

4.4. Weak Areas of Research

- Socio-economic sciences: in general, the Panel think that socio-economic approaches are not sufficiently considered in most of the research programmes and projects. The only unit evaluated by the Panel in the field of socio-economic sciences (Centro de Economia Agrária e Sociologia Rural at ISA) has not developed sufficient relation with the other research teams of ISA, and with the Faculties of economics. Even if this team is connected with other scientists at the European level, its main activities are linked with reports and expertises ordered by the Ministry of Agriculture, and very few scientific papers are published in international journals.
- Animal sciences: with the exception of IISA in veterinary sciences, research in animal sciences is not sufficiently integrated at the national and international level compared to plant sciences. Most of the activities carried out in centres like CECAV at Vila Real or CECA at Vairão-Porto are driven by teaching activities.

5 Recommendations

1 - The Panel recommends an important effort for increasing the number of publications in international journals, especially from young scientists preparing a PhD. For the next evaluation, it is also proposed to include in the list of staff only the scientists participating in research activities. Publications must be ranked according to their level of international audience.

2 – The Panel recommends to better present the scientific objectives of the whole unit if the size and unity of the Centre are appropriated (see 4), instead of listing activities carried out by individual teams or scientists. Such a collective joint approach could also reduce the risks identified in some centres, to promote technical and/or experimental activities, instead of conducting long term research programmes and projects. More cooperation within the country is required in numerous research activities.

3 – The Panel also recommends to increase the effort in the field of socio-economic sciences applied to agriculture, food and environment. It also encourages the non-experts in this field, to utilise economic and sociologic analysis for the proposed research programmes/ projects they are developing.

4 – The Panel recommends to divide some Centres such as ICAM in Evora, CIISA in Lisbon, in 3 or 4 sub-centres with specific research programmes, instead of having a number of small projects, which are difficult to integrate in a clear research approach.

5 – Concerning the new centres to be established within the Agriculture Colleges in Coimbra and Bragança , the Panel recommends to establish as soon as possible linkages with other Portuguese and/or European research institutions, for providing additional support for the young scientists, as the number of senior scientists is quite limited in these centres.

6 – The Panel recommends to improve the coordination between different teams working in different universities on the same topic. This is the case for water management, grapes and wine production, cork trees production, animal pathology and health, etc. The small teams can not reach originality and a critical mass, if not included in a national network. They should be encouraged to tide over this difficulty. Inside or between the different sites, especially in Lisbon, the Panel encourages the young scientists working on biotechnology to create a more or less informal network to exchange information (seminars) and to share some large pieces of equipment.

7 -The Panel also recommends that more relationships be established with other European partners, through joint research projects, in order to be more involved in European programmes. Presently, with the exception of some units, the participation of Portuguese research teams in the 5th and the 6th Framework Programme is not at a suitable level. Due to the lack of poles of excellence, there are very few opportunities for a Portuguese scientist to become coordinator of a project in those programmes.