

# COMMISSION OF THE EUROPEAN COMMUNITIES

COM(90) 214 final

Brussels, 30 May 1990

## THE COORDINATION OF AGRICULTURAL RESEARCH IN THE EUROPEAN COMMUNITY

Report presented to the European Parliament and Council in accordance with Article 4 of Council Decision 83/641/EEC of 12 December 1983 adopting joint research programmes and programmes for coordinating agricultural research

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## 1. INTRODUCTION

The Council, in its Decision 83/641/EEC of 12 December 1983, adopted an agricultural research programme designed to help achieve the objectives of the common agricultural policy.

According to Article 4 of the Decision the Commission is required to report to the European Parliament and the Council on the results of the research carried out under the programme for 1984 to 1988 and on the use of the funds allocated to it.

The coordination of agricultural research facilitates the rational organization of resources and the effective utilization of results, and it supports and supplements efforts undertaken in the Member States in areas of particular importance to the Community.

The five-year programme, to run from 1 January 1984, was allocated a budget of ECU 30 million. The activities envisaged under the programme fall into four main groups:

- utilization and conservation of agricultural resources,
- structural problems,
- improvement of livestock and plant productivity,
- dissemination of agricultural information.

In March 1987, on a proposal first submitted by the Commission in April 1986, the Council adopted another Decision, amending the Decision of 12 December 1983 and pinpointing specific areas of research which could help to reduce surpluses while enabling farmers to adjust the new situation by diversifying production, improving product quality and reducing production costs. At the same time, the need for measures to reconcile modern farm practices with the objectives of environmental conservation was seen as another area in which a contribution from agricultural research might be possible.

The decision provided for a supplementary budget of ECU 20 million for agricultural research during the remainder of the period of the programme. The sum was not used up however (see point 2, p. 9).

Now that the common agricultural policy has undergone further changes, the scenario of agricultural research has changed accordingly.

With some work still to be completed - several contracts will not end until after 1989 and a number of review meetings of scientific committees are to be held during 1989 - it was thought prudent to delay the submission of this report, thus allowing a more substantial document, based on a larger quantity of data, to be produced.

### 1.1. Objectives of agricultural research coordination

Solving the problems facing the common agricultural policy is of vital importance to the whole Community. Community-wide coordination of research, enabling resources to be pooled and results to be obtained and applied more swiftly, can be far more effective than the sum of the efforts of the individual Member States.

The Community has therefore adopted an agricultural research policy and programme founded on the principles that:

- . agriculture is vitally important and the role of research is to facilitate the implementation and development of the CAP;
- . the coordination of research allows effective use to be made of research capabilities and resources, improves communication between research workers and prevents duplication of work;
- . improved communication enables Member States in which agricultural research is less developed to benefit from the experience of countries which are in a more favourable situation;
- . a joint approach allows questions to be considered and problems to be resolved which are important to the Community as a whole, but are less so to the individual Member State;
- . a Community programme has wider scope and greater freedom to anticipate and resolve problems before they have Community-wide effects.

### 1.2. Structure of the research programme

The research programme is divided as follows:

- Utilization and conservation of agricultural resources:
  - a) energy in agriculture
  - b) land and water use and management

- Structural problems:
  - a) Mediterranean problems (AGRIMED)
  - b) other less-favoured areas
  - c) "agro-food".
- Improvement of animal and plant productivity:
  - a) animal husbandry
  - b) plant productivity.
- Dissemination of agricultural information.

### 1.3. Instruments

Research coordination in the Community takes the form of coordinated activities and joint projects.

Coordinated activities are designed to bring research workers together to assess the needs of agricultural research, to avoid duplication of work and to ensure the rapid translation of research results into farming practice. Such activities include seminars, workshops and related publications, as well as scientific visits and exchanges.

Seminars and workshops enable small groups of research workers to demonstrate research techniques to one another, to establish common research methods and to harmonize diagnostic procedures. At the same time research workers can visit other laboratories to familiarize themselves with areas of research of interest to them, and to discuss research techniques. In fact, this system of scientific exchanges constitutes one of the most important features of the coordination programme, permitting not only the design and preparation of research projects of common interest, but more especially the monitoring of such projects by research teams from various research centres in the Community.

The joint projects are designed to provide solutions to specific common agricultural policy problems which, by implication, are eligible for financial aid granted under contract by the Community. The aim of these contracts is to adopt a common approach for resolving problems of overriding interest to the Community. The

particular merit of the joint activities is that they allow certain types of research projects to be implemented which are important, at least to some extent, to the Community as a whole, particularly in so far as the development of the common agricultural policy is concerned. At the same time, the Commission can have a direct influence on the formulation and execution of each project. In the absence of such a common approach it is highly unlikely that these projects could be undertaken at all. Furthermore, if they were to be financed solely by the Member States concerned their usefulness from the Community point of view would be sharply diminished.

A basic prerequisite of the effective coordination of agricultural research is the establishment and updating, at Community level, of a permanent inventory of research projects. The preparation of such an inventory (AGREP) and its improved effectiveness are an important feature of the coordination programme.

Likewise, the results of research conducted under the coordination programme can only be of any practical use if there is an effective means of disseminating them. Consequently, the specific programme which is aimed at supporting the coordination programme by ensuring the effective dissemination of the research results, with particular reference to the use of information technology, is a new and extremely important component of the programme.

#### 1.4. Organization and implementation of research coordination

The main guidelines for the implementation of the programme are laid down by the Commission on the recommendation of the Standing Committee on Agricultural Research (SCAR) - a body made up of government experts from the Member States - and must be approved by the Council and the European Parliament.

The guidelines must cover problems which are important to the Community as a whole. Once approved, their implementation is under the direct control and authority of the Directorate-General for Agriculture which is assisted by Programme Committees (specific for each subject), consisting of a chairman who is a member of the SCAR, together with scientific experts from all the Member States. These committees normally meet twice a year in order to decide on the number, nature, topics and locations of working meetings, and to review the shared-cost joint activities (research projects) financed under the common programme.

Joint research projects are covered by contracts concluded between the Community and various research centres and institutes, with Community aid amounting to up to 50% of the cost. The topics are generally of an urgent nature (it must be possible to put the results into effect within a relatively short period), which exceed national funding capabilities or frontiers and are of general interest to the Community, even though geographically limited, or of a complexity which demands a multidisciplinary approach from the conceptual stage onwards.

