Output and Public Expenditure Implications of the Development of Organic Farming in Europe

Organic Farming in Europe:
Economics and Policy
Volume 4

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Die Deutsche Bibliothek – CIP-Einheitsaufnahme

Output and Public Expenditure Implications of the Development of Organic Farming in Europe / Raffaele Zanoli and Danilo Gambelli.-
Stuttgart-Hohenheim: 1999
(Organic Farming in Europe: Economics and Policy; 4)
ISBN 3-933403-03-0
ISSN 1437-6512

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Published by: Universität Hohenheim
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Cover design and layout by walter + von schickh, Ettlingen, Germany
Printed and bound in Germany by Hago Druck & Medien, Karlsbad-Ittersbach

The authors gratefully acknowledge financial support from the Commission of the European Communities, Agriculture and Fisheries (FAIR) specific RTD programme, FAIR3-CT96-1794, “Effects of the CAP-reform and possible further developments on organic farming in the EU”.

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Executive summary

This report is part of the EU-project "Effects of the CAP-reform and possible further development on organic farming in the EU"; its specific aim is to assess the impact of organic farming on the agricultural output and the level of EU public expenditure for agriculture. With regards to output variation, it focuses on the physical output of the main commodities for the EU countries, and three non-EU countries, namely CH, CZ and NO. In the public expenditure variation chapter, the report specifically considers the EAGGF Guarantee budget, while a more general discussion of public expenditure linked to organic farming can be found in Lampkin et al. (1999).

The data used for the analysis are derived from that presented in Foster and Lampkin (1999), Lampkin et al. (1999), Offermann and Nieberg (1999); it has been integrated with official Eurostat figures, EU documents and other published papers.

Given the severe problems of data availability, the analysis cannot refer to all the analysed countries with the same level of detail; nevertheless, it is a first attempt to present results concerning the impact of organic farming on output and the EAGGF Guarantee budget.

Aspects of organic farming adoption modelling

The main factors explaining output variations due to the adoption of organic farming are basically organic land area and organic land-use patterns and yields. The EU expenditure variation due to organic farming depends directly on organic output variation and its composition, which not only modifies the direct payment amounts, but also the storage and export refund costs.

Probably the most critical factor in the analysis is represented by yields, given that the debate about the exact (and eventual) loss in yields for organic farming is far away from a univocal solution. Any comparison between organic and conventional yields depends on a certain number of variables, like environmental conditions, farmers' skills, the period of conversion, the country considered, farm location and structure, and so on.

Another controversial issue is the difference between organic and conventional land-use patterns; both influence the quantity and composition of agricultural output due to the conversion to organic schemes. Again, a wide range of factors that can directly or indirectly affect land-use pattern changes should be taken into account. These are in some cases difficult to account for and often depend on country-specific characteristics. In particular, attention should be paid to specific rotation schemes adopted by organic farming, which cause material differences in areas harvested under different crops. Furthermore, organic farming manuring is often heavily based on livestock production, therefore causing a tendency to reallocate farm activity in order to balance livestock and crop production according to the proper organic management of the farm.

The basic variables influencing output variation also have a direct influence on the EAGGF Guarantee expenditure. Different land-use patterns modify direct payment expenditure through a reallocation of subsidies, which varies depending on the crops farmed, while storage costs and export refunds are directly linked to a possible reduction in commodity surplus due to the lower level of organic farming yields.

Organic conversion might also cause several spill-over effects on public expenditure that do not only affect EAGGF, but also organic farming supporting schemes in general. Health care costs may also be reduced, through an increase in food quality - from the consumers' side - and a reduction in professional diseases – from the farmers' side. Furthermore, a general reduction in environmental costs might be expected from a widespread adoption of organic farming.

The measurement of output variation

Given the various issues connected with output variation measurement, it is not possible to indicate a single optimal approach to follow. However, the choice of the method should be consistent with the aim of assessing the overall impact that organic farming has produced on output and, from this, on public expenditure, given the present level of uptake. Hence, the approach we adopt is a “what-if” simulation, using an ex-post perspective; in other words, we have performed a perspective simulation of what *would* have happened if organic farming had *not* been adopted.

The ex-post perspective simulates a scenario where land presently farmed organically is farmed under conventional methods. Therefore, it requires fewer and “safer” assumptions than an ex-ante approach, since it uses the land-use patterns and yield data for conventional farming for the simulation, which are much more reliable than those for organic farming (since they refer to more than 98% of UAA in the EU).

Output variation can be considered both from a monetary point of view (Gross Output variation) and from a physical point of view. Here, the second approach is used, since it avoids the problems of the different prices for organic and conventional products, which make monetary aggregates non-comparable. When no detailed physical output breakdown for the various crop categories is available, a simple aggregation can still be performed in physical units within each general product category. For example, pulses production (in T) can be considered as a whole when no detailed information is available about the single pulse typologies, although this can cause some distortions if the organic and conventional aggregates are not homogenous.

For each of the countries involved in the analysis, yields for organic and conventional farming are computed, starting with the yield differences referred to by Offermann and Nieberg (1999). The different land-use structures of organic and conventional farms can be determined by calculating the relative share of each crop (e.g. % of wheat area) in the organic and conventional regimes over the total UAA, on the basis of the results reported in Foster and Lampkin (1999).

Public expenditure variation

After the 1992 reform, the CAP objective was to transfer support from consumers to taxpayers by substituting direct payment for market-price support, and the EAGGF Guarantee budget has increased at a slower rate than before. The main effect on expenditure growth is due to the crop sector, while the livestock and livestock product sectors remain approximately stable. The composition of the EAGGF Guarantee budget also changed after the reform (Matthews and O'Flaherty 1997), and the expenditure on direct aids replaced the more traditional instruments of export refunds and storage costs, while the arable sector has received increasingly higher shares of the total EAGGF budget.

The potential effects of organic farming adoption on public expenditure variation are mainly discussed with reference to their basic components, namely, direct payments, storage costs, export refunds and opportunity costs.

Results of the analysis

Results are obtained for both the specific crop output variation and the evaluation of expenditure variation.

The detail and comprehensiveness of the results are conditioned by data problems, which more or less severely affect all the countries examined in the analysis. A lack of detailed data, for both yield and UAA of all the organic crops and all the 18 countries of the analysis, has caused only partial coverage of the issue of output variation, and to some extent, also of the expenditure variation measurement.

In particular, not all the crops could be examined, and for no single crop could the output variation be computed for each country.

A by-product of the present report has been the assessment of what information is still missing, and for which countries. A detailed list of data problems per country and per commodity is therefore presented, with the aim of stimulating further efforts in data collection for the organic sector. The most serious problems are for BE, IE, PT and ES, which have all been eliminated from the analysis, given the almost total lack of data. FR and GR also have heavy data problems, and they present only very aggregated figures for a few crop typologies.

Data problems have limited the analysis of output variation from the crop side, too. Only total cereals, wheat, barley, oats, rye, potatoes and pulses have been considered, with the other crops being eliminated due to lack of data in area and/or yields.

Output variation results are presented both by country and by commodity, but due to the above-mentioned data problems, it has been impossible to consider the same crop range for each country.

The ex-post approach for output variation measurement consists of simulating what would have been the output situation in a hypothetical scenario with a total lack of organic production. The simulation output figure is then compared to the actual total production for each country and each crop, and the final output variation is computed.

When considering single countries, AT, DE, FI and CH show the highest impacts of organic farming on output, while for DK, FR, GB, GR, IT, NL, SE, NO and CZ, organic farming adoption seems to have produced lower impacts on output, though DK and IT show extremely high variations with regard to fodder crops and pulses, respectively.

Concerning milk and cattle, the approach has been similar, with the only difference being that the stocking rate (i.e. number of cattle units per hectare of grassland and fodder area) has been used to calculate the hypothetical situation where organic livestock were not present. The milk output variation computation is complicated by the milk quota constraining of conventional production. The impact of organic farming is nevertheless presented as an indication of the potential effects it could have on total milk production.

With regard to the EAGGF Guarantee expenditure implications of organic farming, only the direct payment variation can be estimated, given that not enough information was available to assess the impact on storage and export refund costs. The results show reductions of 53 MECU for crops and 42 MECU for livestock. Although in absolute terms such figures are not impressive, they indicate that nearly 46% of organic farming-oriented financial support can be covered by “savings” derived from the organic farming impact on agricultural output. These results are nevertheless partial, since they do not take into account the economic evaluation of the environmental benefits arising from the uptake of organic farming.

List of abbreviations

bio	Organic
CAP	Common Agricultural Policy
conv	Conventional
FAO	Food and Agriculture Organisation
MECU	Millions of ECU
T	Tons
tot	Organic + conventional
UAA	Utilisable Agricultural Area
nd	no data
na	not applicable
–	zero
ŏ	yes

Country abbreviations

AT	Austria
BE	Belgium
CH	Switzerland
CZ	Czech Republic
DE	Germany
DK	Denmark
ES	Spain
FI	Finland
FR	France
GB	Great Britain & Northern Ireland
GR	Greece
IE	Ireland
IT	Italy
LU	Luxembourg
NL	Netherlands
NO	Norway
PT	Portugal
SE	Sweden

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1 Introduction

This report is concerned with estimating, on a *ceteris-paribus* basis, the main impacts on output and public expenditure due to the current level of uptake of organic farming tech niques, both from a EU15 and a national perspective; three non-EU countries (CH, NO and CZ) are also considered in the analysis.

For the analysis of output variation, farm-level data – relative to organic crop areas, livestock units and yields in the different countries – have been raised, and combined to produce estimates of the changes in physical output of key commodities (cereals, sugar beet, oilseeds, wine, olives, milk, beef and sheep) resulting from the expansion of organic production. This data are compared with the official EUROSTAT statistics about conventional crop area, livestock units and production. Non-organic data for the three non-EU countries (CH, CZ and NO) come from the FAO databases.

Concerning the impact on public expenditure related to organic farming, a detailed analysis of all EU financial support for organic farming is available from Lampkin et al, 1999, whose results are here partly used, in conjunction with other sources. The aim of this report – with reference to public expenditure – is to consider how the structural differences in land use and yields for the organic and conventional cases might reflect in different EAGGF Guarantee fund allocations.

In this report we have assumed an ex-post perspective of analysis. This means that we have investigated what would have been the situation for the issues considered if organic farming *had not* been adopted.

As a general *caveat*, it is necessary to understand that all the information available refers to a short period of time (most of the available information about organic farms covers only one year), which has not allowed us to use a time-series analysis for future trends, or even robust mean values calculations. This means that all the results obtained should be considered as single “snapshots”, and as a very preliminary assessment of the impact on output and public expenditure of the policies supporting organic farming.

The analysis is carried out at two levels: first, a descriptive analysis of the main commodities is performed, in terms of UAA and livestock units, yields and production for the main commodities, combining the data collected for organic farming with those of the official Eurostat and FAO statistics. Total data for the various commodities are broken down to obtain organic and conventional figures. Then, a hypothetical scenario with no organic farming is calculated, in order to produce a retrospective view of the impact that organic farming has produced on agricultural output.

The results on different land structure and output variation due to organic farming are then used to estimate the implications on public expenditure, trying to highlight, at least from a theoretical point of view, the expenditure components more affected by output variations.

The structure of the report is as follows: first, a general discussion about the effects that organic farming can have on output and public expenditure is presented, together with a brief description of the different approaches that can be used to measure them. Secondly, the methodology we have used to assess output and public expenditure variation is presented and finally, the results of country-by-country and European calculations are illustrated, and some preliminary conclusions are drawn.

2 Modelling the impact of the widespread adoption of organic farming technologies: the state of the art

Among the wide range of consequences that a conversion to organic farming can produce, the impact on agricultural output is one of the most crucial. This is mainly due to two aspects, namely the consequences that output variation can have on farmers' income, and on public expenditure.

Direct effects of organic conversion on output and public expenditure variation are basically linked to land use and yields; these might also result in the potential reduction of storage and export subsidy costs due to output reduction.

Besides these direct effects of organic farming on output and public expenditure variation, some indirect effects can also be evaluated, although their quantification might be difficult to achieve.

When considering the direct effects that organic conversion might have on output, the attention is mainly focused on the assessment of yields reduction, as well as the different land-use patterns.

2.1 Crop yields

Regarding yields, there is generally no unanimous agreement on the exact loss in yield for the various crops or livestock products. Data differ quite a lot according to the specific environmental conditions, the farmers' skills, the period of conversion, the country, and so on. Furthermore, a significant lack of data are usually encountered in this field, and a quantitative indication of the yield differences between the organic and conventional cases is often missing for many crops in many countries (see chapter 5 for specific details), both due to the above-mentioned difficulties, and to the general lack of specific studies in this sector.

2.2 Land use

The other main factor to consider for output variation, i.e. land use, is also difficult to evaluate. A wide range of elements need to be taken into account that can directly or indirectly affect land-use pattern changes. The most important factor is probably the specific rotation schemes adopted by organic farming, which cause extensive differences in area harvested under different crops. Furthermore, in organic farming manuring is often heavily based on livestock production, hence also causing a te ndency to reallocate farm activities in order to balance livestock and crop production according to the proper organic management of the farm. This results in a different land use for the "average" organic farm, where fodder crops, legumes and pasture are more prevalent than in the conventional situation. On a *ceteris-paribus* basis, this leads to a reduction in the area harvested for crops like wheat, maize, and root crops in general. Concerning cereals, generalisations are difficult, as some specific cereals, like oats, which can be inserted into the organic farming rotation schemes, might be cropped more widely, hence compensating for the reduction of cereal areas due to wheat and maize. Furthermore, specific products, like emmer for example, sometimes experience a renewed importance, not only with regard to rotation requirements, but also because they help to differentiate the production, and hence to exploit the potentials of the market niches (Santucci, 1997).

Actually, market driven forces might have some indirect effect on land use for organic farming, not only through the demand for specific products, but also via different price patterns for organic products, and modifications in consumer tastes (Midmore and Lampkin, 1994).

In fact, organic price premiums are not evenly distributed over all products, and, of course, this can stimulate the production (i.e. land use) of those products for which premiums are higher. Again, it is very difficult to assess to what extent and for which product in particular this factor can interact with organic land use, because this would require in-depth studies on price elasticities for the various crops, which is evidently a hard task by itself, and becomes nearly impossible given the general lack of data about organic product prices.

Also, the preferences of organic product consumers might influence organic land use, for example, through a decrease in meat consumption and an increase in vegetables consumption.

Of course, structural changes in output due to organic farming adoption have effects on a wide range of factors; here we focus our attention on the consequences that output changes might have on public expenditure.

Again, we can identify some direct and indirect effects of output variation on expenditure, where the former affect the changes in aid payments, and the latter are related mainly to social and environmental aspects.

The different land use patterns under organic farming are likely to be one of the main factors influencing EAGGF Guarantee expenditure variation. Total subsidies are paid on a per hectare basis, and subsidy structures will of course have a direct influence on the above-discussed structural changes in land use under organic farming; besides, a reduction in arable area payment can be expected, together with some increase in grassland and fodder area payments. The balancing of these two effects will, of course, determine the net variation in expenditure for area payments. Displacement effects might also occur between leguminous crops and oilseeds, in favour of the former, with positive effects on budget savings.

This higher diversification of organic farms, which can be explained both by technical and market factors (see above), can lead to an increase in non-subsidised productions, as well as an increase in set-aside areas, thus creating the basis for further reductions in EAGGF expenditure.

Changes in animal production due to organic farming systems may also have consequences on expenditure, especially thanks to the reduction in headage payments deriving from stocking reductions, and from dairy displacement effects. Also, a transfer of sheep quota to ewe lambs can be expected.

Land area variation is only one of the factors leading to output variation, which influences EAGGF Guarantee Fund expenditure via storage and intervention costs, and export refunds. Although these two cost chapters have been progressively reduced since the 1992 reform (see chapter 4), it is nevertheless reasonable to expect some further savings due to the general output reduction deriving from the adoption of organic schemes by an increasing number of farms. Further comments on this issue are reported on in chapter 4.

Besides the direct effects on the EAGGF Guarantee Fund via output variation, organic conversion might cause several spill-over effects on public expenditure in general.

