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FUTURE DEVELOPMENT OF ECONOMIC ACCOUNTS STATISTICS: ISSUES AND DIRECTIONS

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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FUTURE DEVELOPMENT OF ECONOMIC ACCOUNTS STATISTICS: ISSUES AND DIRECTIONS

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FOREWORD[1]

Pertinent, reliable and timely economic statistics are increasingly important in today's agricultural policy context. Against the background of the 1993 revision of the United Nations' System of National Accounts, the 1996 revision of the Economic Accounts for Agriculture by the Statistical Office of the European Communities (Eurostat), and the publication a revised accounts handbook by the Food and Agriculture Organisation of the United Nations (FAO)[2], the OECD Secretariat commissioned a thorough review of the options for the revision of its Economic Accounts for Agriculture.

The results of the review are contained in this report, prepared by Dr. Berkeley Hill, of Wye College (University of London). The paper identifies issues to be considered in the revision of the accounts framework and makes detailed recommendations. The report was discussed at a meeting of statistical experts at the OECD in January 1997. With the agreement of the OECD's Committee for Agriculture, an edited version of the report is now made available to a wider audience.

In the light of the recommendations made in the report and the outcome of the meeting of experts, the OECD Secretariat has established two informal working groups with the aim of revising the methodology for OECD's Economic Accounts for Agriculture and for investigating the inclusion of capital stock measures and estimates of net worth.

While the report and its recommendations will play a role in the future direction of the OECD Secretariat's work on the Economic Accounts for Agriculture, the views expressed do not necessarily correspond to those of the OECD or to its Member governments. In particular, the OECD Secretariat is not obliged to implement all the recommendations made in the report. The report is published on the responsibility of the Secretary-General of the OECD.

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1 Requests for information regarding this report should be addressed to Andreas Lindner at the OECD, Fax: 33-14524 9814, E-mail: andreas.lindner@oecd.org.

2 FAO, "A System of Economic Accounts for Food and Agriculture", Rome, 1996.

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INTRODUCTION

Statistics to service policies

The satisfactory analysis and application of policy requires statistics for decision-makers that are pertinent, reliable, impartial, accurate and timely. The nature of the statistics will reflect the objectives of the policies. Economic statistics relating to agriculture are used to service a variety of policy areas (evolution of national income, trade, rural development, food security etc.) as well as to address problems that are features of the agricultural industry (difficulties in making structural adjustment, income problems in the face of the cost-price squeeze associated with technological advance in farming). **Annex 1** considers the objectives of these policies in OECD Member countries. This discussion paper considers the economic statistics collected and used by the OECD, with particular focus on those derived from the aggregate economic accounts for agriculture.

Changes have been occurring that carry implications for the statistical system. Evolution is taking place in the economic conditions in which agriculture finds itself in OECD Member countries, in the technical nature of production, in the perceptions of the problems that need to be addressed and in the policies that are directed at agricultural sectors. A substantial revision in the internationally-accepted methodology of national accounting has been agreed (The United Nations' System of National Accounts - SNA) that requires suitable responses from statisticians who deal with the aggregate economic accounts for this industry. There is increasing recognition that, in order that policy is serviced adequately, aggregate statistics need to be complemented by microeconomic data. And an increased interest in the environmental impact of agriculture has stimulated investigation into how integration of environmental and economic accounts can be achieved.

Because the statistics assembled and used by the OECD must be internationally comparable, each of these issues require solutions that are widely accepted and applied by its Member countries. Any significant disharmonies lower the confidence in statistics that attempt to make international comparisons or to establish general patterns. Because fifteen of the OECD countries are Member States of the European Union, the harmonised methodologies that are co-ordinated by the Statistical Office for the European Communities (Eurostat)[3] and used to generate EU statistics are of particular interest and relevance to the OECD as the possible basis for wider application.

In providing appropriate statistics the statistician will face three main problems:

- selecting the appropriate concepts (**conceptualisation**),
- transforming these concepts into practical entities for which quantification is possible (**operationalisation**) and,

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3 The European Commission's Directorate General for Agriculture in the case of microeconomic survey data relating to farm businesses.

- **measurement.**

Failure of the information system is usually thought of as involving problems with the third stage-measurement. However, it seems increasingly clear that deficiencies in the concepts employed and the ways in which they are operationalised are often overlooked. This is particularly the case when the statistical system continues to employ concepts and methods that have been overtaken by changes in policy; a degree of *conceptual obsolescence* will then be present. Where new policy areas are introduced, or existing policies reoriented, there will be a tendency to utilise existing indicators where they are already calculated. This may reflect the urgency with which *any* information is needed, and the use of economy among the suppliers of statistics. Because the provision of statistics uses resources, the marginal costs of adjusting the information system will have to be weighed against the marginal benefits in terms of improved policy decisions. The extent of these costs and benefits will not always be easily determined, and they may not always be adequately reflected at the place where decisions about statistics are taken.

Emerging policy needs have exposed limitations and gaps in the array of economic statistics on agriculture. For example, the conventional view of what is agricultural production and of the costs and benefits associated with it may be too narrow. Frequently the division between agriculture and its up-stream and down-stream related industries, or the separation of farming from other activities that use the same resource base, such as forestry, is seen as somewhat artificial and unhelpful. The present accounting system currently does not take into account positive and negative externalities created by agriculture and the enhancement or depletion of natural resources in ways that reflect the broader impact of agricultural production.

There is a mismatch between the present array of agricultural income statistics, that relate primarily to agricultural production and the income it generates, and the dominant concern of agricultural policy - the income of farmers and their households[4]. Agriculture in OECD Member countries is no longer formed entirely (or perhaps even predominantly) of family-operated farms where the whole of the livelihood for the household comes from the farm, and there is doubt whether this has ever been the real situation. Provision exists within the framework of national accounts (SNA) for the establishment of a set of accounts for the agricultural household sub-sector (including a Distribution of Income Account, with its balancing item of Net Disposable Income) that would cover all sources of income. However, until recently this area had been little developed. The launching by Eurostat of its Total Income of Agricultural Households (TIAH) statistics has brought attention to this sort of information and its value in a policy context.

As noted above, many of the key issues in agricultural policy for which macroeconomic accounts can provide important information require microeconomic data for their further exploration. To take examples, there may be wide variation within an agricultural sector between farms of different types, sizes or regions in their income situations. The study of poverty among agricultural households demands information on the distribution of (total or disposable) incomes; a satisfactory overall average income shown in sector accounts may well hide a wide distribution and substantial numbers of cases in the low income categories. Poverty may be associated with farms of particular sizes, types and locations or particular sets of socio-economic characteristics (age of operator, education level etc.). Low incomes from farming may be combined with substantial incomes from other sources, so that the distribution of farming incomes may bear little relationship to that of total income. Cases of low total incomes in single years do not necessarily imply that incomes are permanently low, and the distribution of incomes averaged over (say) three years may display a rather different situation from distributions in single years. And low current incomes may be frequently combined with high net worths. These examples suggest that, in

4 Reviewed in: Hill, B. (1996a) *Farm Incomes, Wealth and Agricultural Policy*, Avebury.

addition to aggregate economic information, there is a need for microeconomic data that, preferably, are complementary in their underlying approaches. However, international methodological conventions at this level are less than fully worked out. and sets of harmonised results covering the OECD Member countries are not yet available.

Issues and directions of development

From the above a number of issues and areas of possible development can be identified that must be confronted if statisticians are to provide policy-makers with a firm basis for their decisions.

The **first issue** involves the overhaul of the conventional aggregate production accounts for agriculture (these will be referred to as the Economic Accounts for Agriculture, or EAA, the term used in the European Union) which are already calculated for OECD Member countries. The EAA are conceived within the framework of national accounts (though the methodology for the separate account of the agriculture branch may differ marginally from that used to measure the contribution that agriculture makes to the production account for the whole economy). They face the problem of revision to accommodate changes that flow from the overhaul of the concepts behind national accounting, changes that have been agreed in principal at the international level in the published form of the SNA 1993[5] and expressed in a way appropriate to the EU as the European System of Accounts (ESA) 1995[6]. The revisions carry implications for the basis on which the OECD collects data from its Member countries and publishes harmonised results. This issue is dealt with in **Section I.** Related to this, and included in this section, is the use of labour input estimates to construct indicators of income per unit of labour.

The **second issue** concerns the provision of aggregate statistics on the overall income situation of agricultural households in OECD Member countries (**Section II**). Within the European Union, before the advent of Eurostat's TIAH statistics in the 1990s, only Germany and France carried this out (the Netherlands has recently developed its related socio-economic accounts). Other OECD countries do not seem to have published such a disaggregated account.[7] However, impetus to this approach has been given by the prominence afforded to it in the FAO's 1996 *A System of Economic Accounts for Food and Agriculture*, by the more detailed consideration of how this is to be achieved in the SNA 1993 and ESA 1995, and in the macroeconomic orientation of Eurostat's *TIAH Statistics* that are now being published on a regular basis.

The **third issue** concerns the provision of microeconomic statistics (**Section III**). While surveys of farm businesses form a feature of most (if not all) OECD Member countries and appear to use methodologies that are broadly similar, results are not yet collected and published by the OECD as comparable tables. This represents an information gap that should be filled; the OECD might facilitate this by co-ordinating existing data sources using harmonised definitions agreed by its Members. The EU's Farm Accountancy Data Network (FADN, also known as RICA) provides a model covering fifteen countries that might be applied more widely, though its conventions are not necessarily universally appropriate. Parallel microeconomic information on the total income situation of agricultural households

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5 United Nations (1993) *System of National Accounts 1993.* Published by the Commission of the European Communities, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations, and World Bank.

6 Eurostat (1995) *European System of Accounts - ESA 1995.* Luxembourg: Eurostat.

7 The United States has published income estimates for farm and non-farm populations, but this appears to have been by a process of deducting estimates for the farm population grossed up from microeconomic survey sources from estimates for all households together.

is far less available and the utility of what exists suffers from using a wide variety of methodologies (Blandford 1996, Hill 1996a, OECD 1995a and 1995b[8]).

Within the European Union the extreme scarcity of detailed agricultural household income data for all but four or five of the fifteen Member States effectively blocks attempts to reform the CAP in ways which target aid to low income farm households. The statistical lacuna represents a substantial breakdown of the information system with regard to agriculture - a failure to service policy adequately. When it comes to analysing the extent of the income problem in the European Union, it is not possible in the present state of statistical knowledge to establish how many low income farm families there are, on which types and sizes of farms they are to be found, the ages of the people involved, and in which regions and countries they are located. Despite advances made in the last few years, comparisons of the income position of farmers with non-farmers are only possible in the broadest of terms. These are matters that might be thought central to the design and operation of an agricultural policy which has income support as a central aim. Some idea of the significance to policy of taking a household view of income is given in **Annex 2**, which summarises the findings of an international seminar of income statistics on the agricultural households (sub)sector.

Section IV deals with capital stocks and net worth. Although some matters are primarily technical in nature, nevertheless, there are issues of importance to policy, such as whether a balance sheet for the agricultural industry is a meaningful concept. In particular, the asset position of farmers and their families has been neglected in terms of statistical coverage. While there has been strong interest in the current incomes of farms and farmer households, the impact that policy has had on asset values (capital gains and losses, particularly on land) has rarely been included in income calculations, and the high equity position of farm families relative to other sections of society has usually been ignored. This is less acceptable now that a broader view is being taken of the nature of agricultural activity and the rewards that it generates.

Finally, attention is turned in **Section V** to the issue of integrating economic and environmental accounts. While acknowledging the utility of the Economic Accounts for Agriculture as currently constituted, there is a widespread recognition that the conventional boundaries of economic accounting are too narrow to reflect the full impact that agriculture is having on the use of national resources. A case can be made for an additional satellite account that integrates economic and environmental accounts (leaving the EAA intact). Correcting conventional measures for the expenditure needed to defend the environment against the negative externalities of agricultural production and for the depletion of non-produced capital is the subject of much theoretical and empirical work at the level of national accounts. However, the application of this "greening" of the accounting framework at the level of the accounts of the agricultural sector is beset by a further array of conceptual and practical difficulties.

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8 Blandford, D. (1996) Overview of microeconomic results in OECD countries and policy interests: characteristics of incomes in agriculture and the identification of households with low incomes. In: Hill, B. (ed.)(1996b) *Income Statistics for the Agricultural Household Sector.* Luxembourg: Eurostat.
Hill, B. (1996a) *op cit.*
OECD (1995a) *Adjustment in OECD Agriculture: Issues and Policy Responses.* Paris: OECD.
OECD (1995b) *A Review of Household Income in OECD Countries: Notes by Country* (OCDE/GD(95)97). Paris: OECD.

I. NATIONAL ACCOUNTS - MODIFYING THE PRODUCTION ACCOUNT OF AGRICULTURE TO COMPLY WITH THE SNA 1993[9]

The purpose of any system of national accounts is "to give the fullest possible systematic and comparable picture of the activity of an economy as a basis for analysis, forecasting and policy measures. This is done by classifying the immense variety and number of individual economically relevant transactions and the units involved in them on the basis of standard criteria, and representing them in a clear and meaningful form in a coherent set of accounts and tables." (Eurostat's Manual of the Economic Accounts for Agriculture, 1992, p7[10]). One use of such a classification has been to draw up separate accounts for production undertaken by the agricultural industry.

