



COMMISSION OF THE EUROPEAN COMMUNITIES

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**REPORT FROM THE COMMISSION TO THE COUNCIL**

**on co-financing of remote sensing checks in connection  
with agricultural subsidies**

**required under Article 6 of Regulation (EC) No 165/94**



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### 1. Introduction

#### 1.1 CAP reform

In 1992, Regulation No 1765/92<sup>1</sup> "reformed" the common agricultural policy (CAP). The reform covers the main arable crops and certain fodder areas and imposes compulsory set-aside of part of the arable crop area. Direct area-based subsidies are paid to farmers, amounting to around ECU 16.2 billion in 1996.

#### 1.2 IACS

Council Regulation No 3508/92<sup>2</sup> and Commission Regulation No 3887/92<sup>3</sup> set up an "integrated administration and control system" (IACS) for Community subsidies granted under the reform arrangements. This system requires farmers in all Member States to submit a standardised annual declaration and involves a computerised database, identification of land parcels declared and animals and integrated control procedures.

The rules provide for two forms of control:

- "administrative" i.e. based on the IACS files and databases. These checks, made on all applications, are outside the scope of this report.
- physical checks, covering a sample of at least 5% of applications selected using criteria set in the rules.

#### 1.3 Remote sensing

This is specifically provided for as a physical checking option (Regulation No 3508/92 Article 8 (4)) at Member States' discretion. The alternative is "traditional" checking by inspection on the spot. All Member States except Luxembourg and Austria decided to use remote sensing in 1996.

Remote sensing is in fact a type of on-the-spot checking involving scrutiny of information on the actual use of agricultural parcels during the crop year. This information is however gathered by aircraft or satellite instead of being obtained by visiting the parcels.

#### 1.4 Development of remote sensing for CAP control purposes

The European Commission's Joint Research Centre (JRC) at Ispra in Italy developed the basic techniques used in the Remote Sensing controls, in its MARS Project (Monitoring Agriculture by Remote Sensing) approved by the Council in 1988. The aim at this time was to use satellite imagery to produce European agricultural statistics.

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<sup>1</sup> Council Regulation (EEC) No 1765/92 of 30 June 1992 establishing a support system for producers of certain arable crops (OJ L 181, 1.7.92, p. 12)

<sup>2</sup> Council Regulation (EEC) No 3508/92 of 27 November 1992 establishing an integrated administration and control system for certain Community aid schemes (OJ L 355, 5.12.92, p.1)

<sup>3</sup> Commission Regulation (EEC) No 3887/92 of 23 December 1992 laying down detailed rules for applying the integrated administration and control system for certain Community aid schemes (OJ L 391, 31.12.92, p. 36)

In 1990 the EAGGF used satellite imagery experimentally to compile a regional inventory for durum wheat in southern Italy and central Greece. This was a purely statistical exercise, i.e. there was no checking of individual farmers or their plots.

In 1991, i.e., before implementation of reform, the EAGGF with JRC help began test checks on individual plots declared. In that year declarations covering durum wheat, five year set-aside, vine grubbing and cotton were checked in Greece, Spain, France and Italy.

In 1992, ten Member States used the system for checks on two newly introduced measures: temporary land set-aside<sup>4</sup> and temporary aid for oilseeds<sup>5</sup>.

Remote sensing was thus ready for use when CAP reform was implemented in 1993. This both facilitated adoption of the reform (until then the main experience of subsidising on an area basis was with durum wheat, where serious problems had come to light in 1990) and warranted specific mention of the technique in the regulatory provisions.

### 1.5 Co-financing

Since 1970 Regulation No 729/70<sup>6</sup> has left the cost of control work to be met by Member States. Remote sensing is however a fairly new and complex technique bound to raise expenditure when first used. Accordingly in a waiver from the general rule Commission Regulations Nos 2069/91<sup>7</sup> and 615/92<sup>8</sup> (application rules for temporary land set-aside and for oilseed aid) introduced Community financing of remote sensing checks. Regulation No 3887/92 continued this.

Since 1994 it has been the Council itself by a specific Regulation, No 165/94<sup>9</sup>, that has authorised co-financing for five years of jointly organised control programmes. Commission Regulation (EC) No 601/94<sup>10</sup> sets the detailed rules.