The environmental benefits deriving from organic farming might also result in a general reduction in environmental costs. In particular, specific cost reductions may be derived from lower water treatment and pesticides monitoring costs.

Health care costs may also be reduced due to the diffusion of organic farming: on the one hand, some studies indicate decreases in diseases related to certain professions among organic farmers, while on the other hand, organic products may have a positive long-term impact on consumers' health.

In this context, we are not going to consider explicitly the economic assessment of the overall environmental benefits generated by organic farming, which should be performed through a detailed cost-benefit analysis; it is nevertheless necessary to point out that the quantification of environmental cost reduction of conventional farming can be considered by itself high enough to compensate largely for the cost of supporting organic farming (see, for instance, Berenschot, 1989).

Another general issue that should be taken into account relates to the positive effects that organic farming systems have on marginal and rural areas. Some studies (see for example Zanoli et al., 1997) show that organic farming is more labour intensive than conventional farming, therefore becoming a strategic tool for rural development, especially if combined with typical food products, agro-tourism, and so on. This means that organic farming could operate as a sort of "fly-wheel" for reducing depopulation in rural areas and, at the same time, for generating new stimuli for local economic growth. On a medium term perspective, this could lead to a reduction in the need for specific financial support for some of the rural and less-favoured areas.

The issue of implications in output and public expenditure due to different agricultural policies has been considered in a wide number of papers and reports, but very little work has been done within the specific theme of the consequences of a widespread adoption of organic farming techniques. This is mainly due to the general problem of the lack of basic information about the organic farming sector, which constitutes the ultimate obstacle for any empirical research in this field. Among the most relevant studies published so far, we can mention: Midmore and Lampkin (1988); Zerger and Bossel (1994); Braun (1994); Lampkin (1994); Midmore (1994); Eder (1995); Bechmann and Meier-Schaidnagel (1996).

We have tried to point out that the issue of output and expenditure variation is a complex one, and that of course it is hard to approach it from a univocal point of view. Depending on the context to be analysed, the general goal of the analysis, and the data availability, different methodological approaches can be adopted, using different time frames: linear programming, input-output analysis, “what-if” simulations, etc. All of these approaches can also be referred to at a micro or macro level.

A thorough perspective of the complexity of the consequences deriving from organic conversion is given in the study of Midmore (1994), that uses an input-output approach to investigate the relationships between organic farming and social-environmental aspects. The methodology adopted allows the detailed analysis of the links between organic farming and some “non-conventional” outputs, showing how multiplicative effects can be created within the general system of the organic sector. When different “conventional” outputs are considered, then quantitative approaches like linear programming and “what-if” simulations can be used (see, for example, Midmore and Lampkin, 1988; Braun, 1994; Eder, 1995).

Linear programming can be used to obtain the organic crop areas, reflecting the constraints and technology assumed. Comparisons between the organic and conventional cases can be effected, modifying the matrix of technical coefficients according to the conventional requirements. It is hence possible to highlight the different land structure and physical output which would take place under the organic and conventional “optimal solutions” of the model, and to produce information about crop output, land use, livestock numbers, and farm incomes. Linear programming-based models can of course be personalised using specific assumptions about prices of output, the role played by subsidies, the rate of converted land, and so on, in order to obtain different scenarios according to different initial hypotheses.

Analogous considerations may also be taken for the “what-if” models, which actually share the same comparative static approach with linear programming models, though they generally are not used with an optimisation perspective. Starting from initial conditions about yields and land-use requirements for organic farming, it is possible to obtain simulations showing what would be the output variation according to a range of hypotheses, that can consider organic land share, prices, and so on.

As already mentioned, all the models of this kind have so far used an ex-ante perspective, hence focusing on what would be the output variation according to a certain level of organic adoption. This raises the issue of the uncertainties concerning the basic parameters of the models, which are generally derived from information about organic farming as it is at present. In other words, these models require the generalisation of data on yields, land-use patterns, etc., based on a narrow reality, to a wider situation. For this reason, it is often argued that such simulations should refer to a specific context, or that they should adopt a regional approach, hence taking into account more properly the unavoidable differences in organic farming in different regions. If this issue is difficult to criticise, it must nevertheless face the definite obstacle of the lack of data for organic farming production systems at a regional level, hence suffering from the well-known trade-off between detail of the analysis, and its comprehensiveness. A pragmatic way to manage these problems could be that of supplementing a general comparative static analysis on output with some more in-depth case studies referring to specific regions for which the required level of detailed data are available.

The other basic aspect to consider when handling simulations is the time frame. From this point of view, it is hard to identify the proper time-length to use, since it again depends on the level of generality of the study and on the purpose of the research. Of course, the higher the detail of the analysis, like in the case of linear programming of micro-models, the higher is the risk of adopting very long time frames which would probably be of little use anyway, given the typical purposes of these kinds of studies. On the other hand, when considering general scenarios at a lower detail level, longer time frames are usually adopted, since macro-analysis becomes more interesting when covering longer periods.

Summarising, it is not possible to indicate a single optimal approach to output measurement, but it is necessary to personalise the methodology to the context of the research. Here we need to get some information about what has been the overall impact of organic farming on output and, from this, on public expenditure. The approach we adopt is a "what-if" simulation, using an ex-post perspective, hence performing a simulation of what *would* have happened *if* organic farming was not adopted, and all the presently organically farmed area was farmed conventionally. This allows us to hinge upon fewer and "safer" assumptions, since the "what-if" simulation depicts a scenario where land presently farmed organically is farmed under conventional methods. Given that land-use patterns and yields data for conventional farming are much more reliable than those for organic farming (since they refer to more than 98% of UAA in the EU), while the data on organic farming are not used here for projections, this approach should compensate for the lower "appeal" of the ex-post approach with the higher reliability of the results.

 Output variation

3 The measurement of output variation

Output variation can mainly be considered under two perspectives: total – or aggregated – output variation, and crop-specific output variation.

In the first case, the most sensible aggregation rule is to convert the physical output of each crop into monetary units, in order to obtain comparable variables. Of course, in this case a bias factor is introduced in the analysis, i.e. prices; for each crop, prices can differ among countries, making comparisons and aggregation not completely reliable. More importantly, we should expect price bias to be an even more crucial problem when comparing organic and conventional products.

When single crops are considered, then the price-bias problem is virtually avoided. Aggregation can be performed anyway in physical units within each general product category, to overcome the lack of detailed information. For example, pulses production (in T) can be considered as a whole when no detailed information is available about the single pulse typologies.

3.1 Output variation for specific crops

As a basic approach, single crop output is measured multiplying the respective areas and yields. As the main objective here is to assess what would have been the overall variation in output if the conversion to organic farming had *not* taken place, two main sources of output variation must be considered: the difference in yields and the different land-use allocation among crops for organic and conventional farming.

The first factor should (theoretically) be quite easy to determine, by measuring the yield differences between the organic and conventional cases for each crop. Of course, heavy simplifications must be used, as a single-value yield for each crop-country is required here, hence excluding consideration of yield variations among different regions or different organic farms (including those just converted). Furthermore, the general caveat expressed in the introduction must be considered: a time-series-yield average would of course be recommended, in order to “clean” the data of statistical noise (due, for example, to weather variations), but this information is often not available. However, yield data based on expert assessments should, to some extent, undertake a sort of “automatic” averaging.

The second factor of the analysis, i.e. the different land-use structure of organic and conventional farms, can be determined by calculating the relative share (for example, % of wheat area) of each crop in the organic and conventional regimes over the total UAA.

Once data on land and yields are available for the organic and total (i.e. conventional + organic) cases, output variations can be computed both by crop and by country.

Output variation

Given the ex-post perspective adopted, the estimated output variation indicates what would be the total production for each country of each crop if the organic land area was farmed under conventional techniques (i.e. with the conventional land distribution and crop yields).

Some problems arise within this general approach, mainly for the country-level analyses. The first one is which crops should be considered, or, in other words, which level of crop aggregation should we work with. For example, should cereals be considered as a whole, or should they be split into soft and durum wheat, oats, barley, rye, etc.? Of course, much of the answer depends upon how much detailed information we can obtain.

The second problem is that organic farming involves different crop rotation schemes, which can by themselves produce substantial differences in crop outputs. Due to differences in farming systems, it is quite difficult to assume a general scheme of crop rotation applicable to organic agriculture in all of the countries considered, and upon which to calculate the effects these can have on output. A simple solution (if no other information is available) is just to consider that the observed differences in crop areas shared between organic and conventional farming also reflect the different rotation schemes adopted.

A third problem that also affects the analysis at the commodity level is that organic farms are more likely to be located in marginal areas, hence causing problems for generalising both yields and area computations. For this reason, in order to be comparable with the conventional yields, the observed organic yields should be increased by a percentage that reflects the influence deriving from an unfavourable location. At the same time, an assessment of whether the (organic) marginal land would have been continued to be farmed by conventional practices is also necessary. In other words, the problem is to assess whether organic farming could have significant effects on total EU UAA, by counteracting land abandonment. These aspects have – from the theoretical point of view – a partly counteracting impact on output variation; therefore, given that we had no data to assess any influence, and considering that any such influence would probably be very small, we have decided to ignore this problem in the analysis.

In what follows, output variations by country are computed. Then the results are combined by commodity, for which the total output variation is computed.

The basic rule is to calculate the hypothetical total output for the scenario where no organic farming is present, and then derive the output variation with respect to the actual situation. For each country, the hypothetical "No bio" output for the i-th crop is computed as follows:

$UAA \times share_i \times YC_i$

where: UAA = total UAA (ha);

share = conventional area share (%) of the i-th crop;

YC_i = conventional yield of the i-th crop.

The final output variation is computed with reference to the actual total production for the i-th crop.

3.2 Aggregated output variation

When considering the evaluation of the overall output variation due to a general switch to organic farming, it is necessary to introduce a monetary measurement unit, i.e. prices.

A basic approach to aggregated output variation can be described as follows:

Approach I:

$\Delta out_i/ha = \Delta Y_i \times YC_i \times [WB_i - WC_i]$

where: Δout_i = output variation for the i-th crop

YC_i = yield of conventional i-th crop (quantity/ha);

ΔY_i = variation of organic vs conventional yield for i-th crop (%);

WB_i, WC_i = organic and conventional prices for i-th crop.

This scheme allows the accounting for both quantity (physical production) and value (price) influences in output. Of course, an additional problem with respect to those previously discussed in chapter 3.1 is the information about prices. These can differ widely, even within a single country for the same crop – particularly due to seasonal and regional differences - and can cause the results of the output variation to not be very reliable. Besides, not all organic production is sold at premium prices, and a varying percentage is sold on the conventional market; furthermore, a varying percentage is sold on the organic market in different market channels, which consequently leads to different price-premiums.

The total output variation will be determined by

$\sum_{i=1}^{k} \Delta out_i / UAA \times UAA_i$, where UAA_i is the i-th crop total area (ha) which is supposed to convert to organic farming.

A second, very simplified approach can also be considered, which simply hinges upon information about the gross outputs of organic farms, without producing detailed information about the basic factors determining output variation. This can be described as follows:

Approach II:

$$\Delta out/ha = GOC/ha - GOB/ha$$

where GOC/ha and GOB/ha are, respectively, the average Gross Output per hectare for conventional and organic farms, which can be derived by samplings of representative farms for each of the categories.

The total output variation will be determined by:

$$\Delta outTot = \Delta out/ha \times N° \text{ of ha converted.}$$

Given that detailed information about prices is not available, and that the II° approach would give only an aggregate result about output, the present report will focus only on physical output variations, following the scheme proposed in the previous chapter.

4 Expenditure variation

Russel and Power (1989) proposed a comprehensive approach to expenditure variation measurements derived from the implementation of different agricultural policies. It could be a little ambitious for our purposes, given the general difficulties in data availability for organic farming, but it is nevertheless worthy of consideration as a helpful theoretical guide. The methodology is thereafter illustrated below:

The total (CAP) expenditure for each product is mainly given by the following factors:

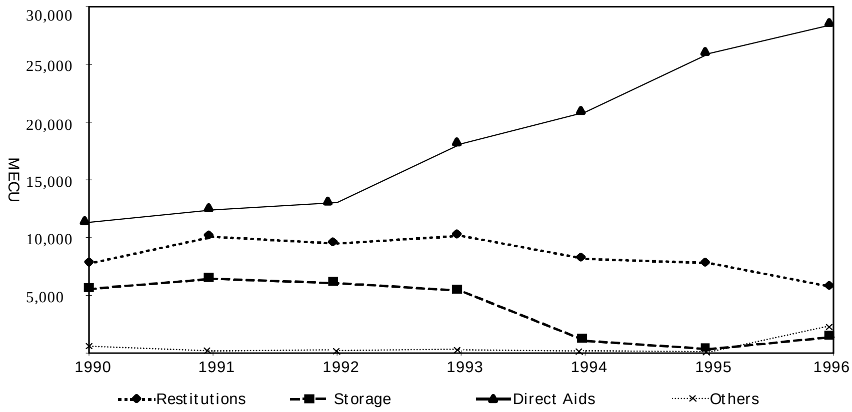
1. **Premiums** (Variables involved: premiums and ha for each crop. The different production structures of conventional and organic farms need to be taken into account)
2. **Storage costs** (Variables involved: % of total output (T) stored, yield, ha, storage subsidy cost per T)
3. **Exports subsidies** (Variables involved: % of total output exported (T), yield, ha, export subsidy cost per T)
4. **Opportunity costs** (Variables involved: expenditure, interest rates, time)

An analogous scheme was proposed as a breakdown of EAGGF Guarantee budget expenditure in a recent study by Matthews and O'Flaherty (1997). In this case, the total budget is divided into four main parts:

1. **Direct payments**: refer mainly to compensatory payments.
2. **Refunds**: concern payment for export refunds.
3. **Intervention expenditure**: concerns costs for public and private storage, and market withdrawals.
4. **Other payments**: concerns expenditure on research, advisory and training services, market information, taxation concessions, etc..

Following Matthews and O'Flaherty (1997), it is interesting to note that, in the last few years, the importance of direct payments has increased with respect to the other categories (see Figure 4-1).

Figure 4-1: Composition EAGGF Guarantee budget by cost category



Source: Matthews and O'Flaherthy (1997)

It is also worth pointing out that:

" ...CAP reform does not show up an accelerated growth in budgetary expenditure after 1993, given the objective to transfer support from consumers to taxpayers by substituting direct payments for market price support. In fact, expenditure actually fell in 1994, and over the period 1993-1996 grew by only 13% compared to 38% in the similar four-year period 1990-93 (Figure 4-1). The disparity is even more pronounced when account is taken of the fact that, after 1993, the Guarantee budget was extended to include expenditure under the market organisation for fisheries, set-aside, income aids and accompanying measures." (Matthews and O'Flaherty 1997, p. 8).

Another point of interest arising from the cited study is that the main cause of expenditure growth is due to the crop sector, while the livestock and livestock product sectors remain approximately stable (see Table 4-1).

Table 4-1: EAGGF Guarantee expenditure by type of expenditure (MECU)

EU 15	1990	1991	1992	1993	1994	1995	1996
Arable crops	7 834.5	9 259.0	10 218.3	10 610.7	12 652.3	15 018.3	16 372.3
Total crops	**14 612.8**	**17 503.2**	**19 033.6**	**21 257.9**	**21 852.8**	**22 959.4**	**24 980.1**
Milk and milk products	4 955.9	5 636.5	4 006.8	5 211.2	4 248.8	4 028.7	3 582.0
Bovine meat	2 833.2	4 295.0	4 413.8	3 986.3	3 466.6	4 021.1	6 687.0
Total Livestock	**9 643.6**	**12 117.2**	**10 478.6**	**11 624.5**	**9 768.0**	**10289.1**	**11 969.3**
Other	**733.2**	**1 280.3**	**1 572.8**	**1 675.3**	**1 312.8**	**1 214.8**	**2 124.3**
Total EAGGF Guarantee	**25 013.2**	**30926.9**	**31117.0**	**34 590.1**	**32 969.5**	**34 502.7**	**39 107.8**

Source: Matthews and O'Flaherty (1997)

Within the two main categories of crop and livestock commodities, a point of interest is the opposite dynamics of arable crops and milk expenditure; the former showing a constant increase, especially from the year of the Mc-Sharry reform, and the latter being characterised by a substantial drop starting from 1994.