Once a topic is selected, draws up, with the help of the Programme Committee, an invitation to tender, which is brought to the attention of research institutes by the SCAR delegations. The Programme Committee examines the tenders and selects those that are most relevant from the scientific point of view.

Under the heading of coordinated activities, each Member State carries out and funds its own research, but the Commission helps arrange meetings between research workers so that national research can be organized better and made mutually dependent and duplication can be avoided.

The coordinated activities may relate solely to work (for example, exchanges of equipment or the definition of diagnostics methods) or they may be wider in scope, to take stock of knowledge in a particular field with a view to determining a measure or a future policy.

Community funding covers 100% of the cost of such meetings and activities.



## 2. BUDGETARY ASPECTS

Under Article 1 of Council Decision 83/641/EEC a sum of ECU 30 million was allocated for the implementation of the research programme during the five-year period 1984-88.

The appropriations provided for in the Council Decision were not immediately available since the budget authority could not authorize their use until the adoption of the annual Community budget.

Consequently, quite apart from the problems raised by the cut in the overall budget allocation proposed originally by the Commission, the actual launching of the research programme was delayed until June 1984, although initially scheduled for 1 January. The reason for the delay was that the budget appropriations for 1984 were not officially decided until mid-May. The Commission was obliged, therefore, to postpone until the second half of 1984 work that it should have undertaken in the first half.

In 1985 the Community budget was not adopted by the Council until August. For the first seven months of the year the research programme had to operate on the basis of carry-overs from 1984. In fact, during the two-year period 1984-85 the research budget was available for only 11 months in all. These delays in the annual implementation of the programme explain why the finalization of some specific measures, notably research contracts, was late. As a result, many contracts will not end until 1990.

Furthermore, the accession in 1986 of Spain and Portugal meant that contracts had to be concluded with these two new Member States. Funding for these activities which had initially been included in the additional ECU 20 million, subsequently had to be charged against the original (ECU 30 million) budget. The supplementary budget of ECU 20 million was adopted by the Council in 1987 but because of difficulties in obtaining these appropriations combined with those arising from the adaptation of the original programme it was decided, in the interests of the sound management of resources, not to commit these supplementary appropriations.

It should be noted in this connection that Article 3 of the Council Decision of 12 December 1983 provides that the Commission may, by means of ad hoc contracts, finance measures for applying the results of the research in the field.

This is confirmed in the Annex to the Decision, particularly in the context of the AGRIMED programme. However, since these measures for demonstrating and applying the results can only logically be implemented on completion of the programme, it was not possible to put them into effect, at the appropriate time, because the funds were not available.

In 1987 the Council adopted a framework programme for Community research and technological development (1987-91). This includes all agricultural research activities in the Community under heading 4.3 entitled "Competitiveness of agriculture and management of agricultural resources".

While this new situation had no immediate repercussions for the 1984-88 agricultural programme, the change will entail an additional cost to the budget in the future.

These problems were compounded by difficulties associated with administrative and budget procedures in the Member States. Contractors, for example, encountered further delays in obtaining appropriations.

At the end of 1988, however, all the commitment appropriations allocated for the 1984-88 programme had been used.

For the reasons described above expenditure relating to research contracts could only be reimbursed in full after 1988. The relevant figures are given in the two tables below.

Research Programme for the 5-year period 1984-1988

Agricultural research  
programme :  
(1984-1988)

Commitment appropriation

30 MECU

Council decisions

**83/641/EEC** and  
**87/218/EEC**

Sub-programmes	Coordination activities		Common research programmes		Total	
		%		%		%
• Energy in agriculture	900.000	3,-	5.800.000	19,35	6.700.000	22,35
• Land and water use and management	700.000	2,35	2.200.000	7,35	2.900.000	9,70
• Mediterranean agriculture	3.450.000	11,50	8.300.000	27,70	11.750.000	39,20
• Other less-favoured regions	100.000	0,35	300.000	1,-	400.000	1,35
• Agro-food	330.000	1,10	1.300.000	4,35	1.630.000	5,45
• Animal husbandry	1.200.000	4,-	1.500.000	5,-	2.700.000	9,-
• Plant productivity	870.000	2,90	1.100.000	3,70	1.970.000	6,60
• Agricultural information	1.900.000	6,35	-	-	1.900.000	6,35
<b>T O T A L</b>	<b>9.500.000</b>	<b>31,55</b>	<b>20.500.000</b>	<b>68,45</b>	<b>30.000.000</b>	<b>100</b>

Research Programme for the 5-year period 1984-1988 Commitment appropriation : 30 MECU

Agricultural research programme (1984-1988)

Council decisions 83/641/ EEC and 87/218/ EEC

Coordination activities (Article : 3)

Common research programmes (Article 3)

Sub-programmes	seminars, meetings * scientific expertise		Scientific exchanges		Publications		Research contracts	
	number	expenditure (ECU)	number	expenditure (ECU)	number	expenditure (ECU)	number	expenditure (ECU)
• Energy in agriculture	76	620.000	247	180.000	21	100.000	69	5.800.000
• Land and water use and management	42 * 3	400.000	129	100.000	15	200.000	16	2.200.000
• Mediterranean agriculture	83 * 21	2.850.000	502	395.000	11	205.000	50	8.300.000
• Other less-favoured regions	18 * 2	130.000	41	20.000	--	-	4	0,300.000
• Agro-food	30	270.000	69	45.000	6	15.000	18	1.300.000
• Animal husbandry	79 * 2	750.000	227	200.000	53	250.000	16	1.500.000
• Plant productivity	55 * 2	520.000	257	250.000	20	100.000	23	1.100.000
• Agricultural information	17 * 3	1.830.000	79	70.000	-	-	-	-
<b>TOTAL</b>	400 * 33	7.370.000	1551	1.260.000	126	870.000	196	20.500.000

1 + 2 + 3 = 9.500.000 ECU = coordination activities  
 4 = 20.500.000 ECU = common activities  
 30.000.000 ECU

### 3. DESCRIPTION OF RESEARCH ACTIVITIES

#### 3.1. ENERGY

##### 3.1.1. Background and objectives

Since one of the major problems facing agriculture at the beginning of the eighties was the rapid escalation in production costs and inputs, the Council Decision of 12 December 1983 recommended that research should help reduce the net use of energy in agriculture. The energy programme was devised with this in mind.