The role of the production accounts for the agricultural industry

The aggregate production accounts for the agricultural industry (the more precise nature of which will be explored below) have at least the following uses within the policy context:

- to monitor the contribution that agriculture, as a significant component of the national economy, makes to that economy, as measured in the system of national accounts;
- to monitor developments in the agricultural industry as a means of informing policies directed at or involving agriculture;
- to enable international comparisons to be made in the economic situations of agriculture in different countries;
- as the basis of calculating indicators of the income derived from farming by persons engaged in agriculture;
- as a source of data that can be incorporated in models of the agricultural industry and its links with other sectors (such as input-output analysis).

It follows that, for the first purpose, the accounts drawn up for agriculture must use the same bases as those for other sectors of the economy. However, the conventions used in the context of national accounts may not be entirely appropriate for the second purpose, which is more directed at servicing the needs of agricultural policy. Consequently, the Economic Accounts for Agriculture (EAA) that are constructed specifically for the production activity of this industry sometimes use conventions that differ from those used for the agriculture component in national accounts; for example, the coverage of wine or olive oil production that occurs on agricultural holdings may be treated as part of the EAA but in national

9 This section draws extensively from the papers prepared by Eurostat F1 for the Working Party on the Economic Accounts for Agriculture.

10 Eurostat (1992) *Manual on Economic Accounts for Agriculture and Forestry*. Theme 5, Series E.

accounts be excluded from this sector and included in food production[11]. This is quite permissible within the framework of national accounts; the EAA are in essence a satellite of the national accounts. Such satellites are free, to a certain extent, to define their own set of rules to cover the particular requirements of the economic accounts for agriculture in the light of (a) their specific objectives; (b) the availability of data sources, and (c) the specific nature of the agricultural units and their economic activities. However, the departures should be only responses to particular situations and not form the rule, and it should be possible to form bridge accounts to reconcile the national account and satellite account approaches.

Comparison among countries of their economic accounts for agriculture implies the acceptance and application of a uniform set of concepts and conventions. A significant example of a harmonised methodology is the EU's *Manual on Economic Accounts for Agriculture and Forestry* (Eurostat 1992, Theme 5 Series E) which forms the basis of the EU's agricultural accounts and income indictors for each Member State and the European Union as a whole. Currently these concepts are based on the United Nations' System of Economic Accounts published in 1968 (SNA 1968), from which was developed the European System of Integrated Economic Accounts of 1979 (ESA 1979). The importance, in the present context, of the Eurostat's EAA methodology stems from the fact that, up to now, the OECD has adopted the same conventions in drawing up its tables of comparable economic accounts for the agriculture sectors of OECD Members. They are set out in the "General remarks" section of the OECD's publications *Economic Accounts for Agriculture.*

Revisions in the SNA and subsequent adjustments in the ESA have introduced changes in the way in which accounts are drawn up for agriculture that present challenges to statisticians.

Main features of the economic accounts for agriculture developed within the frameworks of the SNA 1968 and ESA 1979 (summarised from Eurostat's 1992 *Manual on the Economic Accounts for Agriculture* p7-9).

In brief, the current situation, flowing from the SNA 1968 and ESA 1979, is that:

- the EAA is compiled using the concept of a **production branch** that consists of groupings of **Units of Homogeneous Production (UHP)**, that is, units producing goods of a similar type. These are not *observable units* in the sense that they correspond with agricultural holdings, since such holdings may also be involved in activities that are not strictly agricultural. Rather, they are theoretical (*fictitious)* constructs that relate only to the production of agricultural goods and services. This is sometimes labelled the "pure" branch concept;

- the agricultural production "pure" branch is deemed to comprise all those units which produce, either uniquely of in conjunction with other economic activities (i) crops and crop products of agriculture, whether cultivated or not; (ii) animals and animal products of agriculture and hunting; (iii) grape must and wine; (iv) olive oil, unrefined. However, the branch does not cover the production of butter and cheese and other manufactured dairy products, which are regarded as industrial products. The list of goods the production of which comprise the branch within the EU's EAA is determined in accordance with the version of Eurostat's Nomenclature of Economic Activities in the European Communities (NACE Rev.1) that is used for the establishment of input-output tables (NACE/CLIO).

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11 Similar differences exist within the EU's EAA and national accounts with regards to vegetable materials for plaiting, Christmas trees, some forms of animal husbandry services, farming of horses etc.

This is related to the UN's International Standard Industrial Classification of All Economic Activities (ISIC);

- the "pure" branch account includes the value of production of all agricultural products no matter where and in what type of unit they are produced; but only those products. Thus, agricultural products from units which are primarily concerned with the production of non-agricultural goods, and production from domestic gardens and allotments must be evaluated, whereas non-agricultural goods and services which might be produced on farms are excluded from the agricultural accounts. In vertically integrated establishments, only the value of output of the stage of last truly agricultural activity is included;

- the concept of the "**national farm**" is adopted. In this, output of crops, crop products and animal products is only valued where it is sold to persons or enterprises that are outside agriculture (special rules apply to sales of live animals). Thus sales between farms of production intended for intermediate consumption (within the same accounting year) are ignored when drawing up both the output and input sides of the production account; this netting out has no effect on the final output of the industry and has been adopted primarily for accounting convenience;.

- in calculating the Net Value Added generated by the agriculture branch, deductions are made for inputs purchased from other industries (intermediate consumption) and for depreciation. Changes in stocks are taken into account in this calculation;

- further deductions for the use of "fixed factors" not owned by the units responsible for production (that is, the interest paid on loans to farmers, on rent payments and on the cost of hired labour) have enabled residual incomes from agricultural activity to be calculated and a range of Income Indicators to be developed.

These conventions have proved a useful basis on which to construct aggregate accounts, though the passing of time has eroded the validity of some of their basic assumptions and reduced their utility as information on which to base agricultural policy decisions (see **Annex 3**)

Changes flowing from the 1993 SNA and ESA 1995

The 1993 SNA introduced changes and improvements (cf. **Annex 4**) that have been taken up by both the FAO in its 1996 *A System of Economic Accounts for Food and Agriculture* and by the European Union in its *European System of Accounts 1995.*[12] Not all the adjustments needed to revise the methodology of the EU's Economic Accounts for Agriculture to conform with the new framework have yet been completely finalised, although the broad outline of the changes is clear[13]. Because the OECD's practice has been to follow the EU methodology when building up its data base of aggregate economic accounts for agriculture, these EU changes are of general importance.

Some of the revisions to the EAA are largely to do with presentation. The revised EAA is to be subdivided into three current accounts (Production Account, Generation of income account, Entrepreneurial income account) shown in simplified form in Box I.1.

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12 The theoretical consequences of the ESA revision on the EAA are considered in detail in a working document for Eurostat's Working Party on the Economic Accounts for Agriculture, Doc. F/LG/277, Nov. 1994).

13 Eurostat is likely to issue a handbook for the revised Economic Accounts for Agriculture late in 1997.

Box I.1
Revised scheme of aggregate Economic Accounts for Agriculture

Production account	Generation of income account	Entrepreneurial income account
Output -Intermediate consumption -consumption of fixed capital	Net value added -compensation of employees -other taxes on production +other subsidies on production	Net operating surplus* (mixed income)** - interest paid - rent paid
- Net value added	- Net operating surplus* (Mixed income)**	= Net entrepreneurial income
*corporations; **households		

More significantly, some changes in fundamental concepts are involved (from Eurostat Working Paper F/LG/277 - contribution of Mr P. Muller). These changes concern:

- the basic **statistical unit** for describing the production process
- the **valuation** of output, and its various components, **at basic prices**
- determining the **time** at which output is recorded
- the valuation, content and recording of **intermediate consumption**
- **transactions** of the generation of income account
- **other distributive transactions**
- the content and valuation of **gross fixed capital formation** and **consumption of fixed capital**
- other points: **transport** costs, **concept of value added** at factor cost
- **market/non-market** division, measuring the volume of **labour** etc.

Here attention will focus on the more practical implications of the major changes involving the first four (capital items will be considered in a later section). The SNA/ESA revisions also have a knock-on effect for the indicators of income that Eurostat has developed from the EAA and which are used in the context of agricultural policy.

The basic unit under the revised system

Under the revised EAA the basic unit is to be changed from the UHP. While UHPs remain within the conceptual framework of national accounts and are still seen to have a role within input-output analysis, it is clear that the revised ESA gives pre-eminence to a different concept - the **Local Kind-of-Activity Unit (LKAU**). (The equivalent term in the SNA 1993 and FAO 1996 is the *establishment*). The LKAU is itself a grouping, in a distinct unit, of the production activities of an institutional unit which falls into the same class of the revised NACE. In addition to the main activity, the LKAU is deemed also to

include secondary activities belonging to other NACE classes which are connected with the main activity but where they cannot be separately identified from available information.

The agricultural LKAU will not necessarily correspond to an agricultural holding, since a holding could have both an agriculture LKAU and a LKAU belonging to some other NACE Rev.1 category (or several LKAUs belonging to different categories). In distinguishing between LKAUs within the same holding, much depends on the ability to separate in the data source the agricultural and the other activities. The view of the FAO (FAO 1996[14]) is that in many cases the holding (*enterprise*) and the LKAU (*establishment*) will coincide, but a LKAU could be only part of an establishment. From a conceptual standpoint the agricultural activities of a holding themselves might be separated into a number of LKAUs, though this is not currently envisaged as part of the practical accounting revisions; "..., it is possible that some agricultural holdings ought to be divided into two or more separate establishments if there are two or more different types of agricultural activity, as defined in ISIC, taking place on the holding and if it is possible to compile separate production accounts for them." (FAO 1996 p10 *op cit.*).

For the purpose of the EU's EAA, it is being assumed that agricultural activity will *always* be separable from other activities - that is, agricultural activity will *never* be a secondary activity. Thus the output of the branch agriculture in future within the EU's EAA will thus result from two types of activity: (i) the agricultural activity of LKAUs, and (ii) the non-agricultural secondary activities of agricultural LKAUs, which cannot be separately identified (currently excluded from the "pure" branch that consists of UHPs). It should be noted that, in this approach, all LKAUs with identifiable agricultural activity are included in the branch, and that this ensures that the potential coverage of agricultural production is the same as under the present UHP "pure" branch. If, however, it were conceded that, in practice, there are situations where agriculture is a secondary activity, this element of agricultural production would be lost to some other, non-agricultural branch.

This change broadens the coverage of activities in the new revised agricultural branch compared with the "pure" branch, although there is a proposal that, within the EU's EAA, secondary activities should be covered only if they are of economic significance to a significant number of farms in specific Member States. This corresponds to a narrower coverage of non-agricultural activities than is envisaged by the FAO.

Eurostat is proposing that, for the purpose of the EU's EAA, LKAUs should not include units whose sole purpose of production is for own-consumption (though output from other LKAUs that is used for own-consumption will be included). In effect, this will exclude family gardens and allotments; the boundary between such units and agricultural holdings is to be determined (as a default) by reference to the threshold for inclusion in each Member State's Farm Structure Survey (FSS). It should be noted that, under the present UHP branch concept, output from these is included, so this change represents a small narrowing of coverage. The exclusion of family gardens and allotments might not be an acceptable simplification in non-EU countries where the production of such units represents a more significant proportion of national output.

Measuring output - replacing Final production by Total production

The revisions to the EAA currently under discussion involve a change in the way in which the value of production is measured. At present the value of **Final production** of agriculture is calculated as

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14 FAO (1996) *A System of Economic Accounts for Food and Agriculture.* FAO Statistical Development Series 8. Rome: FAO.

the value of all agricultural products less the value of intra-branch consumption. i.e. it measures the value of products that leave the branch. Under the revised EAA an alternative measure of output, **Total agricultural production,** is being proposed; this represents the total value of all agricultural products and includes production which is then used by another agricultural unit (or the same unit) in a further agricultural process. The most important example of this is cereals and fodder plants used for animal feed. The concept of the **national farm,** on which the present EAA is built, implies that only Final production is measured. The adoption of Total agricultural production as the output measure under the revised EAA does not, of course, have an implication for Value Added, because of the off-setting change in the level of intermediate consumption.

Total agricultural production is, in theory, a more comparable measure of value of agricultural output across national boundaries. Among other advantages, it permits a more meaningful comparison between countries that import different proportions of their animal feed and provides more valid technical coefficients by which the performance of agricultural can be viewed against that of other industries (e.g. output per person). However, there are theoretical issues to be faced and substantial practical difficulties in measuring and valuing the intra-branch production.

It is difficult to draw boundaries between the various parts of the agricultural process and hence to determine what is intermediate consumption of agricultural production. In the revised SNA/ESA the output of a branch is measured as the sum of all the outputs of all the units of the branch (in the case of agriculture, all agricultural LKAUs), excluding the output used as intermediate consumption *within the same unit* (LKAU) and within the same accounting year. Sales of agricultural products between holdings (or agricultural production used by other LKAUs within the same holding) would be measured (unlike the present situation).