A deeper analysis of the EAGGF expenditure evolution for the specific commodities, and of the related consequences for the agricultural sector, is not the purpose of this report; for further details on these issues, see Matthews and O'Flaherty (1997) and Commission Européenne (1998).

Here it is useful to highlight the two basic results of their analysis:

- expenditure on direct aids replaces the more traditional instruments of export refunds and storage costs;
- the arable sector has received increasingly high shares of the total EAGGF budget.

Some more comments may be useful with respect to the issues of export refunds and intervention storage, as substantial difficulties arise when distinguishing between the two cost types for each country. In fact, they strongly depend on the attitude of each country towards export and self-sufficiency.

With regard to export refunds, these rely strongly on the attitude of the country towards export. We can distinguish between two types of exports: extra- EU and intra-EU exports. In the first case, the country will in fact benefit more from the export refunds, while in the second case, it will benefit anyway from the high level of EU agricultural commodity prices. The basic difference is in the source of export financial support: tax payers in the first case, and consumers in the second case.

When intervention storage is considered, the issue of self-sufficiency of a country for each crop becomes important. In fact, if the production level for a commodity exceeds the self-sufficiency level of the country, then the over-production forces prices to drop to the intervention level, hence causing the country to draw funds for intervention storage.

Such a situation could of course be limited if the surplus commodity is exported, and in this case the country could receive funds for export refunds.

Given such basic mechanisms, it is easy to understand why the exact imputation of storage costs or export refunds for each country is not an easy task, and constitutes in fact the main source of problems for EAGGF budget forecast accuracy (Matthews and O'Flaherty, 1997).

The basic source of information for the analysis of EU expenditure for agriculture consists of the EAGGF guarantee budget. Table 4-2 shows the composition of EAGGF guarantee expenditure for the main commodities considered in the analysis for the year 1995, and integrates the information of Table 4-1.

Further comment is also useful: the amount of "other" export refunds mainly refers to sugar (1312.1 MECU), while the "other" price compensatory aids are mainly due to olive oil and tobacco as crops (862.7 and 825.7 MECU, respectively), and to ovine meat (1780 MECU).

Table 4-2: Main EAGGF Guarantee expenditure by sector and type, year 1995 (MECU)

	Total	Export refunds	Storage/ Intervention	Price compensatory aids	Other
Arable crops	15 018.3	1 092.7	62.7	13 862.9	0.0
Dried fodder and pulses	342.0	0.0	0.0	342.0	0.0
Horticultural crops	1 833.4	239.4	328.3	1 053.5	212.2
Milk and milk products	4 028.7	2 267.1	-40.1	1 468.4	333.3
Bovine meat	4 021.1	1 761.0	-215.4	2 472.0	3.5
Interest	69.9	0.0	0.0	0.0	69.9
Other	9 189.4	2 441.9	728.1	6 042.5	-23.1
Total	**34 502.8**	**7 802.1**	**863.6**	**25 241.3**	**595.8**

Source: European Commission, DG VI

Following the schemes proposed by Matthews and O'Flaherty (1997) and by Russel and Power (1989), and referring to the information available, we discuss briefly below how the implications of organic farming on EAGGF expenditure can be measured.

4.1 Premium variation

Since the 1992 reform, the main share of financial support has been coming from direct per hectare payments. In the case of organic farming, the variations in premiums has mainly been determined by two elements, namely the extra premium received by organic farms (according to EU Reg. 2078/92), and the redistribution of standard CAP premiums due to the different production structures of organic and conventional farms. An extensive treatment of the first element can be found in Lampkin et al. (1999), and therefore will not be discussed further here. In the context of the present study, primary importance is to be paid to the second element, which can be determined by drawing upon the results of the analyses of the impact of organic farming on the output of the main agricultural products.

In a slightly more formal way, the premium expenditure variation can be described as follows:

premium (per ha) = ABP – ACP

where: ABP = Average Organic Premium = $\sum_{i=1}^{k} CB_i\% \times (PB_i + PC_i)$

ACP = Average Conventional Premium = $\sum_{i=1}^{k} CC_i\% \times PC_i$

and

$CC_i\%$ = % of i-th crop area (conventional)

$CB_i\%$ = % of i-th crop area (organic)

PB_i = premium per ha of organic i-th crop (only includes extra premiums for organic farming)

PC_i = premium per ha of conventional i-th crop (does not contain extra payments for organic farming)

The information obtained for output variation can also be easily implemented in this second part of the analysis.

The main problem concerning the determination of the standard premium per ha is data availability. In fact, information on EAGGF expenditure is available only in a very aggregated form, both from a geographical point of view, and concerning the crops. Data are available, at the EU level, only for a very aggregated classification, i.e. arable crops, horticulture, dried fodder, and for very specific products, i.e., sugar, olive oil, wine, tobacco, and textile fibres. Also, storage cost data are available for milk and livestock products.

Hence, only general considerations can be made with respect to arable crops, unless, following Thomson (1988), one assumes each crop to contribute in the same proportion to the storage intervention costs.

4.2 Storage costs variation

One of the potential financial benefits of organic farming is supposed to be the reduction in the costs that the Community has to face in order to manage the amount of some agricultural product surpluses. From this point of view, it is interesting to perform an analysis of the impact that organic farming could have on storage cost reduction, at least for the main commodities.

The mechanism of surplus creation is quite cumbersome, but maybe for our purposes it can be simplified according to the following scheme, which uses the information available from the previous steps of the analysis, and from official EUROFARM figures.

$\Delta SC_i = SC_i \times [\Delta Yield_i \times \Delta UAA_i]$ if total output (i) > total demand (i)

$SC_i = -100\%$ if total output (i) < total demand (i)

where: SC_i = storage cost/Ton for i-th crop;

ΔUAA_i = total area variation (ha) for i-th crop due to organic conversion;

total output for the i-th crop (data available from previous results);

total demand (i) = total demand for i-th crop (data available from EUROFARM).

On the ground of the previous considerations about the determinants of storage costs (see above), from a practical point of view some problems arise.

The first problem concerns how one can find a consistent rule for linking commodity variation due to adoption of organic farming techniques, and storage-cost variations. The simple criteria that computes storage-cost reduction as a proportion of output reduction (as described above) could be misleading, given that storage intervention costs might refer only to some specific countries inside the EU, and an output reduction would be effective in storage-cost reductions only if it takes place in those countries. The lack of data at a national level does not allow for the correction for this potential bias, and would require the assumption that all countries contribute in the same proportion to commodity surpluses.

The second problem is data availability, while the considerations about data aggregation can also be extended to the issue of storage costs.

4.3 Export subsidy variation

The issues raised by the assessment of export subsidy cost variations are similar to those regarding surplus cost variations. Again, it seems reasonable to expect that the lower yield of organic farming could create, via output reduction, some benefits in terms of export refunds.

For the sake of simplicity, if we suppose that export takes place only if the EU production of the i-th product exceeds the internal demand, then a simple scheme of export cost reduction due to organic farming adoption is as follows.

$\Delta EC_i = EC_i \times [\Delta Yield_i \times \Delta UAA_i]$ if total output (i) > internal demand (i)

$\Delta EC_i = -100\%$ if total output (i) < internal demand (i)

where: EC_i = export cost/Ton for i-th crop;

UAA_i = total area variation (ha) for i-th crop due to an x% organic conversion rate;

internal demand (i) = internal demand for i-th crop (data available from Eurofarm). NB: total demand = internal demand + export;

In fact, it is also reasonable to extend the considerations discussed for storage costs to the export refund case, that is, probably not all the countries and crops contribute in the same way to the export refund costs, and an output decrease would not necessarily cause a cost reduction if it takes place in a non-extra-EU exporting country.

4.4 Opportunity costs and other costs

A very general figure referring to the cost for interest is available from DG VI, and refers to “figurative costs arising from the modification of the financial support schemes” (see note on Table 3.4.4 of the General Report of the European Commission, 1996). There is no clear way to link these data to the agricultural output level; considering also the low levels of this cost (see Table 4-2), this kind of expenditure will not be taken into account.

5 Results

In this chapter, the main results for specific crop output variations and an evaluation of expenditure variation will be presented in synthetic tables. Further details about the ex-post simulations are presented in Appendix I.

The lack of detailed data, for both yield and UAA, of all the organic crops and all the 18 countries of the analysis, has caused a partial coverage of the issue of output variation, and also, to some extent, of the expenditure variation measurement. Details about data problems are presented in detail in Appendix II. A specific note concerns SE: for this country, no yield data are available, with the exception of those for milk and grassland. Given that area data are quite complete, as opposed to those for yields, for this country, missing yield data have been replaced using an average of yields of the other Scandinavian countries. Such a crude solution can be justified because of the similarities between these countries, but cannot be extended to other countries with missing values.

Results refer in general to year 1995, as at the moment of the analysis no 1996 official Eurostat figures for total (i.e. conventional + organic) production are available; specific organic data are available for AT, IT, SE, CH, only for 1996, and in these cases 1995 total data are compared with 1996 organic data.

5.1 Output variation by country

Given the above-mentioned data problems, crop output variations have been computed only for cereals, wheat, barley, rye, oats, pulses, potatoes and milk. Even while reducing the number of crops analysed, it has been impossible to consider all of the 18 countries for the analysed crops, and the results must therefore refer only to the countries specifically considered.

The basic organic area and yield data come respectively from Foster and Lampkin (1999), and Offermann and Nieberg, (1999), while total (i.e. organic plus conventional) area and yield data come from Eurostat. Conventional area and yield data have been calculated as a difference.

The output variation is measured with an ex-post perspective, hence referring to the hypothesis that organic farming would not have been adopted at all. Output variation is the combination of two basic factors: yield variation and relative crop importance. In fact, relative crop importance is usually different for each country in the organic and conventional cases, which would cause a crop output variation also in the absence of significant yield differences. Hence, output variation is computed as the difference between the hypothetical conventional output that would have been produced under conventional farming, i.e. using, for each country, the respective conventional yields and the conventional land-use pattern, and the total (i.e. conventional plus organic) output. Therefore, a **positive** figure in the output variation column should be interpreted as a **decrease** in the output for that specific crop/country due to the current degree of uptake of organic farming techniques; vice versa, a **negative** figure in the output variation column should be interpreted as an **increase** in the output for that specific crop/country due to the uptake of organic farming techniques.

Table 5-1: Impact on output: AT

	Output (,000 T)		Output variation (,000 T)	(%)
	tot (1)	"No bio" (2)	(2)-(1)	
Cereals	4 282.0	4 606.4	324.4	7.6
Wheat	1 265.0	1 372.8	107.8	8.5
Oats	93.0	93.4	0.4	0.4
Barley	1 123.0	1 214.5	91.5	8.1
Rye	276.0	292.4	16.4	6.0
Pulses	82.0	81.4	-0.6	-0.7
Potatoes	724.0	774.9	50.9	7.0
Tot. grass/fodder	27 306.3	25 801.4	-1 504.9	-5.5

tot = actual output (organic + conventional)
"No bio" = output obtainable if organic farming was not adopted

Table 5-2: Impact on output: DE

	Output (,000 T)		Output variation (,000 T)	(%)
	tot (1)	"No bio"(2)	(2)-(1)	
Cereals	6 535.0	40 147.0	504.0	1.3
Wheat	2 580.0	18 086.4	307.4	1.7
Barley	2 116.0	12 158.1	233.1	2.0
Rye	866.0	4 554.2	21.2	0.5
Maize	324.0	2 170.9	37.9	1.8
Other cereals*	649.0	3 177.4	-95.6	-2.9
Oilseeds	1 059.0	3 051.3	58.3	1.9
Potatoes	315.0	10 024.7	126.7	1.3

tot = actual output (organic + conventional)
"No bio" = output obtainable if organic farming was not adopted
*estimate

Table 5-3: Impact on output: DK

	Output (,000 T)		Output variation (,000 T)	(%)
	tot (1)	"No bio" (2)	(2)-(1)	
Cereals*	9 150.0	9 157.7	7.7	0.1
Wheat	4 598.0	4 664.1	66.1	1.4
Barley	3 899.0	3 945.3	46.3	1.2
Other cereals*	653.0	548.3	-104.7	-16.0
Potatoes	1 441.0	1 452.4	11.4	0.8
Tot. grass/fodder	992.3	787.6	-204.6	-20.6

tot = actual output (organic + conventional)
"No bio" = output obtainable if organic farming was not adopted
*estimate

Table 5-4: Impact on output: FI

	Output (,000 T)		Output variation (,000 T)	(%)
	tot (1)	"No bio" (2)	(2)-(1)	
Cereals	3 298.0	3 390.1	92.1	2.8
Wheat	379.0	389.8	10.8	2.9
Oats	1 097.0	1 128.6	31.6	2.9
Barley	1 764.0	1 819.2	55.2	3.1
Rye	58.0	51.6	-6.4	-11.0
Potatoes	798.0	814.7	16.7	2.1

tot = actual output (organic + conventional)
"No bio" = output obtainable if organic farming was not adopted

Table 5-5: Impact on output: FR

	Output (,000 T)		Output variation (,000 T)	(%)
	tot (1)	"No bio" (2)	(2)-(1)	
Cereals*	52 957.0	53 147.7	190.7	0.4
Pulses	2 784.0	2 757.2	-26.8	-1.0

tot = actual output (organic + conventional)
"No bio" = output obtainable if organic farming was not adopted
*estimate

Table 5-6: Impact on output: GB

	Output (,000 T)		Output variation (,000 T)	(%)
	tot (1)	"No bio" (2)	(2)-(1)	
Cereals	21 973.0	22 024.1	51.1	0.2
Wheat	14 400.0	14 435.8	35.8	0.2
Oats	617.0	614.5	-2.5	-0.4
Barley	6 850.0	6 869.7	19.7	0.3
Other cereals	106.0	104.0	-2.0	-1.8
Pulses-total	592.0	593.3	1.3	0.2
Potatoes	6 297.0	6 310.2	13.2	0.2

tot = actual output (organic + conventional)
"No bio" = output obtainable if organic farming was not adopted
* estimate

Table 5-7: Impact on output: GR

	Output (,000 T)		Output variation (,000 T)	(%)
	tot (1)	"No bio" (2)	(2)-(1)	
Cereals	3 866.0	3 869.7	3.7	0.1
Pulses	6.0	6.0	0.0	-0.3
Vegetables	4 151.0*	4 154.5	3.5	0.1

tot = actual output (organic + conventional)
"No bio" = output obtainable if organic farming was not adopted
*1994 data

Table 5-8: Impact on output: IT

	Output (,000 T)		Output variation (,000 T)	(%)
	tot (1)	"No bio" (2)	(2)-(1)	
Cereals	18 724.8	18 930.7	205.9	1.1
Wheat	4 093.0	4 157.3	64.3	1.6
Durum wheat	4 137.0	4 180.3	43.3	1.0
Oats	534.0	526.1	-7.9	-1.5
Barley	1 450.0	1 460.1	10.1	0.7
Maize	8 274.0	8 422.0	148.0	1.8
Pulses	64.0	54.3	-9.7	-15.2
Sunflower	553.0	560.2	7.2	1.3
Potatoes	2 108.0	2 126.4	18.4	0.9
Apples/pears	3 203.0	3 252.4	49.4	1.5
Peaches/apricots	1 750.0	1 763.8	13.8	0.8

tot = actual output (organic + conventional)
"No bio" = output obtainable if organic farming was not adopted

Table 5-9: Impact on output: LU

	Output (,000 T)		Output variation (,000 T)	(%)
	tot (1)	"No bio" (2)	(2)-(1)	
Cereals	177.5	178.1	0.6	0.3
Wheat	50.9	50.9	0.1	0.2
Oats	18.6	18.7	0.1	0.4
Barley	66.1	66.4	0.3	0.4
Other cereals*	38.7	38.8	0.1	0.3
Potatoes	28.5	28.5	0.0	-0.1

tot = actual output (organic + conventional)
"No bio" = output obtainable if organic farming was not adopted
*estimate