The objectives of the programme were:

1. to promote research that would reduce directly or indirectly the use of energy in agriculture (direct energy consumption in farming means the use of oil or electricity to obtain mechanical power or heat. Indirect consumption means the use of fertilizers and pesticides).
2. to promote research on the production of non-food products at farm level, in particular the production of energy sources (biomass).

Since the energy programme has achieved its objectives the Commission has no plans for future measures in the area of energy use in farming. Various aspects of the use of chemicals, on the other hand, will be included in the new agricultural research programme for 1989-93. A number of measures begun under the energy programme are likely to be continued under the new programme.

##### 3.1.2. Activities undertaken

To make its management easier the programme was divided into sub-programmes, each with its own programme committee. The first six sub-programmes concerned the programme's first objective.

\* Integrated plant protection

The development of methods for controlling pests and diseases, including bee diseases, which are less costly in energy and less harmful to humans and the environment.

\* Fertilization and nitrogen fixation

This is concerned with more economic use of nitrogen fertilizers.

\* New low energy input crops

This sub-programme is concerned with indirect ways of saving energy in glasshouses by breeding plants requiring less heat and light.

\* Socio-economic impact of energy in agriculture

Forecasting the social and economic effects of the above technological innovations, particularly on farming structure, markets and the environment.

Energy and farm mechanization

Energy savings in glasshouses

The following three sub-programmes come within the scope of the second objective.

Straw and by-products

Production of energy crops

Modification of systems

The breakdown of the project between the sub-programmes was as follows: 32 contracts = integrated plant protection; 26 contracts = fertilization and nitrogen fixation; 6 contracts = new low energy input crops; 4 contracts = socio-economic impact of energy in farming.

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(\*) The shared-cost activities were restricted to these 4 sub-programmes.

### 3.1.3. Résultats

Several non-chemical methods of pest control were developed:

1. Biological pesticides (caterpillar-killing viruses prepared in the laboratory) are now ready for mass production and marketing for use on apples against Sydia pomonella and Adoxophyes orana caterpillars.
2. Using a common experimental protocol, traps containing sexual attractants (pheromones) were installed in apple orchards in France, enabling the number of pesticide applications to be reduced from 10 to 4 annually.
3. Pheromone traps in citrus orchards have played a large part in solving the problem caused by Praya citri.
4. The use of parasitoids has been so successful in French olive groves that olive growers have decided to start producing their own supplies.
5. The production of nematodes capable of attacking caterpillars.
6. Biological pesticides (growth regulators which impede the hatching of insects) are now commercially available.
7. Soil "solarization" has become an efficient alternative in the southern Member States.

The study and forecasting of population patterns has made possible the more rational use of chemical pesticides.

1. A 50% reduction in the use of chemicals on cabbages has been achieved in the northern Member States.
2. Similar savings have been achieved in the control of mites, moths, fungi and viral diseases of vines in the southern Member States.

3. The use of sterile male Ceratitidis capitata has reduced radically the number of applications of chemicals in orange plantations.

European cooperation on methods of controlling pests of protected crops has been intensified.

Work on fertilization and nitrogen fixation has been concerned with the physiological aspects of nitrogen fixation on nodules and the study of nitrogen flows. This has helped identify the factors affecting the number of nodules per hectare and the proportion of nitrogen seeping into ground water.

Coordination has been established between research groups engaged in developing new covering materials for greenhouses; this will lead in the future to the results being presented in a standard format, the coordination of test methods and the presentation of joint recommendations.

A training centre for biological and integrated control has been set up jointly with DG XI to provide advice for industry and to record the reactions of end users.

The potential use of straw to produce fuel or other commodities (feed, humus and other non-industrial goods) has been researched and the results published.



### **3.2. LAND AND WATER USE AND MANAGEMENT**

#### **3.2.1. Background and objectives**

A basic and limited resource, land is vulnerable to damage and deterioration due to human intervention. In the Community, such deterioration is assuming serious proportions. One of the main causes is inappropriate cultivation methods, especially permanent cropping, which can result in erosion, and the use of heavy vehicles, causing soil compaction.

In many parts of the Community agricultural output is limited because of too little or too much water. Better water management can have a considerable impact on the types of crops grown, the cost of farm work, and incomes and employment in farming.

Adjustments made to management and their socio-economic effects - the consideration of extensive farming as against highly technical farming and the alternative solution of establishing natural parks in areas of surplus production - call for changes in cultivation techniques of the common agricultural policy is to be implemented.

The general objectives are therefore the following:

- to improve the use and conservation of natural land and water resources,
- to assess the production potential of land and the socio-economic repercussions.

#### **3.2.2. Activities undertaken**

##### **a) Deterioration and fertility**

- Soil erosion (notably the effects of tree-planting), nutrient losses (leaching, oxidation, denitrification).
- Negative factors such as soil compaction, poor soil structure, misuse of agricultural machinery working methods, cropping systems, etc.
- Microbiological activity in the soil.

##### **b) Control and management of water in agriculture**

Control of water surpluses or shortages, ecological and economic effects of any changes.

- c) Management methods
  - Optimum use of land and water resources for the production of food and energy crops.
  - Comparison of farming methods using low inputs with traditional intensive farming methods.
  - Problems associated with farming near to built-up areas.
- d) Land suitability and resource evaluation
  - Preparation of maps showing the production potential of land for the main Community crops.
  - Computerization of data on land use.
  - Potential uses of remote sensing.

### 3.2.2. Results

- a) Deterioration and fertility
  - An inventory of soil erosion in hilly areas and the fertile land of central Europe.
  - A list of 282 research workers and 101 institutions engaged on soil erosion problems.
  - The development of farm vehicles fitted with low-pressure tyres to prevent soil compaction.
  - The publication of a book entitled "Soil structure assessment" on measures for determining structural soil characteristics.
  - An agreement on "Strategies for controlling desertification in the Mediterranean region of Europe".
  - The control of nitrate pollution of groundwater and the subsoil through the use of sound cultivation practices (by properly trained farmers).
  - The determination of common soil protection measures and methods of preventing erosion, in the light of experience gained on holdings in Germany; the broad outline of a European handbook on soil and water conservation.
- b) The control and management of water in agriculture
  - Methods of developing profitable but ecologically acceptable techniques of water management for farming.