However, Eurostat has proposed that for the EAA an approach is adopted in which, in addition, some of the intra-LKAU intermediate consumption is measured *where this output concerns two different basic activities* (the major example is products used for animal feed). The arguments for this departure from the strict conditions of the SNA/ESA are that *inter alia*:

- this form of production for intermediate consumption within the same LKAU is particularly significant in agriculture;
- the LKAU could cover a very heterogeneous collection of different forms of production, though all agricultural;
- adopting the SNA/ESA rule strictly would not adequately meet the aims for dropping the concept of the national farm, since much output is used within LKAUs rather than being sold between agricultural holdings;
- it would enable consistency with other EU statistics, such as the Farm Accountancy Data Network results derived from surveys of farm businesses.

The value of intermediate consumption within the same unit would only be calculated when all the following criteria apply:

- when the two activities being carried out relate to different four-digit levels of NACE Rev 1 This criterion would, for example, exclude the valuation of milk used as feedstuff;

- when the output represents a significant value for a significant number of farmers - a rule to be applied independently by individual countries;

- when data on price and quantity can be known without too many difficulties.

This last point (valuing output) can be particularly troublesome where the output is not normally marketed, or where the amounts marketed are small and unrepresentative. Grass and grass products are a prime example. Details of the ways in which output used as intermediate consumption within the same LKAU can be identified and valued is still under discussion. However, it appears that only hay, silage and other animal feed products that are traded (at least in some countries) will be valued as part of total output.

Valuation of output at basic prices

The current methodology of the EU's EAA is based on valuing output at the "ex-farm" price. However, under the revised SNA/ESA all output, whether intended for sale, or stored for later sale or for any other use, is valued at its **basic price**.

Value of output at basic price is taken as;

Value at producer price (price actually received by the producer) (excluding invoiced VAT)

- Value of taxes on products (other than VAT)

+ Value of subsidies on products

Thus, valuing output at basic prices requires the explicit treatment of taxes on products and subsidies on products. Taxes and subsidies represent the amounts due (rather than actually paid) in respect to output for the year. This is in line with the general principle of the ESA that all recording should be on an accrual basis.

The main issue here is how **subsidies** are treated, and in particular what constitutes a subsidy on a product and what is an "other" subsidy on production. It should be noted that, while this partition makes a difference to the calculation of Value Added at basic prices (the difference between output at basic prices and intermediate consumption at purchaser's prices, excluding VAT and deductible assimilated taxes - which is the balancing item in the production account), it makes no difference to the calculation of operating surplus (or mixed income) of the agriculture branch. This is because the "other" subsidies on production are added in the Generation of Income Account, of which operating surplus (mixed income) is the balancing item; ("other" taxes on products and compensation of employees are also deducted in reaching operating surplus/mixed income).

Eurostat, in conjunction with Member States and after consideration of the aims of the various main forms of subsidy currently provided under the Common Agricultural Policy and the degree to which their payment is linked with the level of output, has proposed that both **compensatory aid for arable crops** and **cattle premiums,** each of which have assumed great importance following the reforms of the CAP introduced in 1992, are to be classed as subsidies on products and therefore are to be included in the

value of output at basic prices (and Value Added)[15]. However, **compulsory set-aside aid** is not linked to either production or products and is therefore classed as "other subsidies on production".

Another area in which the use of basic prices has implications is the changes in inventories, in that entries into inventories are to be made at the basic prices pertaining at the time, and withdrawals from inventories are valued by the basic price prevailing at the time of withdrawal.

Indicators of agricultural "income"

A major function of the aggregate economic accounts for agriculture has been to form the basis of the calculation of a range of indicators of what can be loosely described as "income" from agricultural production. Within the European Union the three Indicators have been as follows (Box I.2):

Box I.2
Calculation of Eurostat's aggregate "income" indicators

Net Value Added "at factor cost" (that is, adjusted for taxes on products and subsidies on products)	Deflated, expressed per unit of total labour input, and in index form = Indicator 1
minus Rents paid minus Interest payments paid (including loans for land purchase	
equals Net Income from agricultural activity of total labour input	Deflated, expressed per unit of total labour input, and in index form = Indicator 2
minus Wages and salaries paid (hired labour)	
equals Net income from agricultural activity of family labour input (the holder and his/her family, more property termed non-hired labour)*(This corresponds with OECD's "net income from agriculture" in its publication "Economic Accounts for Agriculture").*	Deflated, expressed per unit of unpaid labour input, and in index form = Indicator 3

It should be noted that the three income Indicators are expressed per unit of labour input. Thus movements in the indicator will reflect both changes in the economic aggregate and in labour input; the importance of obtaining reliable labour statistics will be covered later. An effort to include such income indicators would be one area in which added value could be provided to the OECD's publication of the Economic Accounts for Agriculture.

15 The treatment of the cattle premiums was not completely settled at the meeting of the relevant working party in July 1996.

Of the three aggregate EU Indicators, Indicator 1 (based on NVA/AWU) is the longest-established, originating in the early 1970s, and the one that receives the greatest attention in official EU publications[16].

However, a case can be made that present Indicator 3 (introduced in 1987) is to be preferred as a proxy for the rewards remaining to farmers and their families for their productive activities in agriculture (though not representing the overall flow of resources to them, which would also encompass income from non-agricultural activities, from employment, from property, from transfers and so on - issues covered in the next section of this discussion paper).

The revised SNA (and ESA) contains, in addition to the Production account and Generation of income account, an Entrepreneurial income account, the balancing item of which is **entrepreneurial income** (see Box I.1). Strictly, this account relates to institutions (such as households or incorporated businesses) although, with some assumptions about the nature of the property income involved, it can be assumed to apply to the agriculture branch.

Entrepreneurial income is calculated after adding to the operating surplus (mixed income in the case of agricultural households) the property income receivable and deducting any income and rents payable *which are related to the productive activity.* Thus, for households, an explicit distinction must be made between the assets and liabilities linked to the unincorporated enterprise's activity and those related to the household's non-productive activities. Only the former are covered. This separation may be difficult in practice. For incorporated enterprises, the deduction of property income does not include payments to owners in the form of dividends or "income to owners of quasi-corporations".

There is therefore a difference between entrepreneurial income relating to corporations and that relating to unincorporated enterprises. For the former, the entrepreneurial income is "pure". For the latter entrepreneurial income includes income from self-employed (independent) work that cannot be separated from "pure" entrepreneurial income.

In essence, entrepreneurial income corresponds with what is currently labelled in the EU's EAA "net income from agricultural activity of family labour input". But it is clear that this current term is inappropriate at the branch level, as it is a mix of reward relating to both households and incorporated businesses. Thus (net) Entrepreneurial income is a better label.

The second, and more fundamental concern with the present array of income indicators relates to their use not as aggregates but when expressed per unit of labour input. There are theoretical objections and practical problems associated with doing this even for the present Indicator 1, but they are brought to a head with attempts to express Entrepreneurial income per unit of "family" labour. A major difficulty is that the entrepreneurial income of incorporated business does not have any units of family labour input associated with it. While under the former system, such problems could be dismissed as not affecting the overall figures greatly (although this was perhaps not the case for the United Kingdom and the Netherlands), this is no longer acceptable for the enlarged Germany, where the output from enterprises that are not close to the family farm model is significant. It would also be inappropriate for many of the countries of Central and Eastern Europe who are potential Member States of the European Union.

Consequently, the European Union is proposing to revise its indicators along the following lines:

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16 Results for Indicator 1 have been calculated since 1976 and cover years from 1973 onwards for all EU Member States except Austria, Portugal, Finland and Sweden, where 1980 is the earliest year. Aggregate economic accounts have been published within the European Union since 1964, and from 1969 onwards the six original Member States adopted the common definitions and procedures of the EAA.

- NEW INDICATOR A **Net entrepreneurial income of the agriculture branch**. This includes the same elements as the previous measure "net income from agricultural activity of the family labour input". However, the title is now more accurate as the measure includes agricultural production from corporations whose labour sources are not unpaid family members. This corresponds to the OECD's "net income from agriculture" as published in its *Economic Accounts for Agriculture.*

- NEW INDICATOR B **Index of net entrepreneurial income of the agricultural branch per unit of recipient (in AWU).** This is essentially the same as the present Indicator 3, and will be retained for countries where agriculture is organised as unincorporated holdings.

- NEW INDICATOR C **Index of Factor income in agriculture per annual work unit**. This is essentially the same as the present Indicator 1.

Labour input statistics and income indicators

Aggregate measures of income derived from the Economic Accounts for Agriculture (EAA) relate to a resource base that is not constant over time. Hence changes in aggregate income may be associated with either a change in the rewards to the activity of agricultural production (resulting from a shift in relative prices of outputs and inputs, or from gains or losses in productivity) or from a change in the volume of resources used. From a policy standpoint it will be necessary to isolate these two sources of change, since a major interest will be the average rewards earned in agriculture, how these are changing and how they compare to the average rewards available elsewhere in the economy.

Conceptually it should be possible to express income aggregates per unit of resource. In practice this is problematic because of contrary movements in factor volumes. Typically the amount of labour used by agriculture in OECD countries has been in decline while the amount of capital in use has increased; consequently the mix of labour and other inputs changes. While techniques exist by which the overall productivity improvement can be assessed (in addition to the partial productivity changes for single factors) using Net Value Added, this approach to measuring income per unit of a combined (fictional) resource has not apparently been developed. One way in which the problem of changing factor combinations might be tackled would be to express income per producing business (that is, per farm or holding), though definitional problems are substantial (cf. **Annex 5**).

In the European Union, in practice agricultural income is usually expressed in relation to the volume of labour engaged in this industry. A justification given for this is that the Treaty or Rome which established the CAP and set its objectives refers to the aim of increasing the *individual earnings of people engaged in agriculture*. The Treaty ignores the complications of a more precise definition of earnings or of being engaged in agriculture. The way that this is carried out is to express income indicators (both Eurostat's aggregate Indicators 1 to 3 and the FADNs microeconomic Farm Net Value Added and Family Farm Income) per unit of labour input measured in Annual Labour Units (AWU). A new harmonised methodology for this purpose has recently been proposed by Eurostat (cf. **Annex 5**). In the cases of Indicator 3 the denominator is the labour input of the non-hired labour (usually labelled, erroneously, family labour, since some family member can be hired, in that they have contracts of employment) because payment for hired labour will have already been deducted[17].

A feature of the current methodology is that no individual is deemed to contribute more than 1 AWU of labour input, despite the assertion of many of the self-employed that they work considerably

17 The same argument applies to the use by FADN of Farm Family Income per Family Work Unit (FFI/FWU).

longer hours than do employees. Furthermore, it should be noted that what is measured by AWU is the simple volume of labour, and no account is taken of the quality of labour. Thus the input of an unskilled person of limited education, ability and enthusiasm counts equal to that of a person of much greater productive capacity (and presumably of greater opportunity cost and higher potential transfer earnings). Even the volume of labour input of self-employed persons, who dominate the labour input in most OECD countries, is notoriously difficult to measure, perhaps to the extent of it being meaningless, especially when the function of the farmer is primarily one of management rather than physical labouring (cf. **Annex 5**).

Expressing income per AWU has not gone uncriticised from a conceptual standpoint[18]. NVA is the hybrid residual reward to **all** the fixed factors in agricultural production, and will cover the rewards to both hired and non-hired labour, the economic characteristics of which are quite distinctly different. To monitor changing incomes by only taking into account changes in one of the fixed factors (labour input) is, at best, arbitrary. Removing the actual payments of interest, rent and hired labour leaves a residual that is still a hybrid, though at least the rewards relate to factors in the same ownership. But even here changes in residual income could be the result of increases or decreases in the volume or productivity of (the farmer's own) land and capital that are not taken into account explicitly when measuring income per AWU.

In the history of the EU's statistical system attempts have been made to isolate the reward to the unpaid labour input by imputing interest and rental charges for owned capital and land, but such exercises have soon foundered on the difficulties of choosing an appropriate figure[19]. When commercial rates of interest and rents are used for imputing, frequently the residuals of labour reward are very small or negative, which underlines the necessity of taking a broad view of income when attempting to explain the behaviour of farmers. Capital gains, taxation concessions, and the value placed on quality of working environment are all currently left out from the EU's income Indicators, though they may be important in determining overall returns. Low labour rewards may be not lead to a decision to leave agriculture if there is a lack of awareness of opportunity costs or if the people working in agriculture have very low transfer earnings. Parallel estimates of the residual return to capital have similarly foundered because of the problem of choosing appropriate rates at which to impute labour charges and rents.

It should be noted that the type of approach embodied in NVA/AWU is essentially one of trying to gauge the rewards to factors rather than the personal incomes of people who happen to be engaged in agriculture. Under the proposed revised scheme of aggregate indicators to be used by Eurostat, prominence is to be given to a measure of income (entrepreneurial income) that is not divided by labour input. However, provision exists for the continuation of calculating both entrepreneurial income and NVA over AWU as this appears to be wanted by policy-makers, possibly because such indicators have become firmly established in the array of information they are accustomed to see annually. No changes appear to have been published yet regarding microeconomic income concepts for use within FADN.

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18 Summarised in Hill, Berkeley (1991) *Calculation of Economic Indicators: Making use of RICA (FADN) accountancy data.* Document series. Brussels: Commission of the EC.