Table 5-10: Impact on output: NL

	Output (,000 T)		Output variation (,000 T)	(%)
	tot (1)	"No bio" (2)	(2)-(1)	
Cereals	1 585.0	1 580.6	-4.4	-0.3
Wheat	1 167.0	1 160.8	-6.2	-0.5
Barley	252.0	252.4	0.4	0.2
Pulses	12.0	11.8	-0.2	-1.4
Potatoes	7 340.0	7 365.9	25.9	0.4
Carrots	430.0	421.3	-8.7	-2.0
Onions	453.0	451.2	-1.8	-0.4

tot = actual output (organic + conventional)
"No bio" = output obtainable if organic farming was not adopted

Table 5-11: Impact on output: SE

	Output (,000 T)		Output variation (,000 T)	(%)
	tot (1)	"No bio" (2)	(2)-(1)	
Cereals	4 967.0	5 013.0	46.0	0.9
Wheat	1 600.0	1 617.9	17.9	1.1
Oats	960.0	968.4	8.4	0.9
Barley	1 890.0	1 921.5	31.5	1.7
Rye	210.0	209.5	-0.5	-0.2
Other cereals*	307.0	295.7	-11.3	-3.7
Potatoes	1 074.0	1 066.7	-7.3	-0.7

tot = actual output (organic + conventional)
"No bio" = output obtainable if organic farming was not adopted
*estimate

Table 5-12: Impact on output: CH

	Output (,000 T)		Output variation (,000 T)	(%)
	tot (1)	"No bio" (2)	(2)-(1)	
Cereals	1 283.8	1 321.0	37.2	2.9
Wheat	621.2	640.8	19.6	3.2
Oats	47.6	48.5	0.9	1.8
Barley	299.9	308.6	8.7	2.9
Rye	35.4	35.9	0.5	1.4
Maize	241.4	249.1	7.8	3.2
Other cereals*	38.3	38.1	-0.3	-0.7
Potatoes	672.1	689.3	17.2	2.6
Pulses	12.0	12.1	0.1	0.5

tot = actual output (organic + conventional)
"No bio" = output obtainable if organic farming was not adopted
*estimate

Table 5-13: Impact on output: CZ

	Output (,000 T)		Output variation (,000 T)	(%)
	tot (1)	"No bio" (2)	(2)-(1)	
Cereals	6 599.7	6 621.7	21.9	0.3
Wheat	3 732.2	3 745.4	13.2	0.4
Barley	2 142.2	2 150.1	8.0	0.4
Rye	260.8	260.3	-0.4	-0.2
Potatoes	1 332.3	1 336.1	3.8	0.3

tot = actual output (organic + conventional)
"No bio" = output obtainable if organic farming was not adopted

Table 5-14: Impact on output: NO

	Output		Output variation	
	(,000 T)		(,000 T)	(%)
	tot (1)	"No bio" (2)	(2)-(1)	
Cereals	1 438.2	1 448.4	10.2	0.7
Wheat	350.0	352.4	2.4	0.7
Oats	420.0	423.1	3.1	0.7
Barley	650.1	654.7	4.6	0.7
Other cereals*	18.1	18.2	0.1	0.5
Potatoes	484.1	485.4	1.2	0.3

tot = actual output (organic + conventional)
"No bio" = output obtainable if organic farming was not adopted
*estimate

5.2 Output variation by commodity

Data problems have limited the analysis of output variation by crop, too. Only total cereals, wheat, barley, oats, rye, potatoes and pulses have been considered, the other crops being eliminated due to lack of data in area and/or yields.

Data sources and the ex-post perspective have already been described in chapter 5.1. Output variation has been measured using the same approach, and referring to the country output-variation results obtained in the previous chapter. Hence, a hypothetical scenario with total lack of organic production is compared to the actual total production for each country and each crop.

With regards to milk and cattle, the approach has been similar, with the only difference being that the stocking rate (i.e. the number of cattle units per hectare of grassland and fodder area) has been used to calculate the hypothetical situation where organic livestock were not present. In other words, the basic idea is to consider the cattle stocking rate as the reference point to distinguish between organic and conventional cattle breeding. Again, a hypothetical “No bio” scenario, i.e. without organic production, has been computed as follows:

$$LU + UAAGF \times SR$$

where: LU = actual N° of conventional livestock units;

UAAGF = number of organic Ha of grassland and fodder;

SR = conventional data for stocking rate.

This broad output estimate is based on the assumption that the total grassland and fodder area would also have been the same in each country without organic farming. Actually, on the basis of the present level of adoption of organic farming, the grassland share in a hypothetical representative organic farm is likely to be higher than in the equivalent conventional farm. It is hard to argue if such a difference is due to the fact that organic farming is relatively more convenient for farms in marginal areas with extensive pasture, which at present represents the major proportion of organic farms, or if such a difference is a structural one.

Concerning milk, the computation of output variation is made difficult due to the milk quota regime, that influences both milk yields and the number of cattle units in the conventional case. It is therefore hard to assess if, and by how much, the observed data would be different without the quotas, and hence any yield comparison could be misleading. In general terms, it is likely that the lower stocking rates and yields for the organic case could help in an easier maintenance of the quota constraint, which would also be obtained at a lower stocking rate.

Table 5-15: Crop output variation: cereals

	Output (,000 T)		Output variation (,000 T)	(%)
	tot (1)	"No bio"(2)	(2)-(1)	
AT*	4 282.0	4 606.4	324.4	7.6
DE	39 643.0	40 147.0	504.0	1.3
DK	9 150.0	9 157.7	7.7	0.1
FI	3 298.0	3 390.1	92.1	2.8
FR**	52 957.0	53 147.7	190.7	0.4
GB	21 973.0	22 024.1	51.1	0.2
GR	3 866.0	3 869.7	3.7	0.1
IT*	18 724.8	18 930.7	205.9	1.1
LU	177.5	178.1	0.6	0.3
NL	1 585.0	1 580.6	-4.4	-0.3
SE*	4 967.0	5 013.0	46.0	0.9
CH*	1 283.8	1 321.0	37.2	2.9
NO	1 438.0	1 448.4	10.4	0.7
Tot. 13	**163 345.1**	**164 814.6**	**1 469.5**	**0.9**

tot = actual output (organic + conventional)
"No bio" = output obtainable if organic farming was not adopted
*1996 organic output data
** 1993 organic output data

Table 5-16: Crop output variation: soft wheat

	Output (,000 T)		Output variation (,000 T)	(%)
	tot (1)	"No bio" (2)	(2)-(1)	
AT*	1 265.0	1 372.8	107.8	8.5
DE	17 779.0	18 086.4	307.4	1.7
DK	4 598.0	4 664.1	66.1	1.4
FI	379.0	389.8	10.8	2.9
GB	14 400.0	14 435.8	35.8	0.2
IT*	4 093.0	4 157.3	64.3	1.6
NL	1 167.0	1 160.8	-6.2	-0.5
SE*	1 600.0	1 617.9	17.9	1.1
Tot. 8	**45 281.0**	**44 267.1**	**586.1**	**1.3**

tot = actual output (organic + conventional)
"No bio" = output obtainable if organic farming was not adopted
*1996 organic output data

Table 5-17: Crop output variation: barley

	Output (,000 T)		Output variation (,000 T)	(%)
	tot (1)	"No bio" (2)	(2)-(1)	
AT*	1 123.0	1 214.5	91.5	8.1
DE	11 925.0	12 158.1	233.1	2.0
DK	3 899.0	3 945.3	46.3	1.2
FI	1 764.0	1 819.2	55.2	3.1
GB	6 850.0	6 869.7	19.7	0.3
IT*	1 450.0	1 460.1	10.1	0.7
SE*	1 890.0	1 921.5	31.5	1.7
NL	252.0	252.4	0.4	0.2
Tot. 8	**29 153.0**	**29 640.8**	**487.8**	**1.7**

tot = actual output (organic + conventional)
"No bio" = output obtainable if organic farming was not adopted
*1996 organic output data

Table 5-18: Crop output variation: rye

	Output		Output variation	
	(,000 T)		(,000 T)	(%)
	tot (1)	"No bio" (2)	(2)-(1)	
AT*	276.0	292.4	16.4	6.0
DE	4 529.2	4 554.2	25.1	0.6
FI	58.0	51.6	-6.4	-11.0
SE*	210.0	209.5	-0.5	-0.2
CH*	35.4	35.9	0.5	1.4
CZ	260.8	260.3	-0.4	-0.2
Tot. 6	**5 369.4**	**5 404.1**	**34.7**	**0.6**

tot = actual output (organic + conventional)
“No bio” = output obtainable if organic farming was not adopted
*1996 organic output data

Table 5-19: Crop output variation: oats

	Output		Output variation	
	(,000 T)		(,000 T)	(%)
	tot (1)	"No bio" (2)	(2)-(1)	
AT*	93.0	93.4	0.4	0.4
FI	1 097.0	1 128.6	31.6	2.9
GB	617.0	614.5	-2.5	-0.4
IT*	534.0	526.1	-7.9	-1.5
LU	18.6	18.7	0.1	0.4
SE*	960.0	968.4	8.4	0.9
CH*	47.6	48.5	0.9	1.8
NO	420.0	423.1	3.1	0.7
Tot. 9	**3 787.2**	**3 821.3**	**34.1**	**0.9**

tot = actual output (organic + conventional)
“No bio” = output obtainable if organic farming was not adopted
*1996 organic output data

Table 5-20: Crop output variation: pulses

	Output		Output variation	
	(,000 T)		(,000 T)	(%)
	tot (1)	"No bio" (2)	(2)-(1)	
AT*	82.0	81.4	-0.6	-0.7
FR	2 784.0	2 757.2	-26.8	-1.0
GB	592.0	593.3	1.3	0.2
GR	6.0	6.0	0.0	-0.3
IT*	64.0	54.3	-9.7	-15.2
NL	12.0	11.8	-0.2	-1.4
CH*	12.0	12.1	0.1	0.5
Tot. 7	**3 552.0**	**3 516.1**	**-35.9**	**-1.0**

tot = actual output (organic + conventional)
"No bio" = output obtainable if organic farming was not adopted
*1996 organic output data

Table 5-21: Crop output variation: potatoes

	Output		Output variation	
	(,000 T)		(,000 T)	(%)
	tot (1)	"No bio" (2)	(2)-(1)	
AT*	724.0	774.9	50.9	7.0
DE	9 898.0	10 024.7	126.7	1.3
DK	1 441.0	1 452.4	11.4	0.8
FI	798.0	814.7	16.7	2.1
GB	6 297.0	6 310.2	13.2	0.2
IT*	2 108.0	2 126.4	18.4	0.9
NL	7 340.0	7 365.9	25.9	0.4
CH*	672.1	689.3	17.2	2.6
SE*	1 074.0	1 066.7	-7.3	-0.7
CZ	1 332.3	1 336.1	3.8	0.3
NO	484.1	485.4	1.2	0.3
Tot. 11	**32 168.5**	**32 446.8**	**278.2**	**0.9**

tot = actual output (organic + conventional)
"No bio" = output obtainable if organic farming was not adopted
*1996 organic output data

Table 5-22: Cattle output variation

	Output (,000 T)		Output variation (,000 T)	(%)
	tot (1)	"No bio" (2)	(2)-(1)	
AT	2 329.0	2 266.0	-63.0	-3.2
BE	3 161.0	3 166.3	5.3	0.2
DE	15 962.0	16 219.7	257.7	1.6
DK	2 082.0	2 100.2	18.2	0.9
FI	1 185.0	1 204.1	19.1	1.6
FR	20 524.0	20 662.4	138.4	0.7
GB	11 686.0	11 693.0	7.0	0.1
LU	204.0	204.6	0.6	0.3
NL	4 588.0	4 603.3	15.3	0.3
SE	1 790.0	2 042.9	252.9	14.3
Tot. 10	**63 511.0**	**64 162.5**	**651.5**	**1.0**

tot = actual output (organic + conventional)
"No bio" = output obtainable if organic farming was not adopted

Table 5-23: Milk output variation

	Output (,000 T)		Output variation (,000 T)	(%)
	tot (1)	"No bio" (2)	(2)-(1)	
BE	3 297.3	3 298.8	1.5	0.0
DE	28 163.4	28 547.1	383.7	7.0
DK	4 653.1	4 668.3	15.2	0.2
FI	2 402.0	2 439.8	37.9	0.6
FR	25 023.2	25 170.9	147.7	2.8
GB	14 156.5	14 166.4	9.9	0.2
LU	263.1	263.9	0.8	0.0
NL	11 430.8	11 453.8	23.1	0.4
CH	3 900.0	3 831.8	-68.2	-1.3
NO	2 084.8	2 147.2	62.4	1.1
Tot. 10	**95 374.2**	**95 988.1**	**613.8**	**0.0**

tot = actual output (organic + conventional)
"No bio" = output obtainable if organic farming was not adopted

5.3 EAGGF Guarantee expenditure variation

Given the potential problems of estimating storage costs and export refund variations due to organic farming adoption, and the relative importance they have on the overall EAGGF expenditure (see above, chapter 4), we have here focused on the variation in direct payment expenditure for arable crops.

The marginal importance of organic arable total UAA does not induce any substantial variation in total EAGGF budget due to different land use. The estimated reduction of 53.7 MECU does not balance the overall cost for organic farming support under EU Reg. 2078/92, which is estimated (for all crops) as 188.64 MECU (see Lampkin et al., 1999). On the other hand, an assessment of the actual cost of the organic farming scheme should take into account the fact that adoption of organic farming has induced savings in the ordinary CAP payments to organic farms, accounting for some 29% of the explicit costs of the organic farming support under EU Reg. 2078/92.

Regarding expenditure variation for export refunds and storage, the lack of detailed information about specific highly supported crops or products, like sugar, olive oil, wine, and horticulture in general, does not allow a more insightful analysis of the consequences on expenditure of organic farming adoption, and the figure of expenditure variation presented in Table 5-24 refers only to direct payments impact.

Nevertheless, as a very general rule of thumb, it can be argued that sugar beet production is usually not a typical organic crop, as it suffers particularly from a lack of pesticides, so that the production of sugar deriving from organic sugar beet should be negligible.

Expenditure variation for cattle has been calculated using a simple proportional rule to link total expenditure and the output variation previously computed, i.e. expenditure impact has been computed proportionally to the output reduction, showing that cattle expenditure has been cut by nearly 42 MECU due to organic farming scheme adoption.

Although in absolute terms such figures are not impressive, they indicate an overall expenditure reduction of 9.4 MECU, which accounts for about 46% of organic farming-oriented financial support. In other words, organic farming policies seem to be able to be partially “self-funding”, and for each 2 MECU invested in organic farming support, nearly 1 MECU can be “recovered” through the organic farming intrinsic output reduction and reallocation mechanisms.

Due to the lack of more detailed information, these results are likely to be underestimated, as they consider only a part of EAGGF Guarantee expenditure, and do not take into account the indirect impacts on expenditure discussed in chapter 2.

Table 5-24: EAGGF Guarantee expenditure variation

year: 1995	Returns and intervention	Direct payments	Cattle variation (“No bio”)		UAA variation (“No bio”)		Expenditure variation (“No bio”)
	MECU	MECU	Heads (,000)	%	Ha (,000)	(%)	MECU
Arable crops	1 512.5	13 506.4	na	na	298.8	0.4	53.7

Fodder	na	342.0	na	na	-277.6	-0.6	-1.9
Vegetables	nd	nd	na	na	nd	nd	nd
Permanent crops	nd	nd	na	na	nd	nd	nd
Horticulture	1 832.0	nd	na	na	nd	nd	nd
Cattle	2 017.3	2 003.8	651.5	1.0	na	na	41.6
Total	**5 361.8**	**15 852.2**	**1 265.3**				**93.4**

nd = no data
na= not applicable

Concluding remarks

6 Concluding remarks

As a general comment, it is necessary to remember that results concerning commodities are based only on countries for which data are available, and that results concerning countries refer only to those products for which data are available.