Before 1994 100% of costs were met from the EU budget. From 1994 to 1998 the rate is 50%. A separate appropriation (no co-financing involved) covers centralised image purchasing by the Directorate-General for Agriculture (see below). The EU budget does not co-finance the administrative costs of the programmes. These remain subject to the general rule.

All Member States using remote sensing have asked for co-financing. Before 1994 Italy and the regional administration of Andalusia made aerial photography checks that did not form part of the programme and were not therefore co-financed.

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<sup>4</sup> Council Regulation (EEC) No 1703/91 of 13 June 1991 introducing a temporary set-aside scheme for arable land for the 1991/92 marketing year and laying down special measures for that marketing year under the set-aside scheme provided for in Regulation (EEC) No 797/85 (OJ L 162, 26.6.1991, p. 1)

<sup>5</sup> Council Regulation (EEC) No 3766/91 of 12 December 1991 establishing a support system for producers of soya beans and rape and sunflower seed (OJ L 356, 24.12.91, p. 17)

<sup>6</sup> Council Regulation (EEC) No 729/70 of 21 April 1970 on the financing of the common agricultural policy (OJ L 94, 28.4.70, p. 13)

<sup>7</sup> Commission Regulation (EEC) No 2069/91 of 11 July 1991 laying down detailed rules for application of the temporary set-aside scheme for arable land for the 1991/92 marketing year (OJ L 191, 16.7.1991, p. 19)

<sup>8</sup> Commission Regulation (EEC) No 615/92 of 10 March 1992 laying down detailed rules for a support system for producers of soya beans and rape and sunflower seed (OJ L 67, 12.3.92, p.11)

<sup>9</sup> Council Regulation (EC) No 165/94 of 24 January 1994 on co-financing by the Community of remote sensing checks and amending Regulation (EEC) No 3508/92 (OJ L 24, 29.1.94, p. 6)

<sup>10</sup> Commission Regulation (EC) No 601/94 of 17 March 1994 laying down detailed rules for application of Council Regulation (EC) No 165/94 as regards co-financing by the Community of remote sensing checks on agricultural areas (OJ L 76, 18.3.1994, p. 20)

## 2. Technical description

### 2.1 General organisation

Farmers are required to submit their annual subsidy applications in prescribed form and by dates set in line with Regulation 3508/92, in general between the end of March and 15 May depending on Member States. Remote sensing allows correct declarations to be picked out so that inspection on the spot can be directed to the others and to problem parcels and its amount and cost reduced accordingly.

What actually happens is that satellite images obtained at several dates in the crop year or aerial photos (depending on local conditions) are "photo-interpreted" to allow comparison of the actual situation as revealed by the images with the parcel areas and contents declared by farmers. This work is very specialised and most Member States contract it out.

The contractor is involved only in the actual photo-interpretation work. Handling of files upstream and downstream of this is by the national administration. The farmer normally has no contact with the contractor and so no third party enters into his relations with the administration. Calculation of penalties and financial adjustments applying to farmers is never entrusted to the contractor.

Table 1 shows the main stages and their times. The times may differ from one Member States and sometimes from one region to another.

Table 1 - Main stages

Task	Period
Choice of control zones, assessment of image requirements	September-November
Call for tenders, selection of contractors, signature of contracts	December-March
Selection and administrative processing of applications lodged in chosen zones; transfer of files to contractors	April-June
Assembly of topographical or IAS documents needed and boundary numbering of parcels declared	March-June
Acquisition of set of images (by Commission) and/or aerial photos by contractors), processing, geometrical correction etc.	November, March, May, June (August)
Photo-interpretation of parcels to be checked on images or photos	May-August
Categorisation and return of files and results	June-August
Inspection on the spot of problem parcels	July-October
Contractor's report to Administration and discussions of results	October-November

### 2.2 Tender specifications

The Commission organises every year with the Member States a general invitation to tender covering the whole Union. A jointly drawn up specification describes the services required. The invitation and the specification are published in October or November (in 1996: 22 November).

### 2.3 Selection of contractors

From 1990 to 1992 contracts were concluded directly by the Commission. Since 1993 each Member State selects one or more contractors in agreement with the Commission and then signs a contract under national law. The contract confers entitlement to co-financing.