19 See Hill, Berkeley (1991) *op cit.*

MATTERS THAT THE OECD SHOULD CONSIDER

The OECD has to change the basis on which it collects harmonised data derived from the economic accounts for agriculture from its Member countries to accommodate changes flowing from the SNA 1993. This will involve changes to the methodology that underlies the accounts as published by OECD and to the questionnaire that is used. To manage this change:

1. ***The OECD will need to monitor the plans and progress of its Members to change their economic accounts for the branch agriculture to come into line with the SNA 1993 (or ESA 1995). Procedures for reporting and co-ordinating actions at national levels to the OECD should be investigated.***
2. ***Decisions will be needed on the revised methodology that lies behind the economic accounts for agriculture as collected on a harmonised basis and published by the OECD. In particular, the OECD should consider whether the conventions adopted by Eurostat for defining the new agriculture production branch in the EU (such as its definition and coverage of agricultural LKAUs) are acceptable for the OECD as a whole. A range of national experts should be consulted on this by the OECD.***
3. ***A forum for discussing detailed aspects of methodology should be established by OECD with the aim of increasing the degree of harmonisation of results supplied to OECD (whether or not the new methodology conforms with models established for the EU). This would enable issues such as the treatment of subsidies and of the value of output (total or final) to be considered and agreed.***
4. ***OECD should consider establishing a range of income indicators developed from the economic accounts for agriculture. These could include those currently proposed by Eurostat. Given that policy-makers show an inclination to use results for the income generated in agricultural production expressed on a per unit basis, consideration should be given to the units available, and in particular whether a theoretical labour input unit is suitable for this purpose (compared with that of the agricultural holding, the farm business, or some other unit).***
5. ***If income per unit of labour input is selected as an income indicator for use within the OECD, choices will be required on the methodology for harmonising the statistics on labour input, and in particular whether the methodology used by Eurostat is more widely appropriate.***

II. HOUSEHOLDS SECTOR

Introduction

A major component of the objectives of agricultural policy in OECD countries relates to the economic situation of agricultural households. One important component determining this is their potential power to spend on consumption or to save, a useful parameter of which is given by their disposable income. Calculation of this income could be used for the following, each of which would be of significance to the aims of agricultural policy:

- to assess **how the disposable incomes** of agricultural households **are developing** over time;
- to observe **how the components of income are changing**, and in particular the contribution to the total derived from the operating of agricultural holdings (that is, from farming);
- to **compare the absolute income levels** of agricultural households with those of other socio-professional groups and the all-households average;
- to **compare the development of incomes** of agricultural households with those of comparable groups;
- to observe the **share of total income** taken from agricultural households by taxation and other non-optional payments, relative to that experienced by other socio-professional groups.

The calculation of the disposable income of agricultural households, and of other socio-professional groups, is provided for in the framework of national accounting. The SNA 1993 and ESA 1995 contain a sequence of accounts for the households sector (II.1.2 allocation of primary income account; II.1.2.1 entrepreneurial income account; II.1.2.2 allocation of other primary income account; II.2 secondary distribution of income account; II.3 redistribution of income in kind account; II.4.1 use of disposable income account; II.4.2 use of adjusted disposable of income account). The balancing item of II.2 is disposable income, and of II.3 adjusted disposable income (the adjustment being for social transfers in kind received by households, which would include education and health care items). The use of disposable income account allocates this income between consumption and saving.

Provision exists within the framework of national accounts (SNA/ESA) for dividing the household sector account into a number of sub-sectors, of which agricultural households could form one, and of constructing separate series of accounts for each group. Comparisons could then be made, on a consistent basis, between agricultural households and other groups in terms of the compositions and levels of income, consumption and saving. In practice, until recently, few countries attempted to breakdown their households into sub-sectors. Within the European Union, only Germany and France carried this out routinely, though the Netherlands later established a set of socio-economic accounts that are closely related.

However, there are significant recent moves in the direction of creating such accounts for the agricultural household sub-sector more generally:

- Since the late 1980s Eurostat has been developing its Total Income of Agricultural Households (TIAH) statistics, which are in effect a disaggregation of the households sector distribution of income account (in which the ESA's primary and secondary accounts are combined), with the balancing item of net disposable income. By 1996, accounts for the agricultural households sub-sector of all fifteen Member States had been published together with, generally, equivalent figures for all households together. However, the degree to which non-agricultural households have been broken down into sub-groups varies among Member States.

- The FAO in its 1996 A System of Economic Accounts for Food and Agriculture gives prominence to drawing up accounts based on agricultural households, and includes an allocation of primary income account for the agricultural households sub-sector in its recommended scheme of accounts. This account covers income from entrepreneurship, from wages, interest and rent but ignores transfer income and payments (social benefits, pension etc.) and taxation. The balancing item therefore stops short of disposable income. However, the FAO recommends the construction of a secondary distribution of income account and a use of income account for agricultural households "by utilizing the standard accounts of the SNA". (FAO 1996, par. 2.36).

In view of these statistical developments, there are grounds for suggesting that OECD should encourage all its Member countries to calculate TIAH statistics and to publish the results in a manner similar to the ***Economic Accounts for Agriculture***. However, there are three main issues that must be discussed and agreed before such statistics can be generated for the agricultural households sub-sector and used within an agricultural policy context. **First** is the basis by which sub-sectoring should be undertaken. This implies settling on a definition of a household and what constitutes an agricultural household or one belonging to some other socio-professional group. The **second** is the suitability of net disposable income as a proxy for the economic situation of these households. The **third** is the practicality of constructing estimates where countries vary in the basic data at their disposal.

The basis of selecting sub-sectors - the definition of an agricultural household

Both the SNA 1993 (4.151 - 4.160) and the ESA 1995 (2.75 - 2.86) propose a scheme of sub-sectors for households and a preferred method by which this should be achieved within the context of national accounts. These proposals are far more detailed than were contained in earlier versions of the respective manuals. Households are to be divided into the following groups on the basis of the main source of income of the entire household (ESA 2.77; with a similar presentation in SNA 4.153):

- employers and own account workers
- employees
- recipients of property income
- recipients of pensions
- recipients of other transfer income
- others

However, a flexible approach is recommended, so that other ways of constructing sub-sectors may be used for particular purposes.

The system of sub-sectoring set out in the SNA/ESA is one of guidance for future development rather than a blueprint for immediate implementation. When Eurostat proposed its TIAH statistics in the late 1980s, a number of hitherto little-explored methodological issues had to be faced. These would confront any country wishing to disaggregate its households sector and must be considered by the OECD if it wishes to promote the development of this area in national accounts. The full methodology of TIAH statistics is presented in the Manual on the 1995 Total Income of Agricultural Households, Rev. 1 (hereafter called the TIAH Manual).

The TIAH Manual sets out "target" definitions and procedures. Important among these are the following:

(a) The household as the unit of measurement

For the purpose of measuring Net disposable income, the most appropriate unit is that of the household; this is already the practice in microeconomic Family Budget Surveys. The logic for preferring the household rather than the individual as the income unit is that members of households, and especially married couples and their dependent children, usually pool their incomes and spend on behalf of the members jointly. This is not to deny that there may be some differentiation; a wife may consider part of her income, perhaps some minor sums coming from outside the farm, as her own to do with as she wishes. However, in general it makes sense to use the household as the unit.

In the SNA a household is described, for the purpose of the System, as “a small group of persons who share the same living accommodation, who pool some, or all, of their income and wealth and who consume certain types of goods and services collectively, mainly housing and food” (SNA 1993, 4.132). In the methodology of the EU’s TIAH statistics, households are defined in this way, the details for each country corresponding to what happens in national family (household) budget surveys (FBS). Though not completely harmonised, the definitions of household employed in Member States typically include all members who live under the same roof and share meals. A household can consist of a single person. Large groups of persons living together in institutions (religious houses, universities etc.) are normally excluded.

This concept is one of a “dwelling household”. From a theoretical standpoint it would be preferable to exclude from the household unit those members who are completely or largely financially independent, to create a unit that shares a common budget (an “accounting household”). This may correspond to the “fiscal household” that is used in some taxation systems (comprising the couple and dependants). However, data problems in some countries that rely on household budget surveys as a primary source imply that harmonisation has usually to accept the dwelling household as the basic unit[20].

In order that households of different sizes and compositions can be brought together for income measurement purposes, it is convenient to express incomes per household member and per consumer unit. While the former is simply the result of a count of the number of persons in households, the latter uses

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20 In TIAH statistics, all but two of the Member States who have supplied results to the TIAH project have adopted the “dwelling” household as the basic unit over which income has been measured. The exceptions are Denmark and the United Kingdom. In the former, where the "family" is used, this is not felt to be a major departure since the social structure of Denmark means that multi-generation households (and other extended forms) are not common. The latter uses tax cases, as this is the only practical option in the United Kingdom.

coefficients (in the form of an equivalence scale) to express children and additional adults in terms of consumer units. A variety of approaches can be used to calculate these coefficients[21]. However it appears that, whatever scales are chosen, arbitrary judgements are inevitable. Scales devised for general application may not necessarily be suitable for application in agriculture, though they may be accepted as being the only ones available. The use of such scales is nevertheless important to any comparison between farmers and non-farmers, since agricultural households are on average larger than households in general in all Member States[22]. Small variations in the scales used are found between Member States (which may reflect real differences in socio-economic conditions between countries), but in practice most Member States adopt a standard set of coefficients; typically the head of the household counts as 1 unit, additional adults 0.7 units, and children as 0.5 units.

(b) Criteria for grouping households into those forming the agricultural household group and those forming other socio-professional groups

A range of criteria exist through which households can be grouped (e.g. income composition, labour use), and these criteria can be applied to the entire (domestic) household group, parts of it (such as the core of adults and dependants) or to a reference person (such as the nominated head of household). Some of the more practical alternatives and their associated problems for statisticians are considered in **Annex 6**.

A system based on the **main** income of a household or reference person will completely allocate all households and will place each household in one (and only one) group. Comparisons can be made between socio-professional groups that are constituted on the same basis. However, when applied to agricultural households this implies that the agricultural household group only contains those where farming is the main source. Other households with some income from agriculture, but where agriculture is not the main income source, will not be covered in the agricultural households group. Such a criterion results in a group that has been termed those that satisfy a “narrow” definition.

Largely on grounds of practicality, Eurostat’s TIAH statistics have adopted, as the target, a system of household classification based on the **main source of income** of the household reference person.

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21 Some of these methods are reviewed in Buhmann, B., Rainwater, L., Schmaus, G. and Smeeding, T. M. (1987) Equivalence Scales, Well-being, Inequality, and Poverty Sensitivity Estimates Across Ten Countries Using the Luxembourg Income Study (LIS) Database. *Review of Income and Wealth*, 33, 115-42.

22 In Eurostat (1986) *Family Budgets - Comparative Tables*, the average numbers (persons) per household were as follows, (all households followed by households headed by farmers and agricultural workers): Belgium 2.9, 4.2; Denmark 2.2, 2.8; FR Germany 2.5, 4.1; Spain 3.7, 4.2; France 2.8, 3.6; Ireland 3.7, 4.0; Italy 3.2, 4.0; Netherlands 2.9, 3.8. The reference year varies from 1978 to 1982. Part of the difference may be explained by the inclusion of households headed by retired persons in the "all households" figure. The way that elderly farmers (who may be in receipt of retirement pensions but who regard themselves still as farmers) are treated in the statistics requires careful consideration.

Box II.1
TIAH statistics - Households and their classification into sub-sectors

Household: the **household** includes all members living together (this varies in detail between Member States), and includes, in agricultural households, both those who work on the agricultural holding and those who do not.

An **agricultural household** ("narrow definition") is one where the main income of the household reference person (typically the head of household) is from independent income in agriculture (farming). A range of other socio-professional groups can be established on the same basis for the purpose of comparison. The "broad" definition of an agricultural household includes all households where any member has some income from independent activity in agriculture.

The definition of an agricultural household used here is consistent with national accounts. In other circumstances other definitions are appropriate[23]. Specific policy programmes will have target groups which may be either more or less restricted in their coverage than the definition adopted here; this is in line with the flexible approach advocated by the SNA/ESA. For some policy purposes it may be desirable to treat all households with which a holding is associated as "agricultural". Eurostat has considered this "broad" definition and the problems of estimating results to cover all the households involved.

In the EU's TIAH methodology, under the "broad" definition an agricultural household is *one which derives an income from independent activity in agriculture (other than income solely in kind).* Because of the way in which the household is defined, this means that a household is included under this "broad" approach if *any* member of the household has some income in this form. It is accepted that this could never be the basis for a complete disaggregation of all households into socio-professional groups' although comparisons with all other households (together) would be possible.

It should be noted that the agricultural household group is unlikely to consist of the same households over time. The numbers are declining in all EU Member States, and this can affect the way in which average results are interpreted. Where income composition is used as a classification criterion, short-term reclassifications of households are also possible with similar implications, although (as is reported in **Annex 6**) most EU countries employ forms of stabilisation procedure.