The ex-post perspective adopted for the analysis of output and expenditure variations due to organic farming adoption, together with the limited rate of current uptake, causes the final results of the analysis to be quantitatively not very significant. In fact, the crop showing the highest impact on output variation is barley, for which total output (for the seven countries considered) could have been 1.7% higher if organic farming techniques were not adopted (see Table 5-17). As expected, due to rotation requirements, the impact of organic farming on pulses output has been positive (Table 5-20), as it would have been 1% lower if, in the countries for which data are available, organic farming was not present.

When considering single countries, two main groups may be identified, one showing relatively high impacts of organic farming on output, and the other one showing lower impacts. AT, DE, FI and CH belong to the first group, since in the scenario without organic farming they show significant output variations for most of the commodities (which are especially higher for AT; Table 5-1).

DK, FR, GB, GR, IT, NL, SE, NO and CZ belong to the second group, where organic farming adoption seems to have produced lower impacts on output. Some specific comments need to be made: DK and IT show extremely high variations with respect to fodder crops and pulses (see Tables 5-3 and 5-8). Furthermore, IT and NL are the only countries for which some results on horticulture are available, concerning fruits for IT and vegetables for NL: in the first case, the results show a negative impact of organic farming on output, mainly due to a lower land quota for fruits in organic farming; in the second case, the result is opposite, showing that output would have been lower if organic farming had not been adopted, again mainly due to an area effect (Tables 5-8 and 5-10).

Concerning cattle, output variation is measured in terms of the number of units, and, on average, shows that organic farming is responsible for a 1% reduction in the number of cattle units. The two extreme results are for AT, for which if land was farmed conventionally, the cattle number would be decreased by 3.7%, and SE, for which, conversely, the effect would be a 14.3% increase. The result for AT is due to the fact that organic grassland and fodder land has an extremely high weighing for organic farming, and that the conventional stocking rate is comparable to that of the organic case. On the other hand, the sensible variation for SE is due basically to the large difference between the organic and conventional stocking rate, the latter being the highest of all the countries in the analysis.

The general comments about the low quantitative impact of organic farming in the ex-post approach can, of course, also be extended to the expenditure variation analysis, where variations are mainly due to the different land use under organic farming, affecting the redistribution of direct per hectare payments. The aggregation level of the official figures of the EAGGF budget does not allow for a more detailed breakdown of expenditure for specific crops. In particular, it is not possible to calculate the impact of output reductions on intervention and export subsidy costs.

Livestock unit increases and different land area patterns would together lead to an increase of nearly 93 million ECU if organic farming was not present. This figure is not particularly impressive if compared to the overall EAGGF budget, but becomes interesting if compared to the EU expenditure for organic farming support, which was estimated as 198 million ECU in 1996 (see Lampkin et al., 1999). In other words, 46% of the financial support for organic farming was covered by savings derived from output structure modifications due to the adoption of organic farming. This result, of course, only concerns agricultural accountancy data, and does not take into account the wide range of positive environmental externalities and environmental cost reductions deriving from organic farming.

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Appendix I

Table A-1: Ex-post simulation results: AT

	UAA			UAA relative frequency		Output			Yield	Yield			"No bio" out	Output variation	
	(,000 ha)			(%)		(,000 T)			(%)	(T/ha)			(,000 T)	(,000 T)	(%)
	bio	conv	tot	bio	conv (1)	bio	conv	tot		bio (2)	conv	tot	(3)		
Cereals	24.3	798.7	823.0	7.8	25.2	84.9	4 197.1	4 282.0	67.3	3.5	5.3	5.2	4 606.4	324.4	7.6
Wheat	4.5	253.5	258.0	1.4	8.0	14.1	1 250.9	1 265.0	64.5	3.2	4.9	4.9	1 372.8	107.8	8.5
Oats	3.2	21.8	25.0	1.0	0.7	7.9	85.1	93.0	65.5	2.4	3.9	3.7	93.4	0.4	0.4
Barley	5.7	244.3	250.0	1.8	7.7	16.4	1 106.6	1 123.0	64.0	2.9	4.5	4.5	1 214.5	91.5	8.1
Rye	3.1	63.9	67.0	1.0	2.0	9.5	266.5	276.0	75.0	3.1	4.2	4.1	292.4	16.4	6.0
Other cereals*	7.7	215.3	223.0	2.5	6.8	nd	nd	nd	nd	nd	nd	nd	-	-	-
Pulses	2.8	22.2	25.0	0.9	0.7	7.8	74.2	82.0	84.0	2.8	3.3	3.3	81.4	-0.6	-0.7
Potatoes	1.4	25.6	27.0	0.5	0.8	17.9	706.1	724.0	46.5	12.5	27.6	26.8	774.9	50.9	7.0
Fodder	236.9	1 211.1	1 448.0	76.6	38.2	3 797.2	23 509.1	27 306.3	85.0	16.0	19.4	18.9	25 801.4	-1 504.9	-5.5
Sub-total	**265.4**	**2 057.6**	**2 323.0**	**85.9**	**64.9**										
Other crops	**43.7**	**1 112.3**	**1 156.0**	**14.1**	**35.1**										
UAA Total	**309.1**	**3 169.9**	**3 479.0**	**100.0**	**100.0**										

bio = organic
conv = conventional
tot = organic + conventional
yield % = organic yield as % of tot yield
(3) = (2) × (1) × UAA Total
*estimate

Table A-2: Ex-post simulation results: DE

Year: 1995	UAA			UAA relative frequency		Output			Yield	Yield			"No bio" out	Output variation	
	(,000 ha)			(%)		(,000 T)			(%)	(T/ha)			(,000 T)	(,000 T)	(%)
	bio	conv	tot	bio	conv (1)	bio	conv	tot		bio (2)	conv	tot	(3)		
Cereals	81.3	6 453.7	6 535.0	23.0	38.0	315.8	39 327.2	39 643.0	64.0	3.9	6.1	6.1	40 147.0	504.0	1.3
Wheat	14.8	2 565.2	2 580.0	4.2	15.1	61.9	17 717.1	17 779.0	60.5	4.2	6.9	6.9	18 086.4	307.4	1.7
Barley	4.1	2 111.9	2 116.0	1.2	12.4	15.2	11 909.8	11 925.0	65.0	3.7	5.6	5.6	12 158.1	233.1	2.0
Rye	22.5	843.5	866.0	6.3	5.0	71.7	4 461.3	4 533.0	61.0	3.2	5.3	5.2	4 554.2	21.2	0.5
Maize	1.4	322.6	324.0	0.4	1.9	6.4	2 126.6	2 133.0	70.0	4.6	6.6	6.6	2 170.9	37.9	1.8
Other cereals*	38.5	610.5	649.0	10.9	3.6	160.5	3 112.5	3 273.0	82.7	4.2	5.1	5.0	3 177.4	-95.6	-2.9
Oilseeds	2.2	1 056.8	1 059.0	0.6	6.2	4.0	2 989.0	2 993.0	63.5	1.8	2.8	2.8	3 051.3	58.3	1.9
Potatoes	4.0	311.0	315.0	1.1	1.8	78.0	9 820.0	9 898.0	61.5	19.3	31.6	31.4	10 024.7	126.7	1.3
Sub-total	**87.6**	**7 821.4**	**7 909.0**	**24.7**	**46.0**										
Other crops	**266.6**	**9 168.4**	**9 435.0**	**75.3**	**54.0**										
UAA Total	**354.2**	**16 989.8**	**17 344.0**	**100.0**	**100.0**										

bio = organic
conv = conventional
tot = organic + conventional
yield % = organic yield as % of tot yield
(3) = (2) × (1) × UAA Total
*estimate

Table A-3: *Ex-post simulation results: DK*

Year: 1995	UAA			UAA relative frequency		Output			Yield	Yield			"No bio" out	Output variation	
	(,000 ha)			(%)		(,000 T)			(%)	(T/ha)			(,000 T)	(,000 T)	(%)
	bio	conv	tot	bio	conv (1)	bio	conv	tot		bio (2)	conv	tot	(3)		
Cereals*	10.1	1 443.9	1 454.0	22.5	54.1	144.0	9 006.0	9 150.0	69.5	4.4	6.2	6.3	9 157.7	7.7	0.1
Wheat	2.5	605.5	608.0	5.6	22.7	11.2	4 586.8	4 598.0	59.0	4.5	7.6	7.6	4 664.1	66.1	1.4
Barley	4.9	714.1	719.0	10.9	26.7	19.1	3 879.9	3 899.0	71.5	3.9	5.4	5.4	3 945.3	46.3	1.2
Other cereals*	2.7	124.3	127.0	6.0	4.7	113.7	539.3	653.0	817.8	42.0	4.3	5.1	548.3	-104.7	-16.0
Potatoes	0.5	41.5	42.0	1.2	1.6	12.6	1 428.4	1 441.0	71.0	24.4	34.4	34.3	1 452.4	11.4	0.8
Grass/Fodder	17.7	49.3	67.0	39.4	1.8	217.7	774.6	992.3	83.0	12.3	15.7	14.8	787.6	-204.6	-20.6
Sub-total	**28.4**	**1 534.7**	**1 563.0**	**63.0**	**57.5**										
Other crops	**16.6**	**1 135.4**	**1 152.0**	**37.0**	**42.5**										
UAA Total	**45.0**	**2 670.0**	**2 715.0**	**100.0**	**100.0**										

bio = organic
conv = conventional
tot = organic + conventional
yield % = organic yield as % of tot yield
(3) = (2) × (1) × UAA Total
*estimate

Table A-4: Ex-post simulation results: FI

Year: 1995	UAA			UAA relative frequency		Output			Yield	Yield			"No bio" out	Output variation	
	(,000 ha)			(%)		(,000 T)			(%)	(T/ha)			(,000 T)	(,000 T)	(%)
	bio	conv	tot	bio	conv (1)	bio	conv	tot		bio (2)	conv	tot	(3)		
Cereals	8.2	939.8	948.0	9.6	37.3	17.9	3 280.1	3 298.0	63.3	2.2	3.5	3.5	3 390.1	92.1	2.8
Wheat	0.7	88.3	89.0	0.9	3.5	1.8	377.2	379.0	59.5	2.5	4.3	4.3	389.8	10.8	2.9
Oats	2.4	341.6	344.0	2.9	13.6	5.0	1 092.0	1 097.0	64.0	2.0	3.2	3.2	1 128.6	31.6	2.9
Barley	2.1	503.9	506.0	2.5	20.0	3.8	1 760.2	1 764.0	52.0	1.8	3.5	3.5	1 819.2	55.2	3.1
Rye	1.6	7.4	9.0	1.9	0.3	8.1	49.9	58.0	77.5	5.0	6.8	6.4	51.6	-6.4	-11.0
Other cereals*	1.3	0.0	0.0	1.5	0.0	nd	0.0	0.0	nd	nd	nd	nd	nd	nd	nd
Potatoes	0.4	35.6	36.0	0.5	1.4	9.7	788.3	798.0	103.5	22.9	22.2	22.2	814.7	16.7	2.1
Sub-total	**8.6**	**975.4**	**984.0**	**10.1**	**38.7**										
Other crops	**76.0**	**1 545.0**	**1 621.0**	**89.9**	**61.3**										
UAA Total	**84.6**	**2 520.4**	**2 605.0**	**100.0**	**100.0**										

bio = organic
conv = conventional
tot = organic + conventional
yield % = organic yield as % of tot yield
(3) = (2) × (1) × UAA Total
*estimate

Table A-5: Ex-post simulation results: FR

Year: 1995	UAA			UAA relative frequency		Output			Yield	Yield			"No bio" out	Output variation	
	(,000 ha)			(%)		(,000 T)			(%)	(T/ha)			(,000 T)	(,000 T)	(%)
	bio	conv	tot	bio	conv (1)	bio	conv	tot		bio (2)	conv	tot	(3)		
Cereals*	14.0	8 172.0	8 186.0	10.2	27.1	50.0	52 907.0	52 957.0	55.0	3.6	6.5	6.5	53 147.7	190.7	0.4
Pulses	9.9	571.1	581.0	7.2	1.9	39.2	2 744.8	2 784.0	83.0	4.0	4.8	4.8	2 757.2	-26.8	-1.0
Sub-total	**23.9**	**8 743.1**	**8 767.0**	**17.4**	**29.0**										
Other crops	**113.2**	**21 396.8**	**21 510.0**	**82.6**	**71.0**										
UAA Total	**137.1**	**30 139.9**	**30 277.0**	**100.0**	**100.0**										

bio = organic
conv = conventional
tot = organic + conventional
yield % = organic yield as % of tot yield
(3) = (2) × (1) × UAA Total
* cereals bio: 1993

Table A-6: Ex-post simulation results: GB

Year: 1995	UAA			UAA relative frequency		Output			Yield	Yield			"No bio" out	Output variation	
	(,000 ha)			(%)		(,000 T)			(%)	(T/ha)			(,000 T)	(,000 T)	(%)
	bio	conv	tot	bio	conv (1)	bio	conv	tot		bio (2)	conv	tot	(3)		
Cereals	4.1	3 176.9	3 181.0	8.2	20.1	17.7	21 955.3	21 973.0	63.0	4.4	6.9	6.9	22 024.1	51.1	0.2
Wheat	2.3	1 855.7	1 858.0	4.7	11.7	9.3	14 390.7	14 400.0	52.0	4.0	7.8	7.8	14 435.8	35.8	0.2
Oats	1.1	110.9	112.0	2.2	0.7	4.4	612.6	617.0	72.0	4.0	5.5	5.5	614.5	-2.5	-0.4
Barley	0.5	1 191.5	1 192.0	0.9	7.5	1.7	6 848.3	6 850.0	64.5	3.7	5.7	5.7	6 869.7	19.7	0.3
Other cereals*	0.2	18.8	19.0	0.4	0.1	2.3	103.7	106.0	221.3	12.3	5.5	5.6	104.0	-2.0	-1.8
Pulses-total	0.2	190.8	191.0	0.4	1.2	0.6	591.4	592.0	108.0	3.3	3.1	3.1	593.3	1.3	0.2
Potatoes	0.3	170.7	171.0	0.6	1.1	6.6	6 290.4	6 297.0	60.0	22.1	36.9	36.8	6 310.2	13.2	0.2
Sub-total	**4.6**	**3 538.4**	**3 543.0**	**9.2**	**22.4**										
Other crops	**45.0**	**12 264.0**	**12 309.0**	**90.8**	**77.6**										
UAA Total	**49.5**	**15 802.5**	**15 852.0**	**100.0**	**100.0**										

bio = organic
conv = conventional
tot = organic + conventional
yield % = organic yield as % of tot yield
(3) = (2) × (1) × UAA Total
*estimate

Table A-7: Ex-post simulation results: GR

Year: 1995	UAA			UAA relative frequency		Output			Yield	Yield			"No bio" out	Output variation	
	(,000 ha)			(%)		(,000 T)			(%)	(T/ha)			(,000 T)	(,000 T)	(%)
	bio	conv	tot	bio	conv (1)	bio	conv	tot		bio (2)	conv	tot	(3)		
Cereals	0.1	1 166.9	1 167.0	1.9	22.6	0.2	3 865.8	3 866.0	70.0	2.3	3.3	3.3	3 869.7	3.7	0.1
Pulses	0.0	3.0	3.0	0.3	0.1	0.0	6.0	6.0	70.0	1.4	2.0	2.0	6.0	0.0	-0.3
Vegetables	0.0	125.0	125.0*	0.6	2.4	0.7	4 150.3	4 151.0*	73.0	24.2	33.2	33.2	4 154.5	3.5	0.1
Sub-total	**0.1**	**1 294.9**	**1 295.0**	**2.8**	**25.1**										
Other crops	**5.1**	**3 862.9**	**3 868.0**	**97.2**	**74.9**										
UAA Total	**5.3**	**5 157.7**	**5 163.0***	**100.0**	**100.0**										

bio = organic
conv = conventional
tot = organic + conventional
yield % = organic yield as % of tot yield
(3) = (2) × (1) × UAA Total
*1994 data