- Use of a synthetic fibre strip to prevent problems caused by the obstruction of pipes.
  - The definition of "Simulation models for cropping systems in relation to water management".
- c) Management methods
- An inventory of the socio-economic aspects of land use and a plan for future research on the definition, at regional level, of models adapted to the various production situations.
  - The establishment of criteria for agro-forestry including techniques for improving wood quality during tree growth.
- d) Land suitability and resource evaluation
- The publication of the Community soil map at a scale of 1/1.000.000 and the development of a uniform method of defining areas in terms of agro-ecological factors for evaluating the biophysical potential of plant production in the Community. Together with the computerization of agro-meteorological data, the digitization of the soil map contributes to the sound planning of land use in the Community and is a very useful tool for Community policy-makers.
  - The development of common information systems relating to land use and management and to the interactions between the environment and agriculture.
  - A catalogue of basic information on land, water, climate and topography derived from computerized data. The current edition, the second, contains 132 data bases.
  - The determination of the future requirements for "land evaluation in the Mediterranean regions" incorporating the interpretation of a survey of climate and soil from the point of view of specific types of farming.
  - The identification of the criteria determining the value of climatic factors for land evaluation, e.g. specific photoperiod combinations, day/night temperatures gaps, soil/air temperature gaps, air humidity, radiation and wind factors.

### 3.3. MEDITERRANEAN AGRICULTURE (AGRIMED)

#### 3.3.1. Reasons and objectives

In the Mediterranean countries, there are areas which because of climate and, more generally, the physical and socio-economic environment, have very varied production systems but certain common features, namely:

- large number of small farms still employing a substantial proportion of the local working population,
- a wide variety of plant and animal species, increasing still further with the need to find alternatives to traditional enterprises which are in surplus or no longer profitable.

Each potential alternative requires the same volume of research. No one Mediterranean country has the necessary resources. It was essential, therefore, to support and coordinate multinational research on forms of production and/or problems specific to those regions. The level of Mediterranean research on each of these very different forms of production had to be adequate, however, to ensure that the necessary link-up with research in the northern countries did not take the forms of transfers of technology, which were often unsuitable, but, rather, of transfers of methods.

The priorities of the AGRIMED programme were:

- a) in general,
  - to reduce the economic and social disparities between the Mediterranean basin and the rest of the Community.
- b) in particular,
  - to analyse the socio-economic situation in regional terms in order to identify the obstacles to agricultural development and, above all, to make proposals for more efficient and more profitable use of available resources, thereby triggering a process of self-sustaining agricultural development.

- to introduce new crop species and/or varieties that are not already in surplus,
- to develop integrated forestry/stockfarming/grazing systems,
- to identify possible outlets for high-quality and high value-added traditional products,
- to develop the techniques for protected and/or out-of-season crop production, the optimum utilization of irrigation, the use of saline or waste water, the protection of crops and livestock against certain diseases, and the encouragement of production systems and farm structures that will allow the most effective application of the research results.

### 3.2.2. Activities undertaken

The AGRIMED programme covers the following three areas:

- the management and improvement of woodland grazing,
- the diversification and adaptation of production.
- the control of cultivation conditions and environmental protection.

The work concerned:

- a) Production systems and woodland management,
- b) Traditional and new livestock resources,
- c) Evaluation of forage resources and by-products,
- d) The breeding, propagation and husbandry of legumes for dry land pasture,
- e) The adaptation to market requirements of certain varieties of cereals and protein plants,
- f) The breeding, production and propagation of white clover seed,
- g) Mediterranean tree fruit crops, particularly nuts,
- h) Aromatic, medicinal and culinary plants,
- i) Tobacco,
- j) Production systems for dry land conditions or where water is scarce with a view to the development of alternative enterprises or the improvement of traditional crops that are not in surplus,
- k) Management of scarce water supplies and optimum utilization of water, especially brackish and waste water,

- l) Soil conservation and control of cultivation conditions to take account of environmental protection and quality,
- m) Development of new types of crop protection suitable for Mediterranean conditions, using solely or mainly renewable sources of energy (solar, geothermal, etc.). Biological and husbandry techniques for optimizing production of the various species cultivated,
- n) Control of certain diseases and development of resistant and/or tolerant varieties (fire blight, cypress canker, malsecco of citrus fruit).

### 3.3.3. Results

#### Management and improvement of woodlands

- Preparation of references, unavailable until now, on the quantity of nutrients that can be derived by grazing livestock from the various types of ground cover studied.
- Development of technical pathways on plots involving use of machinery and grazing, with a view in particular to reducing the risk of forest fire.
- Increase in the prolificacy of local breeds of sheep (particularly the Chios breed).
- Control of transhumant stockfarming.
- Preparation of reference methods for feed analysis.
- Collection and publication of data on the value of feed and by-products of Mediterranean farming in association with the International Centre for Advanced Mediterranean Agronomic Studies (ICAMAS).
  
- Establishment of a standard sheep grazing unit, the Mediterranean sheep unit (MSU), verified on three experimental plots in Italy, France and Spain.
- Preparation of standard protocols for describing rearing systems and livestock performance (ewes and lambs), applied in full in the stations participating in the Greek national sheep programme.
- Definition of a reference cut for lamb and kid carcasses used in Greece, Italy, Spain and Portugal, and in Morocco and Tunisia.
- Prospection for and study of spontaneous Mediterranean forage species (lucerne, medics, clovers, sainfoin, etc.) resistant to drought and grazing. There is considerable variability and high-value populations have been found.

Diversification and adaptation of production

- Development of tests for evaluating resistance to drought of new durum wheat lines in order to create varieties that are more productive in situations where water is scarce.
- Preparation of technical routes suitable for the production of white clover seed in the Mediterranean.
- Prospection for and establishment of a collection of species of local walnut trees which produce fruit on lateral branches and are resistant to bacteriosis.
- Development in dry areas of a method of managing high density hazelnut orchards with the possibility of mechanization.
- Establishment of a multi-centre trial (5 countries) of 30 preselected self-compatible almond trees bred by group research workers.
- Multi-centre collections (5 countries) of pistachio trees.
- Establishment in five countries of a network for the varietal and health improvement of apricot trees.
- Development of the cultivation of gentian and arnica.

Control of cultivation conditions and environmental protection

- Technical improvement of Mediterranean plastic shelters: orientation, air supply, frost control (hydrotunnel or warm water piping) and solar energy supply.
- Search for parthenocarpic tomato genitors for out-of-season harvesting in unheated glasshouses without fertilization.
- Search for alternative crops in the case of out-of-season overproduction of tomatoes in glasshouses.
- Establishment of a multinational trial network for localized irrigation of fruit trees.
- Optimization of use of irrigation water.
- Advantages of surface tillage compared with deep tillage for maintaining fertility and conserving available rainwater.
- Hybridization and breeding of varieties of pear tree tolerant to fire blight.
- Breeding of clones of cypress resistant to cypress canker. Hybrids (AGRIMED varieties).
- Breeding of Burley and Virginia varieties of tobacco better adapted to market requirements and development of cultivation techniques.