Definition of net disposable income

The balancing item in the secondary distribution of income account of the SNA/ESA, and the main concept used in the EU's TIAH statistics, is net disposable income. The way that this is defined is shown in Box II.2. It should be noted that this concept includes not only income from other gainful activities, but also from pensions and other forms of transfer. The value of own-produced goods consumed by agricultural households and the rental value of the farmhouse are treated as positive components of income; in principle equal treatment is applied in other sub-sectors, though such items are

23 The question of what sorts of households constitute the target for agricultural policy is tackled in Hill (1989) *op cit.* and in Hill, B. (1990) In Search of the Common Agricultural Policy's "Agricultural Community". *Journal of Agricultural Economics,* 41(3), 316-26.

likely to be particularly important among agricultural households. Elements deducted include current taxes and social contributions.

Box II.2
Definition of net disposable income for the agricultural households sub-sector and other sub-sectors within the EU's TIAH statistics

(1) Net operating surplus (mixed income)[24] from independent activity
  a) from agricultural activity
  b) from non-agricultural activity
  c) from imputed rental value of owner-occupied dwellings
(2) Compensation to members of agricultural households as employees, from agricultural and non-agricultural activity
(3) Property income received
(4) Non-life insurance claims (personal and material damage)
(5) Social benefits (other than social benefits in kind)
(6) Miscellaneous inward current transfers
(7) Total resources (sum of 1 - 6)

(8) Property income paid
(9) Net non-life insurance premiums
(10) Current taxes on income and wealth
(11) Social contributions
(12) Miscellaneous outgoing current transfers current transfers

(13) Net disposable income (7 minus 8 - 12)

(14) Social transfers in kind
(15) Net adjusted disposable income (13 plus 14)

Some features of the definition are worthy of note, since lack of awareness may lead to a misinterpretation of results. These concern the nature of the main source of income (treated here as operating surplus), the treatment of insurance flows and of interest charges, the coverage of goods and services provided by the state in kind, other income in non-monetary form, and the exclusion of capital gains and wealth (for details see **Annex 7**). Hence net disposable income must be regarded only as a partial measure of the command which agricultural households have over goods and services. There are also differences between the contents of individual items listed in Box II.2 and concepts using similar names within microeconomic sources (such as family budget surveys). However, their importance should not be overstated.

[24] Under the new ESA 1995, *operating surplus* and *mixed income* are alternative names for the same balancing item. Mixed income is the term used in the context of unincorporated enterprises owned by members of households in which the owners or other members of their households may work without receiving any wage or salary. Though farms are usually of this form, for the purpose of the TIAH methodology the term operating surplus is used for this item; this is done to avoid potential confusion between mixed income and other microeconomic income concepts in which interest and rents have already been deducted.

The methods (models) used for generating results for the agricultural households sub-sector and the problems of bringing together macroeconomic and microeconomic approaches

The diversity of data sources found in countries mean that the way in which estimates are actually created must be allowed to vary. Two broad approaches to making estimates are used, representing points on a spectrum between macroeconomic and microeconomic methodology. In practice mixtures will be used to fill particular gaps. Practical approaches are considered in **Annex 9**, summarising the respective advantages and disadvantages of subdividing household sector accounts, grossing-up microeconomic data, the potential of taxation records and the combination of microeconomic with macroeconomic data (the Hybrid model).

MATTERS THAT THE OECD SHOULD CONSIDER

1. ***Given the policy-relevance of information on the overall income situation of agricultural households, and the increasing availability of results, the OECD should consider undertaking the collection, collation and publication of Distribution of Income Accounts for the agricultural household sectors (and other socio-professional groups where feasible) from its Member countries, using a recommended harmonised methodology. The account should show the items leading to Net Disposable Income, so that the composition and level of total income of agricultural households can be monitored, and their income situations (level and trend) can be compared with that of households in general and, where feasible, with other socio-professional groups.***

2. ***Consultation should be held with Member countries on the choice of this harmonised methodology relating to the Distribution of Income Account of the agricultural households sector and for other socio-professional groups, and in particular whether it should conform to the conventions used within the European Union for its TIAH statistics, concepts that have been developed within the framework of national accounts.***

3. ***If positive action is agreed, the OECD should bring together experts from national administrations to consider details, such as the implications of adopting a "narrow" and/or a "broad" definition of an agricultural household, the definition of income etc..***

4. ***Where such calculations are not already undertaken, OECD should act as an agent for the interchange of experience on how this might be done, recognising that countries differ in their existing data sources.***

5. ***The OECD should establish and maintain links between the statisticians dealing with agricultural household results and others dealing with national accounts, where there may be proposals to carry out a general disaggregation of the households sector into sub-sectors under the guidance of the SNA 1993. Particular attention should be paid to what methods will be used, and whether agricultural households will form one group.***

III. MICROECONOMIC DATA - PROVIDING HOUSEHOLD-LEVEL AND FARM-LEVEL ECONOMIC DATA TO COMPLEMENT NATIONAL ACCOUNTS

The need for microeconomic information to complement that coming from aggregate accounts

This discussion paper has concentrated so far on aggregate accounts for the agricultural sectors of national economies (the production account for the agriculture branch and the distribution of income account for the agricultural household sector), both of which are drawn up within the conceptual framework of national accounts. Regional breakdowns in this context relate to administrative sub-divisions (Provinces, Länder, States, etc.), with further disaggregations. The European Union has drawn up a nomenclature of statistical territorial units (NUTS) which classifies the regions of Member States in three interrelated levels. The concepts adopted for drawing up regional accounts are identical to those for agricultural accounts at the national level and regional results are regularly published. The regional sub-divisions can be considered as an intermediate level between the micro- and macroeconomic levels. Regional agricultural production accounts (such as those prepared by Eurostat) depend on surveys of farms to provide basic data for grossing up to regional level or to generate distribution agents by which economic aggregates can be broken down[25]. Disparities between macro and micro statistics are a familiar problem, though the recent revisions to the SNA/ESA have moved the systems somewhat closer together conceptually (see **Annex 8**). In principle, regional breakdowns could also be made for the agricultural household sector's distribution of income account, though this is not at present carried out.

However, even regional aggregate results can only provide summary-type information to service questions associated with agricultural policy. Many policy issues involve distributional aspects for their analysis (for example, the incidence of poverty in agriculture, the distribution of benefit from agricultural support between farms of different sizes, types and regions). Some idea of the importance of the diversity within agriculture can be given by the review of findings given in **Annex 10**.

A case will be made that **more internationally comparable microeconomic results should be collected and collated**. This section should be seen as taking the OECD's Structural Indicators Project (SIP) a stage further by (a) attempting to integrate microeconomic statistics with the aggregates of national accounts and by (b) proposing a harmonised basis on which the OECD could collate statistics for farms and for agricultural households **that should facilitate comparisons across national boundaries.**

OECD's ability to provide a cross-country perspective which strengthens its assessment of policy changes is one of its important - and recognised - functions. The OECD has built over the years a solid reputation for being able to provide more harmonised "value added" statistics in a number of statistical fields (such as the SNA, Main economic indicators, Labour statistics etc.) which have proven to be one of the key-inputs into analytical work.

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25 Regional agricultural accounts in the EU are limited to a few aggregates: these include value added, subsidies, taxes, employee remuneration, rent, interest and GFCF. It seems that a major way in which regional figures are calculated is by using data from the Farm Structure Survey to distribute national aggregates.

Microeconomic data in agriculture relate, in the main, to two types of overlapping but distinct institution - the farm business and the farm family household. Results are generally available in OECD countries from surveys of farm businesses that can be used to complement the information coming from the aggregate Economic Accounts for Agriculture (see also the summary on the policy roots of microeconomic data sources provided in **Annex 11**). While there is a harmonised methodology for collecting and analysing farm survey data in the European Union (within the Farm Accountancy Data Network, or FADN/RICA), no broader multi-country assembly of tables of farm-level data based on a common set of definitions appears to be published. However, a feature of such surveys is that their coverage usually concentrates on those larger businesses that are together responsible for generating the great majority of agricultural output; relatively little is known about the many enterprises (in the European Union corresponding to about half the agricultural holdings) that are responsible for the rest. These excluded units, while not important in the context of policies that are primarily concerned with production, or even land use, may well be of greater relevance to policies with aims that are more social in nature (income support, rural development and so on). Indeed, the cases of greatest policy interest may be largely among this excluded group. Another characteristic of official farm business surveys is that they frequently restrict their coverage to what is deemed to be agricultural in nature; in a world in which many businesses engage both in farming and other activities, there is a danger of leaving out some important explanatory factors for levels of investment etc. Notwithstanding these problems, there is an opportunity here for the OECD to exercise a facilitating role by establishing a common methodology by which the considerable quantities of farm-level data that already exist can be brought together and published as comparable statistics.

When turning to microeconomic data on agricultural households that could be used to further explore patterns found in the aggregate accounts for the agricultural households sector, the situation is far less satisfactory. Data relating to the overall economic activity of households that, *inter alia,* occupy a farm are only patchy and incomplete (**Annex 12**). While some countries have several good sets of data based on households, for many there is a dearth of systematic, regular and reliable results. Moreover, there does not appear to be an internationally accepted accounting framework for application at the household level by which, for example, the OECD could synthesise general patterns.

This problem is amply demonstrated when attempts are made to generalise the characteristics of the overall income situation of agricultural households; a recent report by the OECD[26] attempted to present some general conclusions concerning the income of agricultural households in OECD countries but, for the reasons stated above, found so many discrepancies between countries in definitions, concepts and coverage that the results had to be heavily qualified. Such information gaps appear to act as a constraint to the debate on the reform of agricultural policy.

The basis of more harmonised microeconomic data

Given that greater harmonisation between sets of microeconomic data is needed before meaningful comparisons between OECD countries can be made, some elementary yet fundamental decisions have to be taken by statisticians.

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26 OECD (1995) *A Review of Farm Household Incomes in OECD Countries.* Background paper to *Adjustment in OECD Agriculture: Issues and Policy Responses.* See also: Blandford, D. (1996) 'Overview of microeconomic results in OECD countries and policy interests: characteristics of incomes in agriculture and the identification of households with low income', In Hill, B. (ed.)(1996b) *Proceedings of the International Seminar on Income Statistics for the Agricultural Households Sector.* Luxembourg: Eurostat.

(a) When considering data that relate to farm businesses as institutional units of productive activity

i. *Agreement on the definition of farming*. There is international agreement on what constitutes agricultural production (e.g. International Standard Industrial Classification (ISIC), Nomenclature of Economic Activities in the European Communities, (NACE Rev.1)) and it should not be difficult to decide whether an enterprise undertakes this activity. In practice agricultural holdings frequently also engage in forms of production that are not narrowly agricultural, some of which are part of single production systems (such as farm-forestry in Nordic countries), some is allied to it (such as small-scale farm tourism or food manufacturing or other up-stream and down-stream activities) while some forms bear little relationship to it (other business activities that the farm operator happens to be involved with). The policy interest may be in a wider range of land-using or rurally-based activities than is embraced by the conventional industrial classification, even if these include secondary activities (in the sense of the SNA 1993 or ESA 1995).

ii. *Agreement on what constitutes a single business unit*[27]. Agricultural statistics are often collected in terms of agricultural holdings that relate to specific pieces of land, not usually in terms of farm businesses. There is a potential for a business to consist of a number of land holdings, in which case there is the problem of deciding at what point it becomes appropriate to treat the various parts as independent units. While precision concerning the holding/business unit is not important when the interest is in industry-level parameters (aggregate output etc.), incorrect assumptions over what constitutes a single business can have significant implications on distributional issues (even for descriptive statistics such as the size-distribution of farms).

iii. *Agreement on what constitutes an agricultural business*. A business could be classed as agricultural if it engages in any agricultural production (including ancillary activities), or where it is the main activity or a secondary activity, or where it is the main activity only, or where agriculture accounts for a given share of its total production. Proportions could relate to individual accounting periods or to a longer period. In the EU's FADN, farms are not excluded from the field of observation if they engage in other activities, though it is common in the European Union for the classification of taxation records to be on a main activity basis.

iv. *Setting a minimum size threshold*. There is always a difficulty in distinguishing between a unit that is really only a large garden, where agricultural production takes place completely (or almost completely) for own-consumption, and larger units that intend to sell all (or almost all) of their output to others. As noted in Section 1 above, though at present garden production is included in the "pure" agriculture branch (defined in terms of UHP), the revised EAA proposes to exclude them. The proposed new threshold for the EAA will correspond to that for inclusion in the EU's Farm Structure Survey, which is not the same as that (typically higher) threshold applied for inclusion in the FADN / RICA farm business survey. Agricultural policy of OECD Member countries in normal times appears not to be greatly concerned with garden production (though this changes in times of national emergency). However, for administrative convenience, the threshold may be set somewhat higher to also exclude units with production for sale but where in aggregate these account for only a tiny proportion of national totals[28]. Differences in these thresholds could lead to major impacts on distributional statistics.

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27 The FAO has a target definition of an agricultural holding for application in the World Census of Agriculture. Based essentially on a single management unit, it may be a useful starting point for considering farms as business units.

28 Within the European Union the FADN applies a minimum threshold defined in terms of European Size Units (ESUs) that are based on standard Gross Margins. The aim is to apply a threshold that covers the great majority of production, and this

(b) When considering data that relate to agricultural households

Harmonisation of data relating to agricultural households will need to consider a set of factors that overlap with those in (a) above (such as what constitutes agricultural activity). The degree of overlap depends in part on the criterion chosen to distinguish between agricultural and non-agricultural households. Many of these were encountered in Part II when the agricultural households sector within the framework of national economic accounts was discussed.