### 2.4 Satellite images

The satellites providing usable images for control purposes are SPOT 1, 2 and 3 giving pixel<sup>11</sup> dimensions of 10 metres (black and white) and 20 m (colours) and LANDSAT TM 5 (30 m pixel). The new IRS 1C satellite will give a 5.8 m black and white pixel in 1997. The black and white and colour images from the various satellites are

<sup>11</sup> The pixel is the smallest visible component of the image.

interchangeable. For each control zone 4 or 5 images are acquired during the year so that the full vegetation cycle is covered.

Experience has shown that centralised purchasing of images by the Commission opens up possibilities inaccessible to individual Member States and avoids disorderly competition for satellite programming. Co-ordination is all the more necessary where control responsibilities are regionalised. In addition substantial price reductions are obtained. The EAGGF therefore purchases the images, lends them to the contractors (retaining ownership) and stores them at the JRC at Ispra at the end of the contract.

The number of satellites available and centralised management by the EAGGF means that the optical images needed are available for most of Europe. Even in cases of serious cloud cover (greatest risk in Northern Europe) radar images taken by the European satellites ERS 1 and 2 (not requiring sunlight and unaffected by cloud cover) can replace the missing optical images with still very acceptable results.

These images allow applications for the year in question to be verified and also in certain cases their eligibility as determined by a reference period set in the rules. For instance, archived images found through suppliers' catalogues have been used to check that land declared as "arable" was not on 31.12.1991 under permanent pasture, permanent crops or trees or used for non-agricultural purposes (Article 9 of Regulation 1765/92). Such a check is possible only if images free of cloud cover exist for the required period.

## 2.5 Aerial photographs

Particularly when parcels are small, aerial photos are sometimes used alone or with combination with satellite images. Their pixel is generally 1 or 2 m. Organisation of aerial photography is generally more flexible and decentralised than satellite programming and it has not been considered useful that the Commission take responsibility for photo acquisition. Satellites giving 1 m pixel images are due to operate from 1999 and will be able to replace aerial photos.

Aerial photos generally cost more than satellite images for an equal area. It is often difficult to organise successive coverings of a zone, one reason being that photography takes longer. Most of the time one view only is acquired and some crops, e.g., those already harvested or not yet sown, cannot be checked. This means more site visits to check actual land utilisation, though generally areas do not have to be measured.

## 2.6 Acceptance/rejection of applications

As with any other control procedure a conclusion must be reached on the eligibility of the application checked. In our case this falls into three distinct stages.

- Area and percentage tolerances are applied that have been set in line with the technique used and the national context. In all cases the rules make Member States responsible for setting these tolerances.
- For each application it is then calculated whether the "crop group"<sup>12</sup> found by the photo-interpreter corresponds to that declared. Up to 1995 applications were classed as accepted, rejected or uncertain. Since 1996 two separate gradings are made: accepted/rejected and complete/incomplete. "Incomplete" means that a significant part of the area could not be checked since it was outside the image/photo area, under cloud etc. An application marked as accepted but incomplete is considered as unverified while an application can be rejected even if the check was incomplete.
- It is only after contact with the farmer that the national administration accepts, corrects, applies a penalty to or rejects the application under Article 9 of Regulation No 3887/92 depending on the discrepancy found.

## 3. Achievements

### 3.1 Development of techniques

Working methods have evolved with time, on the basis of the Commission's experience, suggestions from the Member States and technical progress. For example:

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<sup>12</sup> A crop group is a set of crops (or land uses) with the same subsidy rate (cereals, oilseeds, set-aside, durum wheat, fodder crops etc.)

- Adjusted rules (consolidation of control responsibilities, remote sensing explicitly scheduled) were introduced only from 1992 and 1993.
- In 1993 radar images were used for the first time.
- From 1994 use of aerial photography (alone or combined with satellite images) was made available as an option.
- From 1994 checking in two stages (autumn-sown and spring-sown crops) was recommended.
- From 1995 synergy with IACS has been sought. For example, digital orthophotos or digital files of parcel boundaries are exchanged between the two activities. Control can be gradually extended (as an option) to other sectors: compensatory aid for less favoured areas, agri-environmental measures, vineyard and olive trees registers etc.
- To improve database quality the Commission has encouraged ortho-rectification of aerial photos, and this has become general from 1996. Precision of area measurement is improved and these photos can also be used for IACS purposes (or come from IACS as in Ireland and Portugal).
- From 1996 technical tolerances can be applied to the parcel instead of the crop group, so bringing decisional criteria closer to those applicable in traditional checks.