Table A-8: Ex-post simulation results: IT

	UAA			UAA relative frequency		Output			Yield	Yield			"No bio" out	Output variation	
	(,000 ha)			(%)		(,000 T)			(%)	(T/ha)			(,000 T)	(,000 T)	(%)
	bio ('96)	conv	tot ('95)	bio	conv (1)	bio	conv	tot		bio (2)	conv	tot	(3)		
Cereals	48.4	3 935.6	3 984.0	14.5	24.0	171.9	18 552.9	18 724.8	75.5	3.5	4.7	4.7	18 930.7	205.9	1.1
Wheat	4.4	848.6	853.0	1.3	5.2	18.7	4 074.3	4 093.0	88.0	4.2	4.8	4.8	4 157.3	64.3	1.6
Durum/spelt wheat	22.4	1 596.6	1 619.0	6.7	9.7	40.1	4 096.9	4 137.0	70.0	1.8	2.6	2.6	4 180.3	43.3	1.0
Oats	6.7	165.3	172.0	2.0	1.0	18.4	515.6	534.0	88.0	2.7	3.1	3.1	526.1	-7.9	-1.5
Barley	6.9	384.1	391.0	2.1	2.3	19.0	1 431.0	1 450.0	74.5	2.8	3.7	3.7	1 460.1	10.1	0.7
Maize	3.1	937.9	941.0	0.9	5.7	20.1	8 253.9	8 274.0	73.0	6.4	8.8	8.8	8 422.0	148.0	1.8
Other cereals*	4.9	3.1	8.0	1.5	0.0	55.6	181.2	236.8	nd	nd	nd	nd	nd	nd	nd
Pulses	6.4	32.6	39.0	1.9	0.2	10.8	53.2	64.0	86.5	1.4	1.6	1.6	54.3	-9.7	-15.2
Sunflower	2.3	240.7	243.0	0.7	1.5	4.0	549.0	553.0	49.0	1.1	2.3	2.3	560.2	7.2	1.3
Potatoes	0.8	88.2	89.0	0.2	0.5	24.0	2 084.0	2 108.0	80.5	19.1	23.6	23.7	2 126.4	18.4	0.9
Sugar beet*	0.3	247.7	248.0	0.1	1.5	1.8	1 489.2	1 491.0	71.0	4.3	6.0	6.0	1 519.6	28.6	1.9
Vine*	9.4	856.6	866.0	2.8	5.2	1 022.5	57 753.5	58 776.0	58.0	39.4	67.4	67.9	58 929.7	153.7	0.3
Apples/pears	1.2	128.8	130.0	0.4	0.8	15.5	3 187.5	3 203.0	42.0	10.3	24.7	24.6	3 252.4	49.4	1.5
Peaches/apricot	1.9	127.1	129.0	0.6	0.8	21.4	1 728.6	1 750.0	43.0	5.8	13.6	13.6	1 763.8	13.8	0.8
Sub-Total	**116.7**	**9 352.3**	**9 469.0**	**34.9**	**57.0**										
Other Crops	**217.4**	**7 056.6**	**7 274.0**	**65.1**	**43.0**										
Total UAA	**334.2**	**16 408.8**	**16 743.0**	**100.0**	**100.0**										

bio = organic — conv = conventional — tot = organic + conventional
yield % = organic yield as % of tot yield — (3) = (2) × (1) × UAA Total — *estimate

Table A-9: *Ex-post simulation results: LU*

Year: 1995	UAA			UAA relative frequency		Output			Yield	Yields			"No bio" out	Output variation	
	(,000 ha)			(%)		(,000 T)			(%)	(T/ha)			(,000 T)	(,000 T)	(%)
	bio	conv	tot	bio	conv (1)	bio	conv	tot		bio (2)	conv	tot	(3)		
Cereals	0.1	40.9	41.0	16.3	32.4	0.2	177.3	177.5	56.5	2.4	4.3	4.3	178.1	0.6	0.3
Wheat	0.1	8.9	9.0	9.0	7.1	0.2	50.7	50.9	51.0	2.9	5.7	5.7	50.9	0.1	0.2
Oats	0.0	6.0	6.0	0.8	4.7	0.0	18.6	18.6	61.0	1.9	3.1	3.1	18.7	0.1	0.4
Barley	0.0	16.0	16.0	1.1	12.7	0.0	66.1	66.1	48.0	2.0	4.1	4.1	66.4	0.3	0.4
Rye	0.0	1.0	1.0	1.1	0.8	0.0	3.3	3.3	66.0	2.2	3.3	3.3	3.3	0.0	0.0
Other cereals*	0.0	9.0	9.0	4.3	7.1	0.0	38.6	38.7	42.3	1.8	4.3	4.3	38.8	0.1	0.3
Potatoes	0.0	1.0	1.0	1.9	0.8	0.2	28.3	28.5	53.0	15.1	28.7	28.5	28.5	0.0	-0.1
Sub-total	**0.1**	**41.9**	**42.0**	**18.3**	**33.1**										
Other crops	**0.5**	**84.5**	**85.0**	**81.7**	**66.9**										
UAA Total	**0.6**	**126.4**	**127.0**	**100.0**	**100.0**										

bio = organic
conv = conventional
tot = organic + conventional
Yield % = organic yield as % of tot yield
(3) = (2) × (1) × UAA Total
*estimate

Table A-10: *Ex-post simulation results: NL*

Year: 1995	UAA			UAA relative frequency		Output			Yield	Yields			"No bio" out	Output variation	
	(,000 ha)			(%)		(,000 T)			(%)	(T/ha)			(,000 T)	(,000 T)	(%)
	bio	conv	tot	bio	conv (1)	bio	conv	tot		bio (2)	conv	tot	(3)		
Cereals	2.4	196.6	199.0	19.1	10.0	14.3	1 570.7	1 585.0	76.0	6.1	8.0	8.0	1 580.6	-4.4	-0.3
Wheat	2.1	132.9	135.0	17.2	6.7	13.4	1 153.6	1 167.0	73.0	6.3	8.7	8.6	1 160.8	-6.2	-0.5
Barley	0.2	39.8	40.0	1.9	2.0	1.2	250.8	252.0	79.0	5.0	6.3	6.3	252.4	0.4	0.2
Other cereals*	0.0	24.0	24.0	0.0	1.6	0.0	166.0	166.0	na	na	6.9	6.9	166.0	0.0	0.0
Pulses	0.1	3.9	4.0	0.8	0.2	0.2	11.8	12.0	77.5	2.3	3.0	3.0	11.8	-0.2	-1.4
Potatoes	0.7	178.3	179.0	5.6	9.1	20.2	7 319.8	7 340.0	70.5	28.9	41.1	41.0	7 365.9	25.9	0.4
Sugar beet*	0.1	115.9	116.0	0.8	5.9	1.0	987.0	988.0	112.0	9.5	8.5	8.5	993.3	5.3	0.5
Carrots	0.2	6.8	7.0	1.5	0.3	11.3	418.7	430.0	98.0	60.2	61.5	61.4	421.3	-8.7	-2.0
Onions	0.2	11.8	12.0	1.4	0.6	4.6	448.4	453.0	69.5	26.2	37.9	37.8	451.2	-1.8	-0.4
Sub-total	**3.6**	**513.4**	**517.0**	**29.3**	**26.1**										
Other crops	**8.8**	**1 455.2**	**1 464.0**	**70.7**	**73.9**										
UAA Total	**12.4**	**1 968.6**	**1 981.0**	**100.0**	**100.0**										

bio = organic
conv = conventional
tot = organic + conventional
yield % = organic yield as % of tot yield
(3) = (2) × (1) × UAA Total
*estimate

Table A-11: Ex-post simulation results: SE

	UAA			UAA relative frequency		Output			Yield*	Yields			"No bio" out	Output variation	
	(,000 ha)			(%)		(,000 T)			(%)	(T/ha)			(,000 T)	(,000 T)	(%)
	bio ('96)	conv	tot ('95)	bio	conv (1)	bio	conv	tot		bio	conv (2)	tot	(3)		
Cereals	23.5	1 079.5	1 103.0	28.2	32.2	75.5	4 891.5	4 967.0	71.3	3.2	4.5	4.5	5 013.0	46.0	0.9
Wheat	5.1	256.9	262.0	6.2	7.7	21.3	1 578.7	1 600.0	67.8	4.1	6.1	6.1	1 617.9	17.9	1.1
Oats	6.1	271.9	278.0	7.3	8.1	15.1	944.9	960.0	72.0	2.5	3.5	3.5	968.4	8.4	0.9
Barley	5.4	447.6	453.0	6.5	13.3	15.1	1 874.9	1 890.0	67.0	2.8	4.2	4.2	1 921.5	31.5	1.7
Rye	1.4	38.6	40.0	1.6	1.2	5.5	204.5	210.0	77.5	4.1	5.3	5.3	209.5	-0.5	-0.2
Other cereals*	6.9	103.1	110.0	8.3	3.1	18.5	288.5	307.0	28.4	0.8	2.8	2.8	295.7	-11.3	-3.7
Potatoes	1.0	32.0	33.0	1.2	1.0	33.2	1 040.8	1 074.0	101.8	33.1	32.5	32.5	1 066.7	-7.3	-0.7
Sub-total	**24.5**	**1 111.5**	**1 136.0**	**29.4**	**33.1**										
Other crops	**58.8**	**2 243.2**	**2 302.0**	**70.6**	**66.9**										
UAA Total	**83.3**	**3 354.7**	**3 438.0**	**100.0**	**100.0**										

bio = organic
conv = conventional
tot = organic + conventional
yield % = organic yield as % of tot yield
(3) = (2) × (1) × UAA Total
*estimate

Table A-12: Ex-post simulation results: CH

	UAA			UAA relative frequency		Output			Yield	Yields			"No bio" out	Output variation	
	(,000 ha)			(%)		(,000 T)			(%)	(T/ha)			(,000 T)	(,000 T)	(%)
	bio('96)	conv	tot('95)	bio	conv (1)	bio	conv	tot		bio (2)	conv	tot	(3)		
Cereals	2.6	212.4	215.0	4.4	14.0	11.9	1 271.9	1 283.8	76.3	4.6	6.0	6.0	1 321.0	37.2	2.9
Wheat	1.1	110.9	112.0	1.8	7.3	4.2	617.0	621.2	69.5	3.9	5.6	5.5	640.8	19.6	3.2
Oats	0.2	8.8	9.0	0.4	0.6	0.9	46.7	47.6	83.5	4.4	5.3	5.3	48.5	0.9	1.8
Barley	0.7	53.3	54.0	1.1	3.5	2.7	297.1	299.9	74.5	4.1	5.6	5.6	308.6	8.7	2.9
Rye	0.2	5.8	6.0	0.4	0.4	0.8	34.6	35.4	67.5	4.0	6.0	5.9	35.9	0.5	1.4
Maize	0.2	27.8	28.0	0.3	1.8	1.5	239.9	241.4	86.5	7.5	8.6	8.6	249.1	7.8	3.2
Other cereals*	0.2	5.8	6.0	0.4	0.4	1.7	36.7	38.3	111.5	7.1	6.4	6.4	38.1	-0.3	-0.7
Potatoes	0.3	16.7	17.0	0.6	1.1	8.4	663.7	672.1	65.0	25.7	39.8	39.5	689.3	17.2	2.6
Pulses	0.1	2.9	3.0	0.2	0.2	0.4	11.6	12.0	88.0	3.5	4.0	4.0	12.1	0.1	0.5
Sub-total	**2.7**	**215.3**	**218.0**	**4.6**	**14.1**										
Other crops	**56.0**	**1 307.0**	**1 363.0**	**95.4**	**85.9**										
UAA Total	**58.7**	**1 522.3**	**1 581.0**	**100.0**	**100.0**										

bio = organic
conv = conventional
tot = organic + conventional
yield % = organic yield as % of tot yield
(3) = (2) × (1) ×UAA Total
*estimate

Table A-13: *Ex-post simulation results: CZ*

Year: 1995	UAA (,000 ha)			UAA relative frequency (%)		Output (,000 T)			Yield (%)	Yields (T/ha)			"No bio" out (,000 T)	Output variation (,000 T)	(%)
	bio*	conv	tot	bio	conv (1)	bio*	conv	tot		bio (2)	conv	tot	(3)		
Cereals	1.5	1 575.5	1 577.0	8.8	37.0	4.4	6 595.3	6 599.7	71.2	3.0	4.2	4.2	6 621.7	21.9	0.3
Wheat	0.5	810.5	811.0	3.1	19.0	1.7	3 730.5	3 732.2	71.0	3.3	4.6	4.6	3 745.4	13.2	0.4
Barley	0.2	557.8	558.0	1.4	13.1	0.6	2 141.6	2 142.2	66.0	2.5	3.8	3.8	2 150.1	8.0	0.4
Rye	0.6	78.4	79.0	3.4	1.8	1.5	259.3	260.8	76.5	2.5	3.3	3.3	260.3	-0.4	-0.2
Potatoes	0.1	77.9	78.0	0.8	1.8	1.5	1 330.8	1 332.3	62.5	10.7	17.1	17.1	1 336.1	3.8	0.3
Sub-total	**1.6**	**1 653.4**	**1 655.0**	**9.6**	**38.8**										
Other crops	**15.4**	**2 605.6**	**2 621.0**	**90.4**	**61.2**										
UAA Total	**17.0**	**4 259.0**	**4 276.0**	**100.0**	**100.0**										

bio = organic
conv = conventional
tot = organic + conventional
yield % = organic yield as % of tot yield
(3) = (2) × (1) × UAA Total
*estimate

Table A-14: Ex-post simulation results: NO

Year: 1995	UAA			UAA relative frequency		Output			Yield	Yields			"No bio" out	Output variation	
	(,000 ha)			(%)		(,000 T)			(%)	(T/ha)			(,000 T)	(,000 T)	(%)
	bio	conv	tot	bio	conv (1)	bio	conv	tot		bio (2)	conv	tot	(3)		
Cereals	0.3	362.7	363.0	3.6	35.5	0.9	1 437.3	1 438.2	79.3	3.1	4.0	4.0	1 448.4	10.2	0.7
Wheat	0.1	69.9	70.0	1.1	6.8	0.3	349.7	350.0	76.0	3.8	5.0	5.0	352.4	2.4	0.7
Oats	0.1	119.9	120.0	0.7	11.7	0.2	419.8	420.0	80.0	2.8	3.5	3.5	423.1	3.1	0.7
Barley	0.1	169.9	170.0	1.5	16.6	0.4	649.7	650.1	82.0	3.1	3.8	3.8	654.7	4.6	0.7
Other cereals*	0.0	3.0	3.0	0.3	0.3	0.0	18.1	18.1	28.4	1.7	6.1	6.0	18.2	0.1	0.5
Potatoes	0.1	18.9	19.0	1.2	1.8	2.5	481.6	484.1	100.0	25.5	25.5	25.5	485.4	1.2	0.3
Sub-total	**0.4**	**381.6**	**382.0**	**4.8**	**37.3**										
Other crops	**7.5**	**640.5**	**648.0**	**95.2**	**62.7**										
UAA Total	**7.9**	**1 022.1**	**1 030.0**	**100.0**	**100.0**										

bio = organic
conv = conventional
tot = organic + conventional
yield % = organic yield as % of tot yield
(3) = (2) × (1) × UAA Total
*estimate