Key issues are the following:

i. *Coverage of households.* Perhaps the most critical point relates to the coverage of households (i.e. to which households are classed as agricultural households), since results from a number of countries point to the sensitivity of group characteristics (household numbers, levels of disposable income, proportion of income coming from agriculture, and share of total income taken by taxation and social contributions) to the way in which the group is selected. Criteria encountered at microeconomic level include domicile on a farm (United States), operation of a farm (United States), derivation of an income from farming (many OECD Member countries), labour input to farming (many OECD Member countries). Of particular importance is the distinction between those households who derive *some* income from farming (such as the EU's TIAH "broad" definition of an agricultural household) and those where it is the *main* income source (TIAH "narrow" definition).

ii. *The unit for classification purposes.* Mention has been made in Part II of the use of a reference person's characteristics (rather than those of the entire household) to classify households. This is done usually for practical reasons. However, in some countries there can be substantial differences between the results using a household or a reference person for classification, and between using an income or a time criterion, so harmonising a single approach to classification is preferable.

iii. *Household unit and ways of bringing them to a common base*. There is potential for disharmony in the nature of the household unit ("dwelling" unit or "common budget" unit) and in the equivalence scale used to reduce households of different sizes and compositions to a common base. Such problems will be most significant in countries where the extended family predominates.

threshold will reflect the holdings size structure of the country; thus thresholds are country-specific (in 1987 the thresholds varied from 1 ESU in Portugal and 2 ESU in Greece, to 12 ESU in Belgium and 16 ESU in the Netherlands). In the United States a farm is a place which sold or would normally have sold $1,000 in agricultural products. In Canada's Taxation Data Program data relate to the income of families involved in a single unincorporated farming operation with a total farm revenue of $C10,000 and over.

iv. *Concept of income adopted.* There is a recommended definition of disposable income for use in microeconomic studies (UN 1977, Puurunen 1990)[29] that differs from the equivalent term in national accounts in that it does not consider certain transfers between the households sector and the insurance sector and non-profit institutions serving households (such as trades unions, churches etc.). In practice among microeconomic sources there are differences between countries in the coverage given to imputed items (such as the rental value of the dwelling house), to income in kind (own-consumption), to capital depreciation of items used in production (some sources ignore it), to expenses of running the household, to the coverage of income that is non-taxable, and to welfare transfers.

Integration between microeconomic information coming from surveys and the macroeconomic information based in national accounts is facilitated if the two levels adopt the same (or similar) definitions. This may involve developing satellite macroeconomic accounts that provide a coverage of items that parallels microeconomic income concepts (satellites along the lines of the Socio-Economic Accounts of the Netherlands).

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29 UN (1977) *Provisional Guidelines on Statistics of the Distribution of Income, Consumption and Accumulation of Households,* Studies in methods M61, New York, UN.
Puurenen, M. (1990) *A Comparative Study on Farmers' Income.* Research Publication 62-1990. Agricultural Economics Research Institute, Helsinki.

MATTERS THAT THE OECD SHOULD CONSIDER

1. ***Given that there is a lack of harmonised microeconomic information relating to agricultural businesses in OECD countries that can be used to complement the aggregate Economic Accounts for Agriculture, and that the gap represents a significant handicap in the design and monitoring of agricultural policy, the OECD should consider adopting a target methodology relating to microeconomic statistics on farm businesses. This methodology should be worked out in consultation with experts on farms accounts in Member countries.***
2. ***Any such target methodology should not place restrictions on methodologies that are applied at national levels, but should adopt common conventions (coverage, accounting concepts, definitions of agriculture, of single business units, of income etc.) that can be applied across OECD Member countries. Compatibility with aggregate economic accounts for agriculture should be a factor in determining the methodology.***
3. ***Using this methodology, the OECD should collect, collate and publish farm-level results, with an emphasis on the distributional aspects that are of particular importance to policy (results by farm size, type, income level, region etc.).***
4. ***Given that internationally comparable microeconomic statistics on the overall (personal) income situation of agricultural households are not generally available, and that this represents a major gap in the information necessary for the design of agricultural policy and its reform, the OECD should establish a system to provide such statistics.***
5. ***The OECD should establish, in consultation with national experts in Member countries, a target methodology for this purpose. Harmonisation of approach would require, in particular, common definitions for:***

- ***the nature of agriculture (to include or exclude forestry, food processing etc.)***
- ***an agricultural household (income or labour criteria, "narrow" or "broad" approaches), and***
- ***the income concept***

6. ***The OECD should act as a facilitator where household income statistics are not yet adequate, by enabling experts to meet and share experiences of alternative data sources, approaches etc.. While in some countries data on agricultural households might be seen as a development of surveys of farm businesses, in others it may be preferable to utilise administrative registers, taxation data, family budget surveys etc..***
7. ***Using this methodology, the OECD should collect, collate and publish harmonised statistics on the income situation of agricultural households, including, inter alia, distributions of households by level of total income and by components of income.***

IV. CAPITAL ACCUMULATION ACCOUNTS AND MEASUREMENT OF CAPITAL STOCKS AND OF NET WORTHS

Introduction

Knowledge of the capital situation of agriculture is important to analysts of agricultural policy for reasons that include the following:

- Measures of income from production need to take into account the consumption of inputs that takes place over a number of production cycles - the consumption of 'fixed' capital. The deduction of capital consumption produces income measures that are "Net" rather than "gross". Some countries have difficulties in making estimates, and harmonisation on gross income figures may be the only short-term solution[30]. It should be noted that capital consumption may differ from the amount spent on new capital assets in a particular period (Gross Fixed Capital Formation - GFCF), the difference representing a positive or negative Net Fixed Capital Formation (NFCF).

- Changes in Gross Stock (the accumulated Gross Fixed Capital Formation less retirements from the capital stock as assets are withdrawn) or in Net Stock (accumulated NFCF) are often looked at as representing changes in the productive capacity of an industry in the short and long terms respectively. The ability of agriculture to at least maintain its capital stocks will be necessary to ensure future productive ability.

- The ways that capital stocks are owned and financed is of importance to income measurement. Interest on loans for the purchase of (or secured on) fixed and working capital and land are deductible items in reaching income indicators based in the EU's aggregate Economic Accounts for Agriculture and its microeconomic Farm Accountancy Data Network (FADN/RICA)[31]. The ranking of countries, or individual farms, on the basis of NVA will be changed when their varying degree of reliance on outside finance is taken into account. There is also a continuing policy interest in the proportion of the residual income that is taken by interest - a function of the size of borrowings, the rates of interest and the amount of (pre-interest) income that agriculture is generating.

- Real gains on capital assets (including land) and to a lesser extent on financial assets such as loans when inflation occurs, can be taken as a form of income to their holders, in that they can be turned into current income in a variety of ways and spent on consumption without reducing the value of the assets held. Losses are similarly negative items. Such gains (and losses) can be highly significant to the economic situation of farm households. Frequently changes in (real) asset values can be linked to policy actions. However, capital gains on fixed assets are not taken into account when measuring

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30 The issue of the depreciation of breeding livestock is a case in point.

31 Some countries take the view that the ownership of agricultural land and the provision of its services is separate from the process of agricultural production. Thus the United Kingdom has excluded loans made specifically for land purchase when calculating the interest to be deducted from NVA.

aggregate income in the Economic Accounts for Agriculture and are usually ignored in surveys of farm businesses.

- The net worths of agricultural households is a major element in their "economic status", that is, their potential ability to consume that reflects both current income and net worths. Situations are frequently found in agriculture where low current incomes are combined with great wealth; clearly these cases are not in the same position regarding their potential to consume as cases where there is no net worth that can be drawn upon (by sale, taking out loans etc.). There are obvious policy issues here:

  - ♦ support to farmers may be questioned if, as a group, they are more wealthy than the groups from whom the transfers are made;

  - ♦ can policy mechanisms be devised that solve problems of low incomes by turning the substantial assets owned by cases into a more liquid form?

  - ♦ what is the appropriate way with which to combine income and wealth into a single indicator?

Many of these issues require both aggregate and microeconomic statistics to be explored satisfactorily.

Challenges to statisticians

Capital consumption and capital stocks

The SNA 1993, within its series of accounts, provides for accumulation accounts and for balance sheets. The first accumulation account records acquisitions and disposals of (non-financial) assets as a result of transactions with other units or internal bookkeeping transactions linked to production (changes in inventories and consumption of fixed capital). The "uses" side records:

- gross fixed capital formation
- changes in inventories
- consumption of fixed capital (negative items)
- acquisitions less disposals of valuables and non-produced, non-financial assets, including land

Capital consumption relates to assets that are owned by institutions - in the case of agriculture mainly households or corporations. It is debatable whether the concept can be applied to LKAUs where these form parts of agricultural holdings that are also active in other forms of production, as it will be difficult to allocate the consumption between the agricultural and non-agricultural activities (e.g. the wearing out of tractors or buildings). It is even less likely that consumption should be attributed to a "pure" branch made up of fictional UHPs without making some rather heroic assumptions, but this is current practice in many countries. It follows that there may be objections on theoretical grounds to such estimates.

Estimates of capital consumption reflect two main parameters - the size of the gross stock and the rate at which it is consumed. Alternative approaches can be used, but all tend heavily to be data-

demanding (see **Annex 13**). The SNA 1993 has required some changes in the way in which calculations are made.

Capital balance sheets for agriculture

Balance sheets within the framework of the SNA and ESA show the values of the stocks of assets and liabilities held by institutional units or sectors at the beginning and end of an accounting period. These sheets will reflect changes in the accumulation accounts. In practice, within the EU, balance sheets have not yet been developed to accompany the aggregate Economic Accounts for Agriculture and they are not collected and regularly published by the OECD; one has to turn to national examples for a flavour of their contents and how they can be used in a policy context (see **Annex 14** for information for the United Kingdom and the United States). However, the FADN does contain information on assets and liabilities for the 60,000 or so farm businesses it covers in EU Member States.

Estimating the net worth of the agricultural industry depends on satisfactory specifications and measurement of both the assets and liabilities used in farming. Typically, the view taken is essentially similar to that of the "national farm" used in the production account, since only the assets and liabilities that are assumed to be directly linked with agricultural production are included. However, the simplistic view that agricultural assets and liabilities can be separated off from other assets and liabilities is rather unsatisfactory, both from a theoretical and a practical viewpoint. For those farmers that have interests in other industries - even if this is only in the form of surplus farm cottages that are let to people who do not work on the farm - no barrier will exist between the agricultural and other assets under their control. On the liability side, a good deal of uncertainty has always surrounded the division of lending by commercial banks to farmers; it is impossible to distinguish a loan for purely production purposes from one for personal consumption (especially for items which cross the divide, like farm cars) because the overwhelming majority of farm businesses are arranged as sole proprietorships or partnerships, with no clear division between business and private finances. Added to this, the amount of private and merchant credit has always proved difficult to gauge.

Net worth at the level of individual farm businesses and households

At the level of the individual it is possible to examine assets, borrowings and net worth on the basis of social units (farmers as individuals or their households) or, with some simplifying assumptions that mirror those of the national farm, on the basis of unincorporated farm businesses, although this again is not entirely satisfactory. For incorporated business, of course, it is possible to establish a clear boundary around their assets and liabilities, but the number of these is a small minority in most OECD countries.

Balance sheets at microeonomic level overwhelmingly use not the household as the institutional unit but the farm business. Surveys of farm businesses in many countries, including the EU's Farm Accountancy Data Network (FADN/RICA), measure the levels of assets, liabilities and net worths of farms in their samples. In principle there should be no problem in establishing distributions of farms by level of asset value or net worth, though such analysis is rarely carried out, even in the United States where attention is more frequently focused on differences in averages between states and regions (Weldon,

Moss and Erickson, 1993[32]). In practice, publications concentrate on the levels of indebtedness (distribution of farms by total borrowing or by the ratio of their liabilities to assets). The usual practice of these surveys (and that followed in the United Kingdom and by FADN) is to restrict consideration to the assets and liabilities directly attributable to the farm business. As noted above, when discussing the aggregate position, assets may be held outside the farm and other liabilities incurred, but these are not brought into the assessment. There is fragmentary evidence that data based on farm businesses are missing significant amounts of other assets owned by farm households[33].

Among families running unincorporated farms and who own their land, the individuals who own the business will not necessarily correspond to those who own the land. This is obvious with tenanted land rented commercially, but also often applies to ownership within families. In the United Kingdom it is not uncommon to find on a single farm parcels of land being owned individually by the farmer, his spouse and other members of the family, with perhaps some also owned jointly, the pattern reflecting the way in which the farm has been put together over the years by purchase and inheritance and by decisions to pass part of the land to the next generation. When land is held by trusts or similar legal devices, the *de facto* ability of the farmer to exercise the normal rights, such as disposal, may not be transparent (Commission, 1981[34]). Such situations make for difficulty in establishing the assets side of the balance sheet.