- Development of a process for the extraction of proteins from tobacco (medical uses).
- It has been demonstrated that rectified concentrated musts (RCM) can be manufactured and used in winemaking in place of the beet sugar normally used without altering the organoleptic characteristics of the wine treated.
- Extraction of alkaloids from bitter lupin and study of their use as growth and yield promoters.



### **3.4. OTHER LESS-FAVOURED AREAS**

#### **3.4.1. Background and objectives**

The production capacity of the less-favoured areas of the Community is extremely limited. In addition, the remoteness of many of them from population and commercial centres and, hence, the impossibility of developing them in other ways mean that farming is almost certain to remain essential for those regions for the foreseeable future.

The objectives of research to improve agricultural development in those areas can therefore be limited to:

- determining the agricultural products, including new products, best adapted to the physical, economic and socio-cultural situation of the region and the resources to be applied to ensure that those products give rise to the greatest possible added value on local, regional, national and Community markets;
- identifying farming techniques and practices best suited to maximizing farm incomes, bearing in mind the constraints currently facing production;
- identifying the non-farming activities best adapted to the physical and socio-economic characteristics of those areas which, in conjunction with farming, could help maintain farm incomes and a satisfactory level of population.

#### **3.4.2. Activities undertaken**

Quite apart from the problems raised by the cut in the overall budget, a feature of the 1984-88 research budget was its concern to keep the number of research topics small, namely to cover:

- The diversification of production:  
The adaptation of sheep production to demand.  
The work financed concerned a study of the support granted in the West of Ireland to convert sheepfarming to the types of products required in Europe as a whole.

- The conversion of farming to afforestation:  
Research on the transition from stockfarming to forestry based on a study of the optimum afforestation density compatible with sheep grazing in woodland in the course of growth. Work carried out in Scotland.
  
- Quality enhancement:  
Research in the Pays d'Auge on the requirements for upgrading a quality product, cheese.  
The study covered the technical aspects of on-farm production, the operation of agricultural supervisory bodies, the conditions governing industrial milk processing and the control of up grading through marketing.
  
- Multiple job-holding:  
Research on this topic involved examining the combining of farming with non-farming activities in an area of the Federal Republic of Germany with a long mining tradition. Types of holdings where members of the household carry on several activities and have several sources of income.  
Technical-economic profiles of such holdings.

#### 3.4.3. Results

Action in Ireland; while it was possible to specify the quality criteria of European buyers, the endeavours of the advisory services to bring the quality of the finished lambs up to the requisite standard were unsuccessful. Breeding hoggets and stud rams found a market at home however.

Action in Scotland: preparation of a model formally setting out the expected economic results of the different versions of the reafforestation plan and several variants of the sheep farm associated with it based on structural data for a holding of 560 hectares.

**Action in the Pays d'Auge:**

- a) it was not possible to establish any link between the soil and the quality of milk,
- b) "traditional" holdings perform equally well as "modernized" holdings,
- c) on traditional holdings the density of cattle per hectare is appreciably higher than that currently accepted for extensive dairy farming.

**Action in the Federal Republic of Germany: summary of the large number of factors and of their interactions affecting household decision-making relating to multiple job-holding.**

### 3.5. AGRO-FOOD

#### 3.5.1. Background and objectives

The priorities of the CAP, which were previously to increase output, have now become quality improvement and the diversification of farm produce. The enormous size and highly fragmented structure of the food industry means that research on food quality could benefit greatly from coordination at European level. Shared-cost research contracts are difficult to manage at European level, however, since, because of the fragmentation, research objectives that are feasible and appropriate are not easy to define.

Research objectives in some scientific fields can be identified on the basis of market or social considerations, and elsewhere on the basis of the results of earlier work. Neither of these approaches applies in the case of the food sciences.

Intensive discussions were held between food scientists in the Member States and the following four topics were singled out:

- a) production methods
- b) testing procedures
- c) marketing
- d) uses.

One, two or three specific objectives within each topic were then defined and the following seven selected:

- Quality improvement based on crop inputs: the impact on quality of intensive cultivation techniques and of methods of prolonging the production season (for soft fruit, top fruit and salad crops).
- Quality improvement based on crop inputs: the impact on quality of intensive cultivation techniques and damage caused to products (potatoes for processing).
- Optimization of fresh meat quality: the impact on quality of conditions arising immediately following slaughter caused by accelerated processing.

- The subjective evaluation of quality by consumers compared with objective evaluation (definition of standardized evaluation procedures to be used throughout the Community).
- The forecasting of consumer attitudes and expectations (determination of the success or failure of producers' efforts to launch new products, to alter product quality or to modify production systems).
- Product differentiation (the aim being to broaden the outlook of producers).
- New crops and new products.

### 3.5.2. Activities undertaken

#### Joint projects

The seven objectives referred to above were the subject of 16 shared-cost contracts.

#### Coordinated measures

The coordinated measures were undertaken in support of the joint programme. Twenty-eight meetings were held and 67 scientists participated in the arrangements for the exchange of research workers.

### 3.5.3. Results

#### a) Shared-cost contracts

Scientists from Denmark, the Netherlands and the United Kingdom collaborated on developing an electronic method of detecting the points where potatoes were likely to be damaged during transit from the field to store and the consumer/user. In the case of pigmeat, significant progress was achieved in understanding the problems of "pale, soft exudative" meat and shrinkage due to chilling. Rapid refrigeration went some way towards resolving the former problem but aggravated the latter.

Statistical techniques were developed for comparing subjective and objective quality evaluation. Collaborative tests are now under way to define a standard procedure for the Community.

Economic, psychological and ethological theories were put forward to explain the mechanism for the formation of prices paid by consumers.

A detailed economic analysis was made of the costs and prospects of producing game in Ireland. The project showed that while it would be of interest to many grassland holdings there were only a few farmers with the necessary entrepreneurial spirit on the gambling instinct who would be prepared to try it.

Improvement of knowledge regarding the prospects for producing paper from Canabis sativa and from cereal straw.

b) Coordination activities

- Workshops

There were two types of workshops. The object of the first was to establish research requirements in a specific field. That of the others was to summarize the research results.