### 3.2 Volume of work

Table 2 shows the Member States' steady growth of interest as reflected in number of zones selected and volume of applications checked.

**Table 2. Volume of remote sensing co-financed**

MS and number of contracts 1996	Number of zones selected		Number of applications checked in 1996			
	Satellite	Aerial photos alone	Satellite alone	Aerial photos alone	Satellite + photos	Total
Belgium (1)	0	3	0	2,007	0	2,007
Denmark (2)	4	0	3,052	0	0	3,052
Germany (2)	13	0	1,514	0	1,391	2,905
Greece (2)	6	0	3,602	0	700	4,302
Spain (2)	12	8	15,367	921	1,660	17,948
Finland (1)	4	0	0	0	4,177	4,177
France (2)	9	3	4,112	1,466	0	5,578
Ireland (1)	2	0	0	0	2,045	2,045
Italy (1)	21	18	0	37,851	20,500	58,351
Netherlands (1)	4	0	3,110	0	0	3,110
Portugal (2)	5	8	3,543	7,001	0	10,544
Sweden (1)	4	0	0	0	2,621	2,621
United Kingdom (1)	6	0	2,249	0	0	2,249
<b>TOTAL 1996</b>	90	40	36,549	49,246	33,094	118,889

<b>TOTAL 1995</b>	86	21	46,910	38,832	14,456	100,198
<b>TOTAL 1994</b>	56	20	32,833	24,431	9,382	69,811
<b>TOTAL 1993</b>	44	0	24,502	0	10,172	34,674
<b>TOTAL 1992</b>	30	0	14,712	0	0	14,712

Farmers make around 3.06 million applications every year, at least 5% of which must be physically checked. In 1996 Italy checked 8.4% of its applications. If this overshoot is discounted for calculation of the average remote sensing covers 63% of the minimum 5%.

### 3.3 Image purchases

Table 3 gives the numbers of images bought by the Commission for the control zones indicated in Table 2.

**Table 3. Image purchases 1994 to 1996**

	SPOT	Landsat TM	ERS (radar)	Total
1996	390	127	33	550
1995	340	155	6	501
1994	232	90	7	379

### 3.4 Application checks: General results

Check results from 1993 to 1996 are summarised below. "Uncertains" and "incompletes" are not totally comparable. The totals shown do not correspond to those for applications checked (see Table 2) since in certain cases figures for actual application numbers are not available.

**Table 4. Control results 1993 to 1996**

	Accepted complete	%	Rejected, complete or incomplete	%	Accepted incomplete	%	TOTAL
1996 (part)	41,492	72.57%	13,766	24.08%	1,914	3.35%	57,172

	Accepted	%	Rejected	%	Uncertain	%	TOTAL
1995	35,737	57.64%	18,557	29.93%	7,706	12.43%	62,000
1994	24,969	58.31%	11,956	27.92%	5,896	13.77%	42,821
1993	21,462	65.38%	7,658	23.33%	3,709	11.30%	32,829

## 4. Further considerations

### 4.1 Analysis of results

In 1996 the results were: 73% accepted, 23% rejected/complete, 1% rejected/incomplete and 3% accepted/incomplete. Acceptance and rejection percentages vary widely between Member States, much more owing to the quality of declarations and of the parcel system available to farmers than to locally varying fraud rates. In 1996 accepted applications ranged from 60% to 93% by Member State, in 1995 from 45% to 96%.

When a farm visit is decided on following a remote sensing exercise the inspector has the parcel and crop group findings accounting for rejection and can target his work accordingly. The number of parcels involved per application is generally fairly small and inspection time can therefore be cut down, particularly when as in certain cases rejection has turned solely on the use of the parcel and it does not need to be measured. His work is also facilitated by the documentation (map and image extracts) received from the contractor for the problem parcels, particularly if the reference mapping for the area is old.