Table A-15: Ex-post simulation results: cereals

	UAA			Output			Yield	Yields			UAA relative frequency		Share of UAA over 'tot 13' total UAA		"No bio" output	Output variation	
	(,000 ha)			(,000 T)			(%)	(T/ha)			(%)		(%)		(,000 T)	(,000 T)	(%)
	bio	conv	tot	bio	conv	tot		bio	conv	tot	bio	conv	bio	conv			
AT*	24.3	798.7	823.0	84.8	4 197.2	4 282.0	67.2	3.5	5.3	5.2	9.9	2.9	0.1	2.8	4 606.4	324.4	7.6
DE	81.3	6 453.7	6 535.0	315.5	39 327.5	39 643.0	64.0	3.9	6.1	6.1	33.3	23.1	0.3	22.9	40 147.0	504.0	1.3
DK	11.2	1 442.8	1 454.0	48.8	9 101.2	9 150.0	69.5	4.4	6.3	6.3	4.6	5.2	0.0	5.1	9 157.7	7.7	0.1
FI	10.6	937.4	948.0	23.4	3 274.6	3 298.0	63.2	2.2	3.5	3.5	4.4	3.4	0.0	3.3	3 390.1	92.1	2.8
FR**	33.8	8 152.2	8 186.0	120.4	52 836.6	52 957.0	55.0	3.6	6.5	6.5	13.9	29.2	0.1	28.9	53 147.7	190.7	0.4
GB	5.0	3 176.0	3 181.0	21.7	21 951.3	21 973.0	63.0	4.4	6.9	6.9	2.0	11.4	0.0	11.3	22 024.1	51.1	0.2
GR	0.6	1 166.4	1 167.0	1.4	3 864.6	3 866.0	70.0	2.3	3.3	3.3	0.2	4.2	0.0	4.1	3 869.7	3.7	0.1
IT*	48.4	3 935.6	3 984.0	171.9	18 552.9	18 724.8	75.5	3.5	4.7	4.7	19.8	14.1	0.2	14.0	18 930.7	205.9	1.1
LU	0.1	40.9	41.0	0.3	177.2	177.5	56.5	2.4	4.3	4.3	0.0	0.1	0.0	0.1	178.1	0.6	0.3
NL	2.1	196.9	199.0	13.2	1 571.8	1 585.0	77.6	6.2	8.0	8.0	0.9	0.7	0.0	0.7	1 580.6	-4.4	-0.3
CH*	23.5	1 079.5	1 103.0	75.5	4 891.5	4 967.0	71.3	3.2	4.5	4.5	9.6	3.9	0.1	3.8	5 013.0	46.0	0.9
NO	2.6	212.4	215.0	11.9	1 271.9	1 283.8	76.3	4.6	6.0	6.0	1.1	0.8	0.0	0.8	1 321.0	37.2	2.9
SE*	0.5	362.5	363.0	1.6	1 436.4	1 438.0	79.3	3.1	4.0	4.0	0.2	1.3	0.0	1.3	1 448.4	10.4	0.7
Tot. 13	**244.0**	**27 955.0**	**28 199.0**	**890.3**	**162 454.8**	**163 345.1**	**68.3**	**3.6**	**5.3**	**5.3**	**100.0**	**100.0**	**0.9**	**99.1**	**164 814.6**	**1 469.5**	**0.9**

bio = organic; conv = conventional; tot = organic + conventional
yield % = organic yield as % of tot yield; "No bio" = output obtainable if organic farming was not adopted; Output variation = "No bio" - tot
UAA relative frequency = % of organic and conventional UAA, respectively, over total organic and conventional UAA of the sample considered
Share of UAA over 'tot 13' total UAA = % of organic and conventional UAA over total UAA of the sample considered
*1996 organic data
**1993 organic data

Table A-16: *Ex-post simulation results: soft wheat*

	UAA (,000 ha)			Output (,000 T)			Yield (%)	Yield (T/ha)			UAA relative frequency (%)		Share of UAA over 'tot 8' total UAA		"No bio" output (,000 T)	Output variation (,000 T)	Output variation (%)
	bio	conv	tot	bio	conv	tot		bio	conv	tot	bio	conv	bio	conv			
AT*	4.5	253.5	258.0	14.1	1 250.9	1 265.0	64.5	3.2	4.9	4.9	11.7	3.2	0.1	3.2	1 372.8	107.8	8.5
DE	14.8	2 565.2	2 580.0	61.9	17 717.1	17 779.0	60.5	4.2	6.9	6.9	38.7	32.4	0.2	32.2	18 086.4	307.4	1.7
DK	2.5	605.5	608.0	11.2	4 586.8	4 598.0	59.0	4.5	7.6	7.6	6.5	7.6	0.0	7.6	4 664.1	66.1	1.4
FI	0.7	88.3	89.0	1.8	377.2	379.0	59.5	2.5	4.3	4.3	1.9	1.1	0.0	1.1	389.8	10.8	2.9
GB	4.1	3 176.9	3 181.0	11.6	14 388.4	14 400.0	63.0	2.9	4.5	4.5	10.6	40.1	0.1	39.9	14 435.8	35.8	0.2
IT*	4.4	848.6	853.0	18.7	4 074.3	4 093.0	88.0	4.2	4.8	4.8	11.6	10.7	0.1	10.7	4 157.3	64.3	1.6
NL	2.1	132.9	135.0	13.4	1 153.6	1 167.0	73.0	6.3	8.7	8.6	5.5	1.7	0.0	1.7	1 160.8	-6.2	-0.5
SE*	5.1	256.9	262.0	21.3	1 578.7	1 600.0	67.8	4.1	6.1	6.1	13.4	3.2	0.1	3.2	1 617.9	17.9	1.1
Tot. 8	**38.3**	**7 927.7**	**7 966.0**	**154.1**	**45 126.9**	**45 281.0**	**66.9**	**4.0**	**6.0**	**6.0**	**100.0**	**100.0**	**0.5**	**99.5**	**44 267.1**	**586.1**	**1.3**

bio = organic
conv = conventional
tot = organic + conventional
yield % = organic yield as % of tot yield
"No bio" = output obtainable if organic farming was not adopted
Output variation = "No bio" - tot
UAA relative frequency = % of organic and conventional UAA, respectively, over total organic and conventional UAA of the sample considered
Share of UAA over 'tot 8' total UAA = % of organic and conventional UAA over total UAA of the sample considered
*1996 organic data

Table A-17: *Ex-post simulation results: barley*

	UAA			Output			Yield	Yields			UAA relative frequency		Share of UAA over 'tot 8' total UAA		"No bio" output	Output variation	
	(,000 ha)			(,000 T)			(%)	(T/ha)			(%)				(,000 T)	(,000 T)	(%)
	bio	conv	tot	bio	conv	tot		bio	conv	tot	bio	conv	bio	conv			
AT*	5.7	244.3	250.0	16.4	1 106.6	1 123.0	64.0	2.9	4.5	4.5	19.1	4.3	0.1	4.3	1 214.5	91.5	8.1
DE	4.1	2 111.9	2 116.0	15.2	11 909.8	11 925.0	65.0	3.7	5.6	5.6	13.9	37.5	0.1	37.3	12 158.1	233.1	2.0
DK	4.9	714.1	719.0	19.1	3 879.9	3 899.0	71.5	3.9	5.4	5.4	16.5	12.7	0.1	12.6	3 945.3	46.3	1.2
FI	2.1	503.9	506.0	3.8	1 760.2	1 764.0	52.0	1.8	3.5	3.5	7.1	8.9	0.0	8.9	1 819.2	55.2	3.1
GB	0.5	1 191.5	1 192.0	1.7	6 848.3	6 850.0	64.5	3.7	5.7	5.7	1.6	21.1	0.0	21.0	6 869.7	19.7	0.3
IT*	6.9	384.1	391.0	19.0	1 431.0	1 450.0	74.5	2.8	3.7	3.7	23.0	6.8	0.1	6.8	1 460.1	10.1	0.7
NL	5.4	447.6	453.0	15.1	1 874.9	1 890.0	67.0	2.8	4.2	4.2	18.1	7.9	0.1	7.9	1 921.5	31.5	1.7
SE*	0.2	39.8	40.0	1.2	250.8	252.0	79.0	5.0	6.3	6.3	0.8	0.7	0.0	0.7	252.4	0.4	0.2
Tot. 8	**29.9**	**5 637.1**	**5 667.0**	**91.6**	**29 061.4**	**29 153.0**	**67.2**	**3.3**	**4.9**	**4.9**	**100.0**	**100.0**	**0.5**	**99.5**	**29 640.8**	**487.8**	**1.7**

bio = organic
conv = conventional
yield % = organic yield as % of tot yield
"No bio" = output obtainable if organic farming was not adopted
Output variation = "No bio" - tot
UAA relative frequency = % of organic and conventional UAA, respectively, over total organic and conventional UAA of the sample considered
Share of UAA over 'tot 8' total UAA = % of organic and conventional UAA over total UAA of the sample considered
*1996 organic data

Table A-18: Ex-post simulation results: rye

	UAA			Output			Yield	Yields			UAA relative frequency		Share of UAA over 'tot 6' total UAA		"No bio" output	Output variation	
	(,000 ha)			(,000 T)			(%)	(T/ha)			(%)				(,000 T)	(,000 T)	(%)
	bio	Conv	tot	bio	conv	tot		bio	conv	tot	bio	conv	bio	conv			
AT*	3.1	63.9	67.0	9.5	266.5	276.0	75.0	3.1	4.2	4.1	10.5	6.2	0.3	6.0	292.4	16.4	6.0
DE	22.5	843.5	866.0	67.8	4 461.4	4 529.2	61.0	3.0	5.3	5.2	76.7	81.3	2.1	79.1	4 554.2	25.1	0.6
FI	1.6	7.4	9.0	8.1	50.0	58.0	77.5	4.0	5.9	5.2	5.5	0.7	0.2	0.7	51.6	-6.4	-11.0
CH	1.4	38.6	40.0	5.5	204.5	210.0	77.5	4.1	5.3	5.3	4.7	3.7	0.1	3.6	209.5	-0.5	-0.2
CZ	0.2	5.8	6.0	0.9	34.5	35.4	67.5	4.2	6.0	5.9	0.7	0.6	0.0	0.5	35.9	0.5	1.4
SE*	0.6	78.4	79.0	1.5	259.3	260.8	76.5	2.6	3.3	3.3	1.9	7.6	0.1	7.4	260.3	-0.4	-0.2
Tot. 6	**29.3**	**1 037.7**	**1 067.0**	**93.3**	**5 276.2**	**5 369.4**	**72.5**	**3.5**	**5.0**	**4.8**	**100.0**	**100.0**	**2.7**	**97.3**	**5 404.1**	**34.7**	**0.6**

bio = organic
conv = conventional
tot = organic + conventional
yield % = organic yield as % of tot yield
"No bio" = output obtainable if organic farming was not adopted
Output variation = "No bio" - tot
UAA relative frequency = % of organic and conventional UAA, respectively, over total organic and conventional UAA of the sample considered
Share of UAA over 'tot 6' total UAA = % of organic and conventional UAA over total UAA of the sample considered
*1996 organic data

Table A-19: Ex-post simulation results: oats

	UAA			Output			Yield	Yield			UAA relative frequency		Share of UAA over 'tot 8' total UAA		"No bio" output	Output variation	
	(,000 ha)			(,000 T)			(%)	(T/ha)			(%)				(,000 T)	(,000 T)	(%)
	bio	conv	tot	bio	conv	tot		bio	conv	tot	bio	conv	bio	conv			
AT*	3.2	21.8	25.0	7.9	85.1	93.0	65.5	2.4	3.9	3.7	16.3	2.1	0.3	2.0	93.4	0.4	0.4
FI	2.4	341.6	344.0	5.0	1 092.0	1 097.0	64.0	2.0	3.2	3.2	12.3	32.6	0.2	32.0	1 128.6	31.6	2.9
GB	1.1	110.9	112.0	4.4	612.6	617.0	72.0	4.0	5.5	5.5	5.6	10.6	0.1	10.4	614.5	-2.5	-0.4
IT*	6.7	165.3	172.0	15.5	518.5	534.0	74.0	2.3	3.1	3.1	33.8	15.8	0.6	15.5	526.1	-7.9	-1.5
LU	0.0	6.0	6.0	0.0	18.6	18.6	61.0	1.9	3.1	3.1	0.1	0.6	0.0	0.6	18.7	0.1	0.4
CH*	6.1	271.9	278.0	15.1	944.9	960.0	72.0	2.5	3.5	3.5	30.5	26.0	0.6	25.5	968.4	8.4	0.9
NO	0.2	8.8	9.0	0.9	46.7	47.6	83.5	4.4	5.3	5.3	1.1	0.8	0.0	0.8	48.5	0.9	1.8
SE*	0.1	119.9	120.0	0.2	419.8	420.0	80.0	2.8	3.5	3.5	0.3	11.5	0.0	11.3	423.1	3.1	0.7
Tot. 8	**19.9**	**1 046.1**	**1 066.0**	**49.0**	**3 738.2**	**3 787.2**	**71.5**	**2.8**	**3.9**	**3.9**	**100.0**	**100.0**	**1.9**	**98.1**	**3 821.3**	**34.1**	**0.9**

bio = organic
conv = conventional
tot = organic + conventional
yield % = organic yield as % of tot yield
"No bio" = output obtainable if organic farming was not adopted
Output variation = "No bio" - tot
UAA relative frequency = % of organic and conventional UAA, respectively, over total organic and conventional UAA of the sample considered
Share of UAA over 'tot 8' total UAA = % of organic and conventional UAA over total UAA of the sample considered
* 1996 organic data

Table A-20: Ex-post simulation results: pulses

	UAA			Output			Yield	Yield			UAA relative frequency		Share of UAA over 'tot 7' total UAA		"No bio" output	Output variation	
	(,000 ha)			(,000 T)			(%)	(T/ha)			(%)				(,000 T)	(,000 T)	(%)
	bio	conv	tot	bio	conv	tot		bio	conv	tot	bio	conv	bio	conv			
AT*	2.8	23.2	26.0	7.5	74.5	82.0	84.0	2.6	3.2	3.2	13.4	2.6	0.3	2.6	81.4	-0.6	-0.7
FR	11.5	581.5	593.0	44.9	2 739.1	2 784.0	83.0	3.9	4.7	4.7	54.2	66.5	1.3	64.9	2 757.2	-26.8	-1.0
GB	0.2	227.8	228.0	0.6	591.4	592.0	108.0	2.8	2.6	2.6	1.0	26.0	0.0	25.4	593.3	1.3	0.2
GR	0.0	3.0	3.0	0.0	6.0	6.0	70.0	1.4	2.0	2.0	0.1	0.3	0.0	0.3	6.0	0.0	-0.3
IT*	6.4	32.6	39.0	9.1	54.9	64.0	86.5	1.4	1.7	1.6	30.2	3.7	0.7	3.6	54.3	-9.7	-15.2
NL	0.1	3.9	4.0	0.3	11.7	12.0	77.5	2.3	3.0	3.0	0.6	0.4	0.0	0.4	11.8	-0.2	-1.4
CH*	0.1	2.9	3.0	0.4	11.6	12.0	88.0	3.5	4.0	4.0	0.5	0.3	0.0	0.3	12.1	0.1	0.5
Tot. 7	**21.2**	**874.8**	**896.0**	**62.8**	**3 489.2**	**3 552.0**	**85.3**	**2.6**	**3.0**	**3.0**	**100.0**	**100.0**	**2.4**	**97.6**	**3 516.1**	**-35.9**	**-1.0**

bio = organic
conv = conventional
tot = organic + conventional
yield % = organic yield as % of tot yield
"No bio" = output obtainable if organic farming was not adopted
Output variation = "No bio" - tot
UAA relative frequency = % of organic and conventional UAA, respectively, over total organic and conventional UAA of the sample considered
Share of UAA over 'tot 7' total UAA = % of organic and conventional UAA over total UAA of the sample considered
* 1996 organic data