To sum up, attempts to construct a balance sheet for the agricultural industry and for individual farm businesses involve making rather heroic assumptions about the separability of farming from other activities, assumptions that are increasingly under question given the recognition of multiple income sources of many farm households. Where data are collected on what purports to be agricultural assets and liabilities, these form an imperfect guide to the wealth or net worths of farmers and farm households. The extent of the divergence of personal wealth of farmers and their households from farm business assets is difficult to judge, and suffers from the same problem of what constitutes a farmer or farming households as was encountered when incomes were considered.[35]

Capital gains as income

Real capital gains (that is, those that exist after changes in the value of money have been taken into account) are a form of income. A good case can be put that capital gains and losses should be looked

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32 Weldon, R. N., Moss, C. B. and Erickson, K. (1993) The Distribution of Farm Wealth in the United States, *Agricultural Finance Review*, 53, p100-9.

33 A survey in England in 1969 (Harrison, 1975 *Farmers and Farm Businesses in England*, Miscellaneous Studies 62, Department of Agricultural Economics, University of Reading) found that, in addition to the farming capital they owned, 14 per cent of farmers (corresponding to 11 per cent of farms, the difference being explained by some farms having more than one business principal) had assets outside farming equal to at least 50 per cent of their net worths as farmers. About one third of these farmers farmed only in a small way (in terms of farm assets) but for the rest farming was by no means an insignificant activity. No comparable survey has been conducted since this information was gathered.

34 Commission of the European Communities (1981) *Factors Influencing Ownership, Tenancy, Mobility and Use of Farmland in the United Kingdom.* Information on Agriculture No 74. Luxembourg: The Commission.

35 For the UK there are a few indicators from information on part-time farming and from income tax records. About one third of UK farmers covered in the Structure Survey in 1989 had another non-farm gainful activity off the farm, probably nearer a half if spouses were included. The principle form this took for the farmer was self-employment in some other business run in parallel with the farm;. this implies the ownership of some non-farm business assets, but their extent is not known. Another fragment of information relates to income from rents and investments accruing to farmers in the Survey of Personal Incomes (MAFF, 1994 and similar annual publications); in the tax years 1977-78 to 1991-92 investment income for the tax cases classed as agricultural or horticultural accounted for between 18 and 28 per cent of their total taxable income. Grossing up these receipts according to expected yields to achieve a valuation of the assets which generated the investment income would of course be possible but might be wide of the mark unless the types of holdings could also be ascertained.

at over a run of years; land is normally treated as a long or medium term asset. While they differ from current income in terms of liquidity, certainty and measurability, they nevertheless constitute potential spending power that can be exercised without the diminution of the spenders stock of assets. At the farm level capital gains and losses have direct repercussions for a range of behavioural issues. They carry influence on consumption levels and production and investment decisions. They affect savings, with a higher propensity for farmers to save from gains as opposed to current income (Bhatia, 1972[36]). One important repercussion of capital gains is probably a changed attitude towards risk resulting from enhanced wealth. According to Hearn (1977[37]), farmers who had experienced gains could be expected to take on investments and enterprises of higher risk characteristics and thus have a different farming pattern from those who had not. Capital gain can be turned into spending power in a variety of ways, including borrowing on the strength of an improved equity position and the avoidance of having to make provisions for pensions out of current income. Capital gains are also a factor causing farmers to stay in the industry or to quit; anticipation of rising land prices and the preferential taxation given to capital gains, especially on retirement, has been seen as a substantial brake on structural change to a farm size pattern more in accord with the technical and economic conditions of the present (Hearn, 1977; Perry *et al.*, 1986[38]).

The distributional aspects of capital gains and losses can also be important. In the United States Gardner (1975)[39] has estimated incomes of farmers including unrealised capital gains in a "normal" year. This resulted in a substantial reduction in the number of farm families which fell below the poverty line. Harrison (1975) looking at capital gains in England through a survey of farms found that the total capital gains which had accrued were by no means equally shared among farmers but had gone to those who had owned the most land and to those who had owned it longest. Also, farmers had not reacted in identical fashions even though they may have faced identical gains both in total and in time. In the United States there were regional differences in equity gains and losses that could be linked to income expectations flowing from policy decisions on commodity support programmes, implying that some types of farm were affected more than others (Weldon, Moss and Erickson, 1993). A less intuitive finding comes from Hearn (1977) who calculated the value of gains for the United Kingdom over the period 1950-74 and found that, at the individual farm level, capital gains were more important compared with current income among large farms than among small ones. This was because of differential rises in the price of land and because of lower incomes per acre among larger farms. In this case, including capital gain with current income had the effect of increasing the inequality in the distribution of income.

However, few countries make official estimates of capital gains for their agriculture. Examples for the United States, Canada and Denmark are given in **Annex 15**.

Net worth of farmer households and their economic status

Though comparisons between farmers and other sectors of society are most frequently made in terms of incomes, ranking in economic terms should also consider their net worths. Statistics on this are

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36 Bhatia, K. B. (1972) 'Capital Gains and the Aggregate Consumption Function'. *American Economic Review*, 62, 866-79.

37 Hearn, S. (1977) *Farm Incomes and Capital Gains: Implications for Structural Change.* PhD thesis, Wye College, University of London.

38 Perry, G. M. *et al.* (1986), The Effects of Equity Position, Credit Policy, and Capital Gains on Farm Survival, *Agricultural Economic Research.*

39 Gardner, B. L. (1975) *A Full Income Approach to the Measurement of Rural Poverty*, Economic Research Report 34, Department of Economics and Business, North Carolina State University, Raleigh.

rarely available. What exists suggests that farm families are well placed on average (**Annex 16**). This is important from a policy standpoint.

In order to express income and wealth in a common measure the usual approach is to calculate the annuity value of net worth, that is an annual income stream of equivalence to the lump sum. This is added to conventional income to give a parameter of the total flow of economic services at the command of the consumer unit. The method was expounded by Weisbrod and Hansen (1968[40]) in general form and later applied with particularly telling results in agricultural contexts. The determinants of this income-equivalent are the amount of net worth (NW), the life expectancy of the recipient (n) and the rate of interest (r). The three are linked by the following formula (from Weisbrod and Hansen, 1968):

$$\text{Annuity value} = NW \times \frac{r}{1 - (1-r)^{-n}}$$

The shorter the expected life and the larger the sum annuitised, the larger will be the income stream equivalent. Normally the life expectancy would be that of the wealth owner, but in the case of couples it is not unreasonable to use that of the person expected to live the longer. The application of this formula, using various sets of assumptions, is to greatly change the perceived economic situation of agricultural households; examples are given in **Annex 17**.

40 Weisbrod, S. A. and Hansen, W. I. (1968) An income-net worth approach to measuring economic welfare. *American Economic. Review*. 53, 1315-29.

MATTERS THAT THE OECD SHOULD CONSIDER

1. ***The OECD should consult with experts in Member countries on (a) the steps that are being taken to adjust estimates of the calculation of capital consumption to the SNA 1993, and (b) the existence of any major disparities in calculations (such as the treatment of the depreciation of breeding livestock) that could undermine the comparability of net income figures.***
2. ***In view of the probable interactions between the various assets and liabilities owned by households that operate agricultural holdings and the practical difficulties of separating them, the OECD should consult with national experts on the validity of drawing up a balance sheet for the agriculture branch (in the "pure" UHP form) and any further complications resulting from the redefinition of the agriculture branch as comprising LKAUs under the SNA 1993.***
3. ***The OECD should consult with national experts on the feasibility of drawing up balance sheets for agricultural households (in aggregate and giving distributions), which would cover all their assets and liabilities, with perhaps a distinction being drawn between those that relate to the households' productive activities (farm and non-farm) and those that are essentially related to consumption. In particular consideration should be given to whether this should relate to all households that operate a holding, or only those that could be labelled as agricultural (on the basis of the main income source of the head of household, or the entire household, or according to the balance of assets held).***
4. ***Given that agricultural policy actions are frequently associated with changes in asset values that are currently not taken into account in income measurement, the OECD should consider how capital gains (and losses) might be calculated on a harmonised basis for the agricultural industry as a whole or disaggregated (such as by region, farm type). Experts in OECD Member countries should be consulted on the details that might lead to a target methodology. Key elements in the methodology need to be identified that would receive widespread support (such as choice of period over which to measure gains, types of asset to be included etc.).***
5. ***The OECD should consider the potential utility of statistics on the net worths of farmer households within the context of the information offered to policy-makers in agriculture, and consultations should be held with experts in OECD Member countries on the feasibility of making calculation of the economic status (a concept that combines current income with annuitised net worths) of their farmer households.***

V. ENVIRONMENT ISSUES IN ECONOMIC ACCOUNTS

Introduction

Environmental issues constitute an area of public concern in OECD countries and the basis of policy action in their own right. There are also important interactions between the environment and other policies, of particular interest in the present context are those that are directed primarily at the food and agricultural system and the rural economy. There is a particular concern to ensure the economic and environmental sustainability of resource use in agriculture, such that future agriculture and food needs can be met.[41] The OECD has encouraged an integrated approach to agricultural and environmental policy[42]. In recent years the OECD has intensified its work on analysing the policy linkages between agriculture and the environment. A key part of this work has been the development of a set of environmental indicators for agriculture[43].

Changes in the environment can be accounted for in physical terms that relate both to the volume of attributes (e.g. stocks of forest area, and changes over time) and their quality. Natural resource accounting focuses on physical asset balances (opening and closing stocks and changes therein) of materials, energy and natural resources. Where appropriate, changes in quality of resources can also be involved. The UN has developed a *Framework for the development of Environmental Statistics* to assist countries with such an approach. Data on physical attributes are useful in promoting understanding of the wider impact of changes (see Repetto *et al.* 1989)[44].

As part of its programme on environmental indicators and accounting, the OECD has carried out work on physical natural resource accounts, i.e. forest and water accounts, as well as on pollution abatement and control expenditure. The OECD also acts as a forum in the areas of environmental accounting, and regularly organises seminar sessions to take stock of recent developments in Member countries[45].

However, in the present context the main interest must be how aggregate *economic* accounts might be used to reflect environmental change. For this to be accomplished, changes in physical characteristics must be capable of expression in monetary terms. This section deals with the conceptual problems encountered where environmental elements are introduced to the conventional framework of the

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41 See OECD (1995) Sustainable Agriculture: Concepts, Issues and Policies in OECD Countries.

42 See for example OECD (1989) *Agricultural and Environmental Policies: Opportunities for Integration*; OECD (1993) *Agricultural and Environmental Policy Integration: Recent Progress and New Directions.*

43 See OECD (1997) Environmental Indicators for Agriculture and OECD (1996) *Work on Agriculture and the Environment.*

44 Repetto, R., Magrath, W., Wells, M., Beer, C. and Rossini, F. (1989) *Wasting assets: natural resources in the national income accounts.* Washington: World Resources Institute.

45 See the following General Distribution documents: OECD (1986) Information and Natural Resources, OECD (1993) Natural Resource Accounts: Taking Stock in OECD Countries, OECD (1995) Environmental Accounting for Decision-Making, Summary report of an OECD Seminar, OECD (1996) Pollution Abatement and Control Expenditure in OECD Countries.

aggregate Economic Accounts for Agriculture. It must be stressed that there is no suggestion here that the EAA should be displaced or discontinued; the EAA is founded on well-understood principles and has been widely used as a major policy tool. Rather, attention is concentrated on the opportunity for *additional* ways in which the basic national accounts framework can be used to generate information that is relevant to policy involving agriculture and the environment.

Provision in the SNA 1993 and ESA 1995

The SNA stresses the need for national accounting to take a flexible approach to meet the statistical needs of policy-makers and others. To this end it proposes an array of satellite accounts, linked to the main framework and leaving the main aggregates intact but allowing rearrangements to facilitate the use of alternative concepts and, where appropriate, making extensions to include items not part of the conventional coverage. Only where the satellite account definitely requires a modification are changes in the basic concepts to be introduced, and in such instances the satellite account should also contain a table showing the link between the major aggregates in the satellite account and those in the standard framework. The SNA 1993 devotes an entire chapter (Chapter 21) to functionally-orientated satellite accounts, of which a major proportion (par. 21.122 to 21.186) is concerned with the general design, concepts and classifications of integrated economic and environmental satellite accounts. The explanations are based to a large extent on the System of Environmental Economic Accounts (SEEA) that is presented in the UN handbook *Integrated Environmental and Economic Accounting*[46]. The treatment in the SNA 1993 is described by its authors as "a description of the present state of the art of integrated and economic accounting, which may evolve over time as a result of continuing discussions". It should not therefore be regarded as providing the level of conceptual and practical guidance as applies, for example, to the production accounts for the agricultural branch that form the basis of data gathered and published by the OECD.

At the outset it must be noted that the ESA 1995, while listing as a possible use for a satellite account the analysis of the interaction between the environment and the economy, does not include an equivalent section in the main text on environmental accounting. Indeed, the lack of a detailed treatment of such accounts is described in the ESA 1995 as one feature by which it differs from the SNA 1993. While the ESA is intended to be fully compatible with the SNA it is evident that, when the ESA 1995 was drawn up, discussion of the additional concepts and practice guidance that would be necessary for the application of integrated environmental and economic accounts within the European Union had not reached a level that was felt appropriate for them to be incorporated. Nevertheless, the European Commission, in its response to the EU's Fifth Environmental Action Programme, has identified the creation of a handbook on Green Accounting and the development of environmental satellite accounts as among steps it intends to take.[47]

Of greater immediate relevance to the OECD must be the fact that, at present, the debate concerning the possible introduction of environmental issues into aggregate accounts is being conducted

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46 United Nations (1993) *Integrated Environmental and Economic Accounting*, Interim version. E.91.XVII.18, New York: UN.