The proceedings of most of the workshops were published.

- Exchanges of research workers

Sixty-seven exchanges took place. Most of these (38) examined matters related to the common measures and to the preparation of the research projects. Others compared data and procedures, principally on trade in boned beef between Member States, the bacterial contamination of meat, the production of Pleurotus mushrooms, the production of game and new cheese production techniques.

Publications:

Fourteen works were published and five are being prepared.

In addition to the publication, all of which are based on the coordinated activities, a number of scientific papers setting out the results of the shared-cost research projects under the food programme have appeared already in scientific journals and others are expected.

### 3.6. ANIMAL HUSBANDRY

#### 3.6.1. Background and objectives

Over time the activities undertaken in the Meat Production and Animal Pathology programmes have expanded to include more applied research, which is closer to the needs of the common agricultural policy and of the markets, whereas initially there was more basic research.

The reduced budget has meant that only a small number of contracts have been concluded, for two years instead of five, and that few institutes have been involved.

The objective of the Animal Husbandry programme was to improve production efficiency rather than output itself. Research has focussed on resolving problems in the areas of animal health and welfare. A number of limited measures have been developed on livestock productivity and management techniques. The research has been on a small scale.

In the area of animal health, strategic research has concentrated on diseases that are likely to hinder trade. Efforts were made to develop and harmonize diagnostic methods. The development of immune mechanisms against diseases were dealt with under the biotechnology programme because of the basic research involved. Epidemiology and the economic aspects of disease control, on the other hand, came under the animal husbandry programme.

Activities in the area of animal welfare covered:

- physical and social space requirements,
- disturbed behaviour and stress,
- the transportation of farm animals,
- alternative production systems.

A certain priority was given to the welfare of animals during transportation and intensive rearing.

The number of topics dealt with under livestock productivity and management was small in spite of the undoubted need at Community and international level for studies on biological and economic efficiency. Some of the results obtained on the physiology of cattle, sheep and pig reproduction had to be checked and, where possible, exploited for the benefit of Community farming. Work carried out on earlier Community programmes to coordinate research on rumen function deserved to be followed up.

### 3.6.2. Activities undertaken

The shared-cost activities (1986-87) under the animal husbandry programme included 14 new contracts costing ECU 1.2 million. Spain and Portugal took part starting in 1988.

Several very effective activities were undertaken based on proposals or results arising from earlier Community programmes. In addition, a number of specific topics of key interest to the Community were dealt with speedily and effectively. The programme Committee played a major role, several working groups were set up and the results described below were achieved.

A number of scientific visits and exchanges of research workers took place, priority being given to requests likely to produce practical results that might assist the common agricultural policy, and in particular the marketing of goods.

Exchanges of research workers were devised in such a way as to ensure a large number of short visits rather than a few expensive and lengthy ones. While research was the main object of some exchanges, the training aspect was never overlooked. Several visits were financed as part of shared-cost measures which, as far back as 1984, were multinational.

### 3.6.3. Results

The principal results achieved through the growing cooperation between multinational groups were:



- The improvement of techniques for the diagnosis vaccination against and control of *Brucella Melitensis* in sheep and goats.
- The improvement of techniques for the diagnosis, vaccination against and control of Aujeszky's disease.
- Improved knowledge of the African swine fever virus.
- The improved control and diagnosis of contagious bovine pleuropneumonia in Portugal.
- Research - in the context of animal welfare - on the behaviour of pigs and poultry and the development of alternative, less intensive production systems.
- The improvement of conditions for the transportation of farm animals.
- Progress achieved in applying new technologies in the area of fertility, reproduction and growth in cattle, sheep and pigs.

Numerous problems of major significance to the common agricultural policy, and especially the marketing of products were discussed at meetings and seminars, including:

Animal health

- . Improved diagnosis of leptospirosis.
- . Effects electro-stimulation of meat in cases of latent foot-and-mouth disease.
- . Improved diagnosis of rinderpest.
- . Review of chlamydial disease in sheep, goats and cattle.
- . Review of acute viral diseases of fowl.
- . Advances in the diagnosis of bovine viral diarrhoea.
- . Description of Blue Tongue virus vectors.

- . Advances in the eradication of rabies.
- . Definition of the impact of paratuberculosis infections on sheep and goats.
- . Review of the diagnosis of African horse sickness and its eradication.
- . Improved awareness of the economic repercussions of animal health and disease.

#### Animal welfare

- . Pain assessment in farm animals.
- . Determination of social stress in relation to space and adaption.
- . Review of stress syndrome in pigs and meat quality.
- . Reduction of stocking density to improved welfare.

#### Livestock productivity and management

- . Improved feed analyses, notably near infra red analyses (NIR).
- . Review of the biochemical identification of various types of meat.
- . Harmonization of standards for the nutrition of farm animals.
- . Effects of milk quotas on milk productivity and alternatives.
- . Review of the use of rape in cattle feed.
- . Full description of rabbit production and welfare.
- . Reduction of the harmful effects on the environment of cattle rearing.
- . Early detection of Beta Agonists.
- . Use of the magnetic nuclear resonance technique for measuring the body features of live animals.
- . Review of the detection of aflatoxins, their decontamination and potential toxicological effects.
- . Health and management of farmed deer.
- . Somatropin used in cattle production.

### **3.7. PLANT PRODUCTIVITY**

#### **3.7.1. Background and objectives**

The principal reason for the Plant Productivity Programme 1984-88 is the variability of the yields of certain crops (eg. grain legumes), which causes farmers to opt for crops which are more profitable and/or easier to cultivate (cereals, for example). The inclusion of legumes in cropping systems improves soil conditions and crop resistance to certain diseases. The inadequate nutritional value of certain types of fodder and cereals makes them unsuitable for large-scale incorporation in feed.

The aim of the programme is to increase farmers' incomes by improving their productivity through the more rational use of inputs, and to encourage the cultivation of products which are in deficit, namely:

- a) to continue plant breeding in order to stabilize crop yields, obtain better-quality products and improve resistance to disease and environmental stress;
- b) to improve husbandry methods and techniques from the point of view of the physiological needs of plants;
- c) to develop rapid breeding techniques for shortening considerably the duration of biological processes or for accommodating natural incompatibilities.