### 4.2 Quality control

In complement to the contractor's own quality assurance required in every case, a double check on the quality of contractor's work is also made. The Commission (JRC at Ispra in collaboration with DG VI) checks, to the benefit of and with the agreement of the Member States, a sample of the data received from contractors to ensure that the work was carried out correctly. Member States also make on-the-spot checks of a sample of applications accepted, along with those rejected, to check that the decisional criteria were correctly applied and assess what irregularities are passed over by remote sensing. This approach has no equivalent in traditional control. The aim is adjustment and integration of the different physical control methods so that they are complementary rather than in competition.

In 1995 the JRC made a first test on the data from three contractors. In 1996 a JRC subcontractor and the JRC between them tested 11 contractors out of 18. These tests were financed by the JRC budget. The test results will be available at the end of 1996 or beginning of 1997 depending on when the data to be tested was transmitted to Ispra.

#### 4.3 Reliability of results

The reliability of remote sensing can be assessed from the JRC's quality testing (only preliminary results are available) and from the findings of on-the-spot visits sent by the Member State to the contractor and included in his report. Usable incomplete results are available only for 1995 and 1996. Gathering this information is a very tricky matter, since the assessment is in part subjective, there are numerous unclassifiable individual cases and the feedback the on-the-spot checks, sometimes very concise, comes from local officials and can be difficult to interpret.

- Irregularities were confirmed in 42% of the 12 294 applications rejected and then checked on the spot in 1995. In 1996 (incomplete figures, 2 545 applications) the figure is 61%. The filter is therefore taking on a reasonable degree of efficiency in that it is not producing too many false alerts on applications that should have been accepted.
- It is also necessary to check that the filter stops all irregular applications, i.e. that applications are not accepted that should have been rejected. The checks so far made cannot be termed systematic given the very restricted results available: for 4 contractors in 1995 and 3 so far in 1996. Irregularities were found in 71 out of 241 applications accepted in 1995 and then checked on the spot. These were mainly restricted to two contractors. In 1996 irregularities were found in 24 applications out of 198. These figures for a very restricted sample of applications and contractors appear to indicate poor interpretation of information or differing views of what constitutes an irregularity. Nor have these percentages been confirmed so far by the JRC's quality control. To clarify matters a minimum volume of verification on the spot of accepted applications has now been recommended to all Member States. It should also be noted that some irregularities, over wheat and rape varieties and fallow maintenance, cannot be detected by remote sensing and this may explain certain differences.
- The contractors sent back 25% of the applications to national administrations for further information or correction before they could be dealt with and were then resent 21% (1995-96 averages). Some of these applications were undoubtedly rejected a second time after photo-interpretation, which does not allow the "corrected" and the "rejected" applications to be added together. Others, after correction of "obvious errors" or additional information, undoubtedly became acceptable. The 4% which were not photo-interpreted were probably checked on the spot even though not credited to remote sensing. From this angle remote sensing is just as or even more effective than traditional control.

#### 5. Cost of remote sensing

##### 5.1 Member States

Tables 5 and 6 show the unit costs, separately for satellite imaging and aerial photography. They vary widely by Member State depending on number of applications checked and their size (area) and complexity (number of parcels). The 1996 figures are provisional except for number of applications. Costs have steadily fallen owing to improvement of techniques and contractor proficiency, increased volume and recently availability of IACS databases. There is much less of a steady trend for aerial photography, where the figures for Italy predominate (see Table 2). Italy's technical approach and sectoral coverage has varied very markedly from year to year. In 1994 and 1995 remote sensing checks were basic and followed by verification with the farmers, not co-financed. In 1996 ortho-rectification, generalised at the Commission's request, alone added about ECU 29 per application.

**Table 5. Cost trend of remote sensing by satellite, images included, exclusive of VAT**

	No. of applications	No. of parcels	Area (ha)	Total cost (ECU)	ECU/ application	ECU/ parcel	ECU/ ha
1996 (provisional)	69,643	1,023,771	2,929,454	11,320,188	162.55	11.06	3.86
1995	53,388	797,067	2,498,218	9,720,793	182.08	12.20	3.89
1994	42,269	472,975	1,471,363	8,779,903	207.71	18.56	5.97
1993	34,674	331,567	937,055	8,806,351	253.98	26.56	9.40

**Table 6. Cost trend of remote sensing by aerial photography, exclusive of VAT**

	No. of applications	No. of parcels	Area ( ha)	Total cost (ECU)	ECU/ application	ECU/ parcel	ECU/ ha
1996 (provisional)	50,146	719,236	769,110	7,154,987	142.68	9.95	9.30
1995	46,810	553,169	700,953	4,427,537	94.59	8.00	6.32
1994	27,426	285,386	313,864	2,465,382	89.89	8.64	7.85

These costs include purchase of images and aerial photos and the entire remuneration (Member State's and EAGGF contributions) of contractors for their photo-interpretation and application processing work.