47 Commission of the European Communities (1996) *Environmental Indicators and Green Accounting: Practical steps towards the implementation of the Communication from the Commission to the Council and the European Parliament on Environmental Indicators and Green National Accounting (COM(94) 670 final).* DG XI, DG XII and Eurostat.

within Eurostat at the level of national accounts[48]. The incorporation of economic elements in the Economic Accounts for Agriculture has not yet been the subject of debate within the Eurostat working party that would be responsible for the development of these statistics, and on which the national statistical authorities of Member States are represented[49]. This suggests that such a satellite account for EU agriculture is some way off, certainly beyond the turn of the millennium.

Thus any review of environment issues in the economic accounts for agriculture must, at this stage, confine itself to theoretical issues. Not until these are settled, particularly for application within the European Union, would it be appropriate to consider recommendations for the practice by which the OECD assembles comparative results for all its Members.

Theoretical aspects of the integration of environmental and economic national accounts

Aggregate economic accounts that comprise the bulk of the system of conventional national accounts incorporate a number of important conventions. The main concepts, that are well-established and have been barely changed in successive sets of international guidelines, are focused on describing the economic process in monetary and readily observable terms. "For the most part, stocks and flows that are not readily observable in monetary terms, or that do not have a clear monetary counterpart are not taken into account" (ESA 1.12). This principle has not been applied strictly, on the grounds of consistency and various data needs. For example, consistency requires that the value of collective services produced by government is recorded as output, because the payment of compensation of employees and the purchase of all kinds of goods and services by government are readily observable in monetary terms.

The economic accounts thus relate to activities that fall inside a production boundary, the nature of which is in part a matter of convention. For example, own-account production of housing services by owner-occupiers and goods for own final consumption (such as agricultural products), and breeding of fish in fish farms are considered to be within the boundary, whereas domestic and personal services produced and consumed within the same household (e.g. the preparation of meals or the care of elderly people) and the natural breeding of fish in open seas are both excluded. In general, national accounts record all outputs that result from production within the production boundary.

The thrust of the case against the docile acceptance of the conventional production boundary, and hence the Net National Product (national income) and related measures that are bound to it, comes from two main directions.

- **Firstly**, some of the GDP arises from activities that are necessary to defend the environment from the harmful affects of other activities, both the negative externalities of production and of consumption. Where this activity is carried on by producing units (such as incorporated or unincorporated businesses, including farms, that are forced to take steps to limit air or water pollution) as a cost to be faced this is already treated as intermediate consumption and deducted in the calculation of Value Added. However the defensive spending financed by the state (e.g. of actions to reduce pollution in rivers or to clean up oil spillage) or by households (that purchase water-treatment devices, or who resort to buying bottled water) is not treated in this way. Perversely, more pollution that requires

48 This matter is being handled by Directorate B (Economic statistics and economic and monetary convergence). It has not as yet been passed to the level of the section of Eurostat responsible for the Economic Accounts for Agriculture and the Total Income of Agricultural Households statistics (Directorate F - Agricultural, fisheries and environmental statistics, and specifically its Unit F1 - Agricultural accounts and structures).

49 In the last ten years only one working paper has been presented to the Eurostat Working Party on the Economic Accounts for Agriculture that specifically was concerned with the possible integration of environmental issues into the economic accounts for agriculture.

more corrective action will lead to an increase in GDP as currently calculated. Such public and consumer expenditure might more appropriately be treated as intermediate consumption and deducted from the value of aggregate output to achieve an environmentally-adjusted final demand. A case can be made (Harrison 1989)[50] that, even if such defensive expenditure does not take place, an estimate of their costs should be deducted to reflect decreased welfare. However, symmetry of treatment requires that positive externalities are also considered, such as the benefit that forestry and agriculture provides by acting as a sink for carbon that is released into the atmosphere by the burning of fossil fuels and by the release of methane by farm animals (the carbon-sequestering properties of forestry and plant-based agricultural processes);

- **Secondly**, while consumption of the stock of fixed capital is treated as a negative item in reaching conventional estimates of national income, no account is taken of the consumption of non-produced natural resources (apart from the activity that results in the depletion or degradation of the resource, such as the mining or fishing process). Under the SNA, where the major interest is on production, the activities that result in degradation and depletion of natural resources are only regarded as an economic gain; no loss is incorporated (da Motta and May 1996)[51]. "As both environmental and natural resource capital are crucial to the production of goods and services, neglecting to value their depletion necessarily means that net or sustainable income is overstated"(Peskin 1991)[52]. The SEEA (cf. **Annex 18**) extends the concept of capital to include the "naturally-grown" assets of agriculture, forestry, and fisheries, non-produced natural assets of scarce renewable resources such as marine resources, tropical forests, non-renewable resources of land, soil and subsoil assets (mineral deposits), and cyclical resources of air and water (Bartelmus 1996). Consumption of these items is treated in a manner in principle identical with that of produced capital, though it must be acknowledged that some of these resources are not marketed (such as clean air, the stock of fisheries, and bio-diversity) and problems of valuation will arise. Natural resources often also have a self-regenerative or renewable characteristic, so that the critical consumption is likely to be that rate of use that exceeds the natural and managed regenerative rate of the asset, a rate that is not easily defined. Nevertheless, it is evident that a running down of natural resources will restrict the ability to generate income in the future and must be accounted for. A build up of produced capital that is achieved only by a reduction in natural resources will not represent a net change. As a corollary, the concept of capital formation (covering only produced assets) is changed by adopting an integrated approach into a broader concept of capital accumulation, which can encompass bringing into the stock additional assets that are created by nature rather than by man's activities.

Thus, when the adjustments mentioned are made:

- Sustainable Net National Product = Net National Product *less* Defensive Expenditures *less* Net Depreciation of Natural Capital.[53]

- Or, in an alternative expenditure-based presentation (Bartelmus 1996[54])

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50 Harrison, A. (1989) Introducing natural capital into the SNA. In: Ahmad, Y. J., El Serafy, S. and Lutz, E. (eds.) *Environmental Accounting for Sustainable Development.* Washington: The World Bank.

51 da Motta, R. S. and May, P. H. (1996) Measuring Sustainable Income: The Cases of Mineral and Forest Depletion in Brazil. In: May, P. H. and da Motta, R. S. (eds.) *Pricing the Planet: Economic Analysis for Sustainable Development.* Columbia University Press.

52 Peskin, H. M. (1991) Alternative environmental and resource accounting approaches. In: Costanza, R. (1991) *Ecological Economics.* Columbia University Press.

53 Adger, N. and Whitby, M. (1991) *National Accounting for the Externalities of Agriculture and Forestry.* ESRC Countryside Change Initiative, Working Paper 16. University of Newcastle-upon-Tyne.

- Environmental Domestic Product = Final Consumption + Capital Formation - (environmental cost of production + environmental cost of final demand (shifted to production)) + (exports - imports)

This view of national income is in accord with the original Hicksian approach, that income corresponds with the level of consumption that does not jeopardise future generation of income or welfare (Daly 1989)[55]. It however takes a broader view of the resources that should not be depleted over the period than has usually been adopted in economic accounting.

Although there is general agreement about the desirability of making some adjustments to the conventional presentation of national accounts, and a range of revisions has been suggested which involve wider environmental changes (Ahmad *et al*, 1989), there appears to be little consensus as to correct procedures. "The reasons for this stem from the inconsistencies in the underlying economic model of income generated in an economy (Norgaard 1989) and from suggested revisions requiring large capacities for data collection (Heuting 1990; Blades 1989)[56]" (Adger and Whitby 1991). It is not self-evident which spending on activities within the economy should be regarded as "defensive expenditure" in protection of the *natural* environment (as opposed to consumption spending, or spending to defend humans in their built environment on items such as double-glazing to reduce the nuisance of traffic noise). And the valuation of natural resources, particularly where they provide non-marketed services, is notoriously problematical.

Theoretical and practical aspects of integrating environmental and economic accounts for the agriculture and food sector

The opportunity to integrate environmental and economic accounts at the sector level should be welcomed in principle so that the wider implications of policy changes within the sector can be appreciated by decision-makers. However, there are substantial problems to be faced at the sector level.

First, there are theoretical issues. Most important is the need to be able to draw a boundary around the sector in a meaningful way so as to highlight and value the environmental externalities. By definition, a sectoral view excludes consideration of the activities that lie outside the sector, and this creates the danger that some important environmental externalities will be ignored or under-represented, but it also brings the benefit of simplification. For example, in their study of the primary land using sector of the United Kingdom, Adger and Whitby (1991) found it necessary to combine the conventional economic accounts for agriculture and for forestry (not something that is normal practice in national accounts) because they recognised the interdependence of the externalities within these primary land-using sectors of the economy. In contrast, a sectoral exercise for the United States included aspects of the water

54 Bartelmus, P. (1996) Green Accounting for Sustainable Development. In: May, P. H. and da Motta, R. S. (eds.)(1996) *Pricing the Planet: Economic Analysis for Sustainable Development.* New York: Columbia University Press. A more lengthy exposition appears in Bartelmus, P. (1994) *Environment, Growth and Development: The Concepts and Strategies of Sustainability.* London: Routledge. See also Bartelmus, P., Stahmer, C. and Van Tongeren, J. (1991) Integrating Environmental and Economic Accounting: Framework for a SNA Satellite System, *The Review of Income and Wealth,* 37 (37), pp111-48.

55 Daly, H E (1989) Toward a measure of Sustainable Social Net National Product. In: Ahmad, Y. J., El Serafy, S. and Lutz, E. (eds.) *Environmental Accounting for Sustainable Development.* Washington: The World Bank.

56 Heuting, R. (1990) The Brundtland Report: a matter of conflicting goals. *Ecological Economics*, 2, 109-17. Blades, D. W. (1989) Measuring pollution within the framework of the national accounts. In: Ahmad, Y. J., El Serafy, S. and Lutz, E. (eds.) *Environmental Accounting for Sustainable Development.* Washington: The World Bank.

sector, but did not include forestry (Hrubovcak, LeBlanc and Eakin 1995[57]). A case could be made that a satellite account should take a broad approach and include agriculture, forestry, the supply of water services, and perhaps more. However, this would involve a quantum leap in accounting practice and in the ways that economic statistics are routinely presented by Eurostat and the OECD.

On the other hand, a sectoral approach, even one enlarged to encompass the main land-using activities, can avoid certain tricky problems. For example, while modifications for pollution caused by the use in agriculture and forestry of fossil fuels are counted against this sector, the depletion of oil stocks is an element leading to modification of the account for the oil sector. Similarly, while the degradation of the stock of natural capital that results from pollution of water falls within the responsibility of the agriculture sector, the depletion of raw materials used in the production of inorganic fertiliser accrues against the manufacturing sector. Also excluded are the activities of the purchasers of agricultural and forestry products who may quickly convert them to waste and add further to global pollution.

Then there are the practical aspects of measurement. Firstly, with the adjustments for defensive expenditure, there are the problems of identification and measurement. Public spending may not be easily partitioned into that associated with correcting for agricultural (+forestry+water) externalities and others. For some, the classification may be quite clear, such as management agreements paid to farmers to maintain the landscape and wildlife amenity of rural areas, or sums spent directly and indirectly for the protection areas designated as environmentally sensitive or of special scientific interest (though where such agreements are voluntary the sums that could be paid to non-participants who, presumably, farm in environmentally-unfriendly ways, is not counted). However, there would be disagreement on whether payment for set-aside or as subsidies to farmers in less-favoured areas should be fully considered as defensive spending (particularly where the latter can be shown to be environmentally damaging through encouraging higher density stocking). These payments have multiple objectives. Similarly, public spending on enforcing pollution controls may not easily be partitioned from the costs of other functions undertaken by water or river authorities. Within private spending, household expenditure to reverse environmental externalities related to a single land-based sector are difficult to identify and measure in practice. Concern with food and water quality may reflect more the activities of firm falling outside the statistical coverage of the sector singled out here.

When making adjustments for the degradation of natural capital, decisions have to be reached on the nature of the degradation and how it can be valued. There does not seem to be yet a common approach to what forms of natural capital should be taken into consideration when drawing up integrated environment and economic sector accounts. For the United Kingdom, attention has focused on the stock of carbon and the impact on the environment of higher levels of nitrogen[58] and phosphorus (Adger and Whitby 1991)[59]. For phosphorus the sectoral approach is complicated in that agriculture is not the only source; it is a non-point source of water pollution from households and some point sources from industrial outputs. The US study (Hrubovcak, LeBlanc and Eakin 1995) concerned itself only with the economic effects of soil erosion on agricultural productivity, of surface-water quality (sedimentation rather than

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57 Hrubovcak, J., LeBlanc, M. and Eakin, B. K. (1995) *Accounting for the Environment in Agriculture.* Technical Bulletin