#### **3.7.2. Activities undertaken**

- The improvement of techniques for producing grasses and forage legumes, grain legumes and oilseeds.
- The improvement of the nutritional quality of crops, particularly the reduction of antinutrients in rape and grain legumes; the improvement of the protein composition of cereals.
- The development of improved techniques for the production of hybrids, the rapid evaluation of plant breeding material and the finalization of efficient micropropagation techniques.

- The improvement of cork oak (*Quercus suber*) cultivation in Portugal.

### 3.7.3. Results

- The inclusion of white clover in grassland is equivalent to an average application of nitrogen with an obvious reduction in production costs.
- The maintenance of white clover in grassland depends on certain characteristics and on the number of stolons.
- The development of a growth model for lucerne (*Medicago sativa*) (UK-F joint measure). Lucerne can survive in association with grasses (F-IT joint measure).
- The preparation of an experimental protocol for a pilot project on the production of white clover seed involving 10 Community countries.
- The determination of the best compromise between yield and yield stability in beans (*Vicia faba*) and peas (*Pisum sativum*). (Pilot projects).
- The breeding of pea genotypes resistant to drought and the definition of an ideotype.
- The setting up of a network of European research workers studying peas and the establishment of an experimental protocol for evaluating their feed and non-feed potential.
- Inter-specific crossing of European lupins with American species.
- The preparation of an experimental protocol for the definition of breeding criteria for yield in sweet lupin.
- The development of rapid methods of evaluating sunflower genetic material.
- A standardized Community method has been devised for determining the glucosinolate content (antinutrients) of rape and is now used as the official reference method.
- Improved knowledge of the toxic effects of OO rape with a low glucosinolate and erucic acid content on livestock, especially game.
- The development of a chemical method of detecting alkaloids in potatoes, some of which are carcinogenic.
- The development of methods for the accelerated production of hybrids in maize, white clover and Ray Grass.

- A contribution towards the in vitro evaluation of the susceptibility of certain ligneous plants to pathogenic bacteria (vines, poplars, pears).
- Simple tests for early evaluation of wood quality in rapid growing spruces.
- The improvement of in vitro micropropagation of ligneous species by development of a culture medium that overcomes the problems of vitrification and necroses. The result has been applied at industrial production level.

#### Action with Portugal

This contractual project (which is to end in February 1990) concerns the improvement of the efficiency of cork oak (*Quercus suber*) production, starting with the development of improved breeding methods, followed by the definition of integrated and biological control strategies, more effective husbandry and the sound management of water use. The measure is carried on jointly with the Energy programme.

### **3.8. AGRICULTURAL INFORMATION**

#### **3.8.1. Background and objectives**

The gathering of agricultural information has been one of the Commission's activities since the end of the sixties, as a support for the development and coordination of agricultural information services for the scientific community. The aim was to make Community agricultural research more efficient by eliminating duplication and improving the quality of research. More recently, the Commission's work has included the dissemination of agricultural information, particularly to agricultural advisers and farmers.

These activities were originally the responsibility of DG XIII (the Directorate-General for Telecommunications, Information Industries and Innovation), but were placed low on its list of priorities in 1984. Their transfer to DG VI (Agriculture) guaranteed their continuity in the Community agriculture information programme.

Since then the latter programme has had the following four subdivisions:

- a) the introduction, preparation and development of a Community inventory of current agricultural research (AGREP);
- b) agricultural information dissemination, notably the coordination of data input for the farm data base (FAO/AGRIS);
- c) the establishment and execution of measures by the Advisory Committee on the Dissemination of Agricultural Information<sup>(1)</sup>;
- d) the identification and implementation of Community initiatives for the development of agricultural data processing.

#### **3.8.2. Activities undertaken**

A thorough examination helped define the measures needed to improve the AGREP data base and the management information system.

<sup>(1)</sup> This Committee consists of the heads of the Member States' farm advisory services. Its purpose is to advise the Commission on the dissemination of farm information and on the effects, at farm level, of the Community agricultural and structural policies.

The main input problems of the EUR/AGRIS system were also highlighted. Efforts were continued to encourage the coordinated development of agricultural data processing and to identify major spheres of activity for the Advisory Committee on the Dissemination of Agricultural Information.

### 3.8.3. Results

#### AGREP:

A new AGREP research management system has been devised. The development of the computerized system is continuing and it will probably be operational half way through 1990. The relaunching of the AGREP data base was not entirely satisfactory because of problems at national focal points.

#### EUR-AGRIS:

Community activities have played a part in the involvement of all Member States in supplying data to the EUR-AGRIS system and in increasing cooperation between suppliers of the main data bases.

All data input problems arising in the Member States have been resolved as and when they have come to light. Appropriate measures have also been established for the coordination, shaping and development of mechanisms for data input and dissemination.

#### AGRICULTURAL DATA-PROCESSING:

Short and medium-term cooperative measures have been drawn up, namely:

- to develop and define information models and expert systems for farm enterprises;
- for the education and training of farmers, agricultural advisers and specialist staff;
- to develop evaluation methods for agricultural software;
- for the ergonomic assessment and improvement of data-processing services and software;
- for the setting up of computerized communications networks and of experimental cooperative data-processing services.

Four proposals for high-priority activities have been developed as part of the above measures.

A proposal for a Council decision has also been drawn up for the further development of agricultural data-processing.

ADVISORY COMMITTEE ON THE DISSEMINATION OF AGRICULTURAL INFORMATION

The above Committee has identified priority areas for evaluating the impact of the reform of the common agricultural policy on farm advisory services. These include the training of agricultural advisers and farmers, the transfer of information to and from the Commission, new advisory activities, agricultural data-processing and cooperation between advisory and research services. The Committee did not meet often enough, however, and was not sufficiently consulted because of lack of staff.



#### 4. EVALUATION

The Commission's policy in relation to evaluation, to which the Council has given its consent, is that each research programme under the framework programme must be assessed periodically by independent outside experts. The Commission's plan of action, published in the Official Journal on 20 January 1987, sets out the objectives and method of the evaluation.

In addition to the external independent evaluation (Report 39 EVR/2147-EN), in which the aim was to give a better orientation of future proposals from the Commission, an internal evaluation has been undertaken by the services of the Commission at all stages of preparing and implementing these programmes.