## 5.2 EAGGF expenditure

The EAGGF itself purchases the images. Up to 1994 it met 100% of the cost of contracts, since then 50%. Table 7 summarises these costs. The figures are not precisely comparable with those of tables 5 and 6 since certain expenditure was either not presented or not authorised for co-financing (see § 5.3) and some remote sensing control work (e.g. vineyard and olive trees registers) is not included in tables 5 and 6. Some additional work in connection with remote sensing was also financed from the same budget:

- a study on precision of measurement of agricultural parcel boundaries (one contract in 1992) costing ECU 31,560;
- a study on automatic segmentation of parcel boundaries using satellite images (three contracts in 1992-93) costing ECU 101,910;
- a study on use of radar images in replacement of optical images (one contract in 1993) costing ECU 26,230;
- development (following an open call for tenders) of software for the use of remote sensing for control purposes and testing of this by three experienced contractors (ECU 82,800 in 1993, ECU 372,729 in 1994 and ECU 223,506 in 1995). The software (CACHOO) is now being used in Denmark, Finland and Portugal, and by the JRC for quality testing.

**Table 7. EAGGF expenditure on remote sensing (ECU)**

Year	Images (100%)	Application checks	Other contracts	Total
1990 (100%)	138,718	584,500	0	723,218
1991 (100%)	73,286	713,931	0	787,217
1992 (100%)	437,022	4,142,227	31,560	4,610,809
1993 (100%)	1,059,482	7,577,104	210,940	8,847,526
1994 (100%)	1,184,134	8,314,638	372,729	9,871,501
1995 (50%)	1,367,966	7,000,000	223,506	8,591,472
1996 (50%, provisional)	1,408,662	9,653,150	0	11,061,812
Total 1990-96	5,669,270	37,985,549	838,735	44,493,554

When Regulation 165/94 was adopted the financial statement indicated expenditure of ECU 20 million per year up to 1998 (raised to ECU 21.5 million by the 1994 Act of Accession). This amount was arrived at from current data: 6 million applications, 5% of which to be checked, estimated unit cost ECU 200, remote sensing used for 2/3. On present figures this estimate can be revised downwards. With extended use of remote sensing but lower unit costs an annual amount of ECU 15 million (including images) now appears reasonable.

### 5.3 Distribution key

The co-financing rules provided for the available funds to be shared between Member States by a distribution key annexed to Regulations 3887/92 and 165/94. The key has only had to be used in 1993 since in other years appropriations exceeded Member States' eligible requests. In 1993 Greece did not confirm its co-financing request. In 1995 Italy's application could be granted at only 48% instead of 50%. The reason was that an additional control programme had been organised by Italy with the Commission's agreement but the information needed by the Commission to allow it to commit the extra funds was not provided in due time.

## 6. Cost efficiency

### 6.1 Commission study

In 1996 the EAGGF undertook with JRC support a cost effectiveness study analysing three data sources: contractors' reports on remote sensing (1993 to 1995), the Member States' annual reports on implementation of IACS (1993 to 1995) and a questionnaire to Member States for 1995 covering supplementary checks to remote sensing and traditional checks. Seven Member States and four German Länder agreed to reply. The Commission already had some information on costs for two other Member States. The volume of data available is considerable but is sometimes difficult to interpret or compare.

The first results show for the criteria used widely varying situations from one Member State to another and difficulty by some national administrations in calculating the cost of traditional checks and assessing their consistency. The Commission does not wish to risk wrongly interpreting some of the answers to the questionnaires. Moreover as the situation develops - and in general improves - rapidly as IACS becomes firmly implemented, it is often difficult to compare the reports for different years. The Commission accordingly proposes to supplement its analysis with the 1996 results and validate and discuss it in the next few months with the Member States before drawing final conclusions.

This additional work should aid the Member States in their choices after 1998 (if co-financing is discontinued) and also help the Commission in defining its position as that date approaches.