Table A-21: *Ex-post simulation results: potatoes*

	UAA (,000 ha)			Output (,000 T)			Yield (%)	Yield (T/ha)			UAA relative frequency (%)		Share of UAA over 'tot 11' total UAA		"No bio" output (,000 T)	Output variation (,000 T)	Output variation (%)
	bio	conv	tot	bio	conv	tot		bio	conv	tot	bio	conv	bio	conv			
AT*	1.4	25.6	27.0	17.9	706.1	724.0	46.5	12.5	27.6	26.8	14.8	2.6	0.1	2.5	774.9	50.9	7.0
DE	4.0	311.0	315.0	78.0	9 820.0	9 898.0	61.5	19.3	31.6	31.4	41.5	31.2	0.4	30.9	10 024.7	126.7	1.3
DK	0.5	41.5	42.0	12.6	1 428.4	1 441.0	71.0	24.4	34.4	34.3	5.3	4.2	0.1	4.1	1 452.4	11.4	0.8
FI	0.4	35.6	36.0	9.7	788.3	798.0	103.5	22.9	22.2	22.2	4.4	3.6	0.0	3.5	814.7	16.7	2.1
GB	0.3	170.7	171.0	6.6	6 290.4	6 297.0	60.0	22.1	36.9	36.8	3.1	17.1	0.0	17.0	6 310.2	13.2	0.2
IT*	0.8	88.2	89.0	14.9	2 093.1	2 108.0	80.5	19.2	23.7	23.8	8.0	8.9	0.1	8.8	2 126.4	18.4	0.9
NL	0.7	178.3	179.0	20.2	7 319.8	7 340.0	70.5	28.9	41.1	41.0	7.2	17.9	0.1	17.7	7 365.9	25.9	0.4
CH*	0.3	16.7	17.0	8.4	663.7	672.1	65.0	25.7	39.8	39.5	3.4	1.7	0.0	1.7	689.3	17.2	2.6
CZ	1.0	32.0	33.0	33.2	1 040.8	1 074.0	101.8	33.1	32.5	32.5	10.3	3.2	0.1	3.2	1 066.7	-7.3	-0.7
NO	0.1	77.9	78.0	1.1	1 331.3	1 332.3	62.5	10.7	17.1	17.1	1.0	7.8	0.0	7.7	1 336.1	3.8	0.3
SE*	0.1	18.9	19.0	2.5	481.6	484.1	100.0	25.5	25.5	25.5	1.0	1.9	0.0	1.9	485.4	1.2	0.3
Tot. 11	**9.7**	**996.3**	**1 006.0**	**205.0**	**31 963.5**	**32 168.5**	**74.8**	**22.2**	**30.2**	**30.1**	**100.0**	**100.0**	**1.0**	**99.0**	**32 446.8**	**278.2**	**0.9**

bio = organic
conv = conventional
tot = organic + conventional
yield % = organic yield as % of tot yield
"No bio" = output obtainable if organic farming was not adopted
Output variation = "No bio" - tot
UAA relative frequency = % of organic and conventional UAA, respectively, over total organic and conventional UAA of the sample considered
Share of UAA over 'tot 11' total UAA = % of organic and conventional UAA over total UAA of the sample considered
*1996 organic data

Table A-22: Ex-post simulation results: milk

	Cows (,000 head)			Yield (%)	Yield (kg/head)			Milk (,000 T)			Cows relative frequency (%)		Share of cows over 'tot 10 'tot cows (%)		Stocking rate (head /ha)		Grass-land/ fodder (,000 ha)	Milk output variation (,000 T)	(%)
	bio	conv	tot		bio	con (1)	tot	bio	conv	tot (2)	bio	conv	bio	conv	bio	conv(3)	tot(4)	(5)	
BE	1.0	679.0	680.0	106.0	5 139.9	4 856.4	4 849.0	5.3	3 292.0	3 297.3	0.8	3.9	0.01	3.9	0.6	0.8	871.0	6.8	0.2
DE	55.4	5 173.6	5 229.0	82.5	4 443.5	5 443.7	5 386.0	246.3	27 917.1	28 163.4	43.2	30.1	0.32	29.8	0.4	0.7	7 098.0	630.0	2.2
DK	20.4	693.6	714.0	95.0	6 191.2	6 708.4	6 517.0	126.1	4 527.0	4 653.1	15.9	4.0	0.12	4.0	1.1	1.2	601.0	141.3	3.0
FI	1.2	400.8	402.0	92.0	5 497.0	5 992.7	5 975.0	6.5	2 395.4	2 402.0	0.9	2.3	0.01	2.3	0.1	0.6	691.0	44.4	1.8
FR	9.5	4 662.5	4 672.0	78.0	4 177.7	5 366.9	5 356.0	39.7	24 983.5	25 023.2	7.4	27.1	0.05	26.9	0.1	0.3	15 448.0	187.4	0.7
GB	2.5	2 653.5	2 656.0	97.0	5 170.1	5 335.0	5 330.0	12.9	14 143.5	14 156.5	2.0	15.4	0.01	15.3	0.1	0.2	11 355.0	22.9	0.2
LU	0.2	47.8	48.0	80.0	4 385.6	5 503.4	5 482.0	0.8	262.3	263.1	0.1	0.3	0.00	0.3	0.3	0.5	90.0	1.6	0.6
NL	5.0	1 773.0	1 778.0	94.5	6 075.4	6 447.0	6 429.0	30.1	11 400.7	11 430.8	3.9	10.3	0.03	10.2	0.8	1.4	1 291.0	53.1	0.5
CH*	32.5	747.5	780.0	89.0	4 450.0	5 217.4	5 000.0	144.6	3 755.4	3 900.0	25.3	4.3	0.19	4.3	1.4	0.7	1 169.5	76.4	2.0
NO	0.6	376.4	377.0	76.0	4 202.8	5 538.4	5 530.0	2.4	2 082.4	2 084.8	0.4	2.2	0.00	2.2	0.1	2.9	133.0	64.8	3.1
Tot. 10	**128.2**	**17 207.8**	**17 336.0**	**89.0**	**4 973.3**	**5 640.9**	**5 585.4**	**614.8**	**94 759.4**	**95 374.2**	**100.0**	**100.0**	**0.7**	**99.3**	**0.5**	**0.9**	**38 747.5**	**1 228.7**	**1.3**

bio = organic
conv = conventional
tot = organic + conventional
yield (%) = organic yield as % of tot yield
(5) = (1)/1000 x (3) x (4) – (2)
Cows relative frequency = % of organic and conventional dairy cows, respectively, over total organic and conventional dairy cows of the sample considered
Share of cows over 'tot 10' total cows = % of organic and conventional dairy cows over total cows of the sample considered
*1996 organic data

Table A-23: Ex-post simulation results: cattle

	bio (,000 head)			conv (,000 head)			tot (,000 head)			Grassland/fodder (,000 ha)			Stocking rate (head/ha)		Cattle variation (,000 head)	(%)
	dairy	other	total	dairy	other	total	dairy	other	total (1)	bio	conv	tot (2)	bio	conv (3)	(4)	
AT*	87.1	251.1	338.2	617.9	1 372.9	1 990.8	705.0	1 624.0	2 329.0	236.9	1 714.1	1 951.0	1.4	1.2	-63.0	-3.2
BE	1.0	0.2	1.2	679.0	2 480.8	3 159.8	680.0	2 481.0	3 161.0	1.8	869.2	871.0	0.7	3.6	5.3	0.2
DE	55.4	41.7	97.2	5 173.6	10 691.3	15 864.8	5 229.0	10 733.0	15 962.0	155.3	6 942.7	7 098.0	0.6	2.3	257.7	1.6
DK	20.4	23.3	43.7	693.6	1 344.7	2 038.3	714.0	1 368.0	2 082.0	17.7	583.3	601.0	2.5	3.5	18.2	0.9
FI	1.2	1.6	2.8	400.8	781.4	1 182.2	402.0	783.0	1 185.0	12.5	678.5	691.0	0.2	1.7	19.1	1.6
FR	9.5	5.6	15.1	4 662.5	15 846.4	20 508.9	4 672.0	15 852.0	20 524.0	114.8	15 333.2	15 448.0	0.1	1.3	138.4	0.7
GB	2.5	9.4	11.9	2 653.5	9 020.6	11 674.1	2 656.0	9 030.0	11 686.0	18.3	11 336.7	11 355.0	0.6	1.0	7.0	0.1
LU	0.2	0.4	0.6	47.8	155.6	203.4	48.0	156.0	204.0	0.5	89.5	90.0	1.2	2.3	0.6	0.3
NL	5.0	1.0	6.0	1 773.0	2 809.0	4 582.0	1 778.0	2 810.0	4 588.0	6.0	1 285.0	1 291.0	1.0	3.6	15.3	0.3
SE*	11.8	8.7	20.5	469.2	1 300.3	1 769.5	481.0	1 309.0	1 790.0	55.3	357.7	413.0	0.4	4.9	252.9	14.3
Tot. 10	**194.0**	**343.0**	**537.1**	**17 171.0**	**45 803.0**	**62 973.9**	**17 365.0**	**46 146.0**	**63 511.0**	**619.1**	**39 189.9**	**39 809.0**	**0.9**	**2.5**	**651.5**	**1.0**

bio = organic cattle units
conv = conventional cattle units
tot = actual cattle units (organic + conventional)
(4) = (3) x (2) – (1)
*1996 organic data

Appendix II

Appendix II

Here, a schematic list of data problems for areas and yields for each crop and country is reported, before the results of the analysis are presented.

In particular, for no crop could the output variation have been computed for each country, and hence not all the crops could have been considered.

Furthermore, for interconnecting information regarding different issues, like land use and land productivity, the serious lack of information for the organic sector becomes dramatically clear.

Therefore, in what follows, we take the opportunity to highlight the sectors where the lack of data are particularly serious, with reference to the main crops and to the basic variables for the determination of output.

Cereals

No area data are available for BE, IE and CZ; data for ES and FR are available only for 1993 and 1994, and 1993, respectively. Yield data are missing for BE, ES, IE, LU, PT and therefore, these countries will not be considered in the analysis.

Soft wheat

No area data are available for BE, ES, FR, GR, IE and PT; yield data are missing for ES, and PT. This causes BE, ES, FR, GR, IE, and PT to be excluded from the analysis.

Durum wheat

The Mediterranean disposition of this crop has suggested that it should not be considered in the analysis. Furthermore, no area data are available for FR, ES and GR, and yield data are missing for ES.

Oats

No area data are available for BE, ES, FR, GR, IE and PT. Yield data are missing for BE, DE, DK, ES, FR, PT, SE and CZ. No data on area and yield exist for NL and CZ. Hence, BE, ES, FR, GR, IE, PT SE, CZ and NL are excluded from the analysis.

Barley

No area data are available for BE, ES, FR, GR, IE and PT; no yield data are available for ES, PT and SE. Hence, BE, ES, FR, GR, IE and PT are excluded from the analysis.

Rye

No area data are available for BE, ES, FR, GR, IE and PT; no yield data are available for BE, DK, ES, FR, GB, IE, IT, PT, SE and NO. No data on area and yield exist for NL. BE, ES, FR, GR, IE, PT, SE, NL and NO. They will hence be excluded from the analysis.

Maize

No area data are available for BE, ES, FR, IE and PT. Yield data are missing for AT, BE, DE, DK, ES, IE, LU, PT, SE and NO. No data on area and yield exist for FI, GB, NL, CZ and NO. Given the high number of countries with missing values, this crop is not considered explicitly in the analysis.

Pulses

For these commodities, no disaggregated yield data are available; furthermore, disaggragated area data are also missing for all countries, with the exception of AT, DK, FI, GB, IT, LU, SE and CH.

Regarding aggregated pulses area, there are missing values for BE, DE, IE and CZ; ES data refer to 1993, and no area or yield data are available for BE, PT and NO. Aggregated pulses yield data are missing for DK, ES, FI, LU, PT, and NO, and therefore BE, DE, DK, ES, FI, IE, LU, PT, CZ and NO will be excluded from the analysis.

Oilseeds

Disaggragated area data are missing for all countries, with the exception of AT, DK, FI, GB, IT and CH. Disaggregated yield data are also missing for all countries, with the exception of data on sunflower.

Aggregated area data are missing for BE, ES, FR, IE and CZ. GR, LU, PT and NO have negligible areas harvested. Aggregated yield crops are available only for DE. Such a situation has, of course, caused this crop not to be considered in the analysis.

Root crops

Detailed information on areas is available only for potatoes; sugar beet area data are nearly completely missing (with the exception of AT, IT, NL, SE and CH). Disaggregated yield data are also nearly completely missing for sugar beet (with the exception of DE, FR, IT and NL). Hence, the analysis for root crops concentrates on potatoes. Again, potatoes area data are missing for BE, ES, FR, GR, IE, and PT.

Horticulture and vegetables

Aggregated area data are available for all countries but IE, but no aggregated yield data are available. Disaggregated yield data are available only for IT, and for FR, NL, GB, CH and NO, but for only very few specific vegetables. Hence, these crops are not considered in the analysis.

Permanent crops

Aggregated area data are available for all countries but IE, but no aggregated yield data are available. Disaggregated yield data are available only for IT and GR; for FR and CH yield data are available only for apples. Hence, these crops are not considered in the analysis.

Grassland and fodder crops

Aggregated area data are available for all countries but IE and CZ, but aggregated yield data are available only for AT, DK, SE and NO. Hence, these crops are not considered in the analysis.

Dairy cows and milk

The number of dairy cows is available for all countries but IE, IT, and PT; for ES there are data only for the year 1993; for GR no data are available because there is no certified organic livestock. Milk yields are not available for AT, ES, GR, PT and SE. These countries therefore are not considered in the analysis.

In some cases (AT, FI, IT, LU, NL, CH, CZ, NO) cereals yields data were missing, but yield data for all the major cereals crops are available, so the aggregated cereals yield has been computed as a weighted average.

Table A-24: Area and yield data availability by commodity and country

		Cereals	Soft Wheat	Oats	Barley	Rye	Maize	Pulses	Oilseeds	Potatoes	Horticulture & Veg.	Permanent Crops	Grassland & Fodder	Dairy
AT	area		ŏ	ŏ	ŏ	ŏ		ŏ		ŏ	ŏ	ŏ	ŏ	ŏ
	yield	ŏ	ŏ	ŏ	ŏ	ŏ		ŏ		ŏ			ŏ	
BE	area													ŏ
	yield		ŏ		ŏ					ŏ				ŏ
CH	area	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ
	yield		ŏ	ŏ	ŏ	ŏ	ŏ	ŏ		ŏ				ŏ
CZ	area		ŏ		ŏ	ŏ				ŏ	ŏ	ŏ	ŏ	ŏ
	yield		ŏ		ŏ	ŏ		ŏ		ŏ				ŏ
DE	area	ŏ	ŏ	ŏ	ŏ	ŏ			ŏ	ŏ				ŏ
	yield	ŏ	ŏ		ŏ	ŏ	ŏ	ŏ	ŏ	ŏ				ŏ
DK	area	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ
	yield	ŏ	ŏ		ŏ					ŏ			ŏ	ŏ
ES	area	ŏ						ŏ			ŏ	ŏ	ŏ	ŏ
	yield													
FI	area	ŏ	ŏ	ŏ	ŏ	ŏ		ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ
	yield		ŏ	ŏ	ŏ	ŏ				ŏ				ŏ
FR	area	ŏ						ŏ			ŏ	ŏ	ŏ	ŏ
	yield	ŏ	ŏ		ŏ		ŏ	ŏ		ŏ				ŏ
GB	area	ŏ	ŏ	ŏ	ŏ	ŏ		ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ
	yield	ŏ	ŏ	ŏ	ŏ			ŏ		ŏ				ŏ

Table A-24: Area and yield data availability by commodity and country (cont.)

		Cereals	Soft Wheat	Oats	Barley	Rye	Maize	Pulses	Oilseeds	Potatoes	Horticulture & Veg.	Permanent Crops	Grassland & Fodder	Dairy
GR	area	ŏ			ŏ			ŏ	ŏ		ŏ	ŏ	ŏ	
	yield	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ		ŏ			ŏ	
IE	area													
	yield		ŏ	ŏ	ŏ			ŏ						ŏ
IT	area	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	
	yield		ŏ	ŏ	ŏ		ŏ	ŏ		ŏ				ŏ
LU	area	ŏ	ŏ	ŏ	ŏ	ŏ		ŏ		ŏ	ŏ	ŏ	ŏ	ŏ
	yield		ŏ	ŏ	ŏ	ŏ				ŏ				ŏ
NL	area	ŏ	ŏ	ŏ	ŏ			ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ
	yield		ŏ	ŏ	ŏ	ŏ	ŏ	ŏ		ŏ			ŏ	ŏ
NO	area	ŏ	ŏ	ŏ	ŏ	ŏ			ŏ	ŏ	ŏ	ŏ	ŏ	ŏ
	yield		ŏ	ŏ	ŏ					ŏ			ŏ	ŏ
PT	area	ŏ									ŏ	ŏ	ŏ	
	yield													
SE	area	ŏ	ŏ	ŏ	ŏ	ŏ		ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	
	yield				ŏ								ŏ	ŏ