It is all the more important to evaluate the coordination of Community agricultural research if such research can contribute effectively to resolving the problems of the CAP, particularly:

- . the reduction of agricultural surpluses,
  - . the strengthening of the economic and social cohesion of rural areas,
  - . the development of a scientific community,
  - . the reinforcement of the experimentation and advisory services.
- Generally speaking, none of the research has concerned crops or forms of production which are in surplus. Instead, the aim has been to encourage farmers to cultivate alternative or substitute crops that would give them the same or a higher return, in most cases with a drop in production costs.
- The Mediterranean Agriculture (AGRIMED) sub-programmes on land and water use and management and on other less-favoured areas have been concerned directly or indirectly with examining the socio-economic situation of difficult, marginal, slow-developing regions affected by severe depopulation. The research only helped identify the factors hampering development but contributed above all to the better use of existing resources. Environmental protection follows on naturally from these measures.
- Research in the various Member States has covered a wide field but the introduction of Community coordination of the national programmes established transnational cooperation which facilitated the pooling of knowhow, experience and facilities. This has led to a better distribution of effort with a synergistic effect which has helped bring about a speedier resolution of common problems that go beyond national frontiers.

- Full and rapid results cannot always be obtained for immediate appraisal due to the slowness of biological cycles. The very fact, however, that research workers from several countries are engaged in a given research project has made an effective contribution towards the dissemination of those results both among research workers themselves and advisers and among the end users, i.e. farmers.
- The figures show once again that the proportion of the Community budget earmarked for the coordination of agricultural research has always been too small. Its cost/effectiveness, on the other hand, has nevertheless been considerable and this will become increasingly evident as the results of the research are put into effect by farmers throughout the Community.
- Attention should be drawn to the positive contribution made by the Programme Committees consisting of permanent and specialist members who, for more than 10 years, have been assisting the Commission in making a reasoned selection of the research projects and in checking the results obtained and have thus gradually steered the research in the direction mapped out in the CAP directives.
- Preparations for the new 1989-93 programme have been undertaken, thus guaranteeing a smooth transition and continuity of the work needed to contribute to the future development of the common agricultural policy, notably through:
  - . the diversification of production,
  - . the improvement of product quality,
  - . the reduction of production costs.
- In addition, effective cooperation has been established both within the Commission departments and between the Commission and other international bodies.
  - . Between 1984 and 1988 meetings took place with various Divisions of the Directorate-General for Agriculture and these have resulted in specific achievements over the years.
  - . The Community programme for the coordination of agricultural research has made a specific contribution towards the implementation of the following measures falling directly within the terms of reference of the common agricultural policy and which have persuaded the Commission to:
    - a) propose the replacement of sucrose by rectified concentrated musts (RCM);

- b) develop systems for the classification of cattle, sheep, goat and pig carcasses;
- c) identify varieties of tobacco which meet specific market demand;
- d) develop strategies for improving animal health and welfare;
- e) develop strategies for increasing the use of cereals in cattle feed;
- f) draw up plans for controlling varroa-mite disease in bees;
- g) improve the determination of toxic substances such as glucosinolates and aflatoxins;
- h) select specific projects in the context of the integrated Mediterranean programmes and other structural initiatives;
- i) draw up a Community plan on nuts.

This gives an idea of the wide-ranging active cooperation with market organizations, legislative departments and structures.

- . In some cases there has been cooperation with other Commission departments which have sought aid or which possess a particular competence.

The scope for cooperation with the Directorate-General for Science, Research and Development increased, more especially when the framework programme (1987-91) was launched. The brief list below shows the type of subject on which a collaborative approach was adopted to enhance the value of the research:

- tropical farming
- remote sensing
- integrated and biological control
- biotechnology
- the environment.

The Directorate-General for Telecommunications, Information Industries and Innovation (DG XIII) has contributed effectively to the production of excellent publications. Their assistance in this area and in disseminating much of the information arising from the research activities is much appreciated.

- . International cooperation with agricultural scientists in Algeria, Yugoslavia and Israel has been very useful. A large proportion of this work has been made possible through the funding provided by the Directorate-General for External Relations.

. Cooperation that is especially effective has been established with international organizations such as the FAO, the International Centre for Advanced Mediterranean Agronomic Studies (ICAMAS) and the European Association of Animal Production (EAAP). That with ICAMAS has helped in particular to surmount speedily the critical transitional period with the new Member States, Greece, Spain and Portugal, by affording scientists in those countries the opportunity, prior to accession, of becoming involved in the work and thus familiarizing themselves with Community procedures.

## 5. CONCLUSIONS

The Commission takes the view that the following lessons can be drawn from the way in which Community coordination has been conducted:

- Agricultural research should take greater account of the needs of the common agricultural policy which is constantly undergoing change, i.e. it should not confine itself to questions relating to crop and livestock production but should consider also the socio-economic repercussions of measures implemented under the policy on markets and structure, for example. It could provide far more scientific backing for the various sectoral policies.
- The dispersion of national research activities and the problems that this has created for coordination militate in favour of greater concentration of research efforts at European level. Projects should receive far more funds and be much more multidisciplinary and transnational so that the efforts of the Member States produce a synergistic effect and scientific knowledge in certain well-defined areas progresses more swiftly. In other words, the principle of subsidiarity must be pursued and applied.
- Future research efforts, thus concentrated and better targeted, will have to be conducted in close cooperation with the SCAR in order to allow it to perform its role fully to assume the effective management of the research programmes.

- Such programmes are implemented through genuine "research networks" involving long-term scientific activity in which coordination has a major and increasing role. The credibility and effectiveness of these networks depend closely on the transnational status of the Community manager and the scientific recognition of their coordinators, who are also independent research workers. A certain degree of decentralization must be contemplated, therefore, by entrusting, where possible, the operational management of projects to these local coordinators.
- Coordination activities would be implemented as part of each network programme and would focus only on activities forming part of that programme. In view of the success achieved to date by those activities, increasing them would give a significant impetus to the entire future programme, which has been restructured under three major multidisciplinary headings on the basis of the experience gained so far.
- The effectiveness of the new programme will depend on the transparency of the procedures for attracting interested parties but also on their flexibility and speed. Now that it forms part of the Community framework programme, the agricultural programme will call for greater coordination to ensure the necessary complementarity and to avoid duplication.
- Changes made in the course of the research programme to bring it better into line with the new demands of the common agricultural policy, have, through the continuity of effort, helped bring about a smooth transition towards the new programme.

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ISSN 0254-1475

COM(90) 214 final

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Catalogue number : CB-CO-90-221-EN-C  
ISBN 92-77-60320-8

PRICE	1 - 30 pages: 3.50 ECU	per additional 10 pages: 1.25 ECU
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Office for Official Publications of the European Communities  
L-2985 Luxembourg