### 6.2 Viability

In terms of numbers of applications checked (leaving aside questions of relative efficiency) calculation from the gross figures supplied by the Member States shows remote sensing checks (all related costs and VAT included) to be cheaper than traditional checks in Denmark, Italy, the Netherlands, one German Land (Saxony), Sweden (1996 only) and Portugal (overall national estimate). Spain and Greece were close to equality between the two methods in 1995 and reached it in 1996. Remote sensing is dearer in France, the United Kingdom and several German Länder. No information on traditional checks is available for the other Member States.

The use of remote sensing has been preferentially targeted on applications covering a large area (generally 1.5 to 6 times bigger than the IACS average). A calculation in terms of area covered, if possible, would give the advantage to remote sensing in most cases but in the absence of data on areas checked by traditional methods the weighting would be open to question.

To the costs shown in Tables 5 and 6 the national administration must add the cost of processing applications before and after their handling by the contractor, any purchase of additional information (e.g. cadastral maps supplied to contractors) and on-the-spot checking of rejected applications. Lastly, VAT on contract prices is generally met by the national administration. This is not a factor for traditional checks.

The comparative cost (weighted averages) of traditional checks and of checks before and after remote sensing has been estimated in the aggregate for 1995 and 1996. Table 8 gives the figures.

**Table 8. Comparison of unit costs per application checked (ECU)**

	Remote sensing average 1995 (8 MS)	Remote sensing average 1996 (8 MS)	Traditional check average 1995 (9 MS)
Administrative preparation of the dossiers	24	24	31
Remote sensing contract excl. VAT	173	164	0
Images supplied by Commission	24	21	0
Check on-the-spot	34	34	198
VAT on remote sensing contract	29	28	0
<b>Total cost per application</b>	<b>284</b>	<b>271</b>	<b>229</b>
Average EAGGF contribution	86	82	0

For those Member States for which 1995 figures are available Table 8 shows that remote sensing checks were on average more expensive, VAT included, but that co-financing offset this. Comparison for the same Member States of the 1996 remote sensing and 1995 on-the-spot figures confirms this. These averages however conceal widely differing situations from one Member State to another. In 1995 costs for remote sensing ranged from ECU 160 to 714 per application and for traditional checks from ECU 132 to 933. The average area per application checked ranged from 4 to 201 ha by Member State.

### 6.3 Comparative efficiency

Only Member State statistics are available for any attempt to analyse comparative efficiency in terms of volume of penalties applied or of irregularities detected. Their figures cover checks following remote sensing and traditional checks and they are contained in the IACS reports.

Comparison of their figures without correction would appear to indicate that for three years (1993-95) remote sensing has almost always uncovered fewer problem applications than traditional checks (generally 2 to 4 times fewer depending on Member State). In fact when account is taken of the dossiers sent back to the national authorities before remote sensing (see § 4.3) the difference dwindles and the number of irregularities detected sometimes turns to the advantage of remote sensing. Moreover in terms of areas on which penalties are applied (and not of application numbers) the figures also become more favourable to remote sensing, which checks larger areas and verifies each application more fully. Remote sensing tends to leave more small irregularities undetected but this has a very small impact on the areas on which penalties are applied.

It is nonetheless true that risk analysis is less flexible for remote sensing (checks grouped zonally, whereas traditional checks can be targeted on isolated applications) and that the two types of check differ somewhat in nature: an inspector on the spot can cover points of detail, check elements beyond the scope of satellite images (e.g. durum wheat and rape varieties, maintenance of fallow etc.), make corrections in the light of information from the farmer and count animals.

### 6.4 Traditional checks on the spot

Analysis of cost-effectiveness will necessarily involve comparison with traditional checks. In the IACS reports the Commission receives statistics on the checks made and their results but has little information on their actual content and the measuring methods used and tolerances applied. Traditional checks in fact vary widely in character from one country to another and also from one application to another within Member States.

In practice traditional checks are restricted by logistical constraints (travelling time, productivity expected of inspectors) and by the reasonably acceptable duration to a farmer of a routine visit. The average inspection visit duration notified by Member States is about one day. This means that except on small farms it is impossible for the inspector to visit all parcels and at least walk round them on foot to make a rough check of their area.

Given the time necessarily absorbed by preliminary contacts, document checks and map consultation at the farmhouse, in most Member States, as might realistically be expected, only between 15 and 40% of the parcels are actually visited on the occasion of a traditional check.

In practice unless something arises indicating the need for a thoroughgoing check the inspector making a routine visit selects a sample of parcels to be visited. A selection may of course be very well judged, on the basis of anomalies discerned or intuition, but is none the less influenceable by the farmer or physical constraints (access, distance, etc.).

Traditional checks are in some way or another often restricted by the allocation of resources, whereas remote sensing, for which a complete working specification can be given, is as a control both uniform and more objective, even if in certain respects less precise.

Clearly if uniformity and objectivity are considered the prime criteria in efficiency in checking remote sensing will be advantageous in most Member States.

## **7. Summary**

Remote sensing is now becoming a mature technique. Its feasibility and the grounds for its use are no longer questioned. The volume of applications treated by it exceeds that for the corresponding traditional checks. Thirteen national administrations have been able to employ a large number of contractors on it without major difficulty.

Remote sensing has been given special emphasis and co-financed by the Commission, which sees a number of substantial advantages: its dissuasive effect, essential during the critical setting-up phase of IACS, the availability of full documentation for each application checked and the possibility of consulting this in case of subsequent dispute, its function as a focal point for reflection on control techniques and finally its more and more evident synergy with the most advanced aspects of IACS.

Member States have also had to put up with certain drawbacks. Its technical limitations for recognition of certain crops, minimum parcel size and cloud cover are well known but there are alternatives: aerial photos and radar images. The need to use contractors and group applications by zone makes management more complex and results in regionally imbalanced on-the-spot checking. Lastly, the timetable for checking procedures is tight and delays fairly frequent. Some contractors manage however to complete the bulk of their work in three or even two months.

This encouragement from the Commission to the Member States has given rise to some transfer of their responsibilities to the Commission. The situation is now moving towards a return of these to the Member States, which have suggested many improvements: use of aerial photographs, two-stage checking, application of parcel tolerances, remote sensing training courses, etc.

On the other side of the coin, this support is a valuable source of documentation and a means of monitoring the difficulties encountered and assessing the quality of declarations and national IACS implementation. Co-financing has enabled the Commission to introduce a certain transparency with the Member States on checking by remote sensing. A means is available of securing quality, rigour and equality of treatment in physical checking.

This rigour ought also to be imposed on traditional on-the-spot checks, which are carried out in much more variable fashion. It would however increase the cost of these and thus tilt the cost-effectiveness balance with remote sensing.

## **8. Conclusions**

The following are the Commission's provisional conclusions that it proposes to refine in the light of data that will shortly be available: final report on the cost-effectiveness study, analysis of the full results of the 1996 checks and possibly 1997 and conclusions and recommendations from the JRC following its quality control.

1. The Commission proposes to apply Regulation N° 165/94 fully until it expires. It will therefore be asking the budget authority for the appropriations needed for co-financing for 1998.
2. Beyond 1998, if the principle of full Member State responsibility is the only consideration, it is desirable that the Commission ceases all co-financing of remote sensing and the Member States, on the basis of their own cost-effectiveness analyses, decide what techniques to use.

3. For the moment it appears essential that the Commission continue after 1998 to be responsible for provision of satellite images. This will guarantee the present security of supply, maintain the present price advantage and avoid disorderly competition between neighbouring control zones. Image supply, which accounts for less than 10% of the full cost of checking by remote sensing, and the corresponding support could be a direct responsibility of DG VI or the JRC or contracted out to one of the image distributors.
4. Even without co-financing the Commission could continue its support for Member States wishing to avail themselves of it, either as purely technical assistance given by the JRC or as technico-administrative assistance given jointly by DG VI and the JRC. Support could also involve continuing external independent quality control after 1998, under procedures to be decided with participating Member States, if demand is sufficient.
5. It would appear advantageous to pursue certain types of co-financing at 50% for Member States which, after launching IACS on the basis of an existing land register, wish to improve their IACS arrangements by creating a better or more updated one or by linking up with other declaratory or control arrangements (e.g. vineyard or olive trees registers). Such action is warranted by both the importance of high quality declaratory and parcel identification arrangements for the purposes of administrative checks (which have to cover 100% of data) and the multiannual (at least five years) nature of such an investment.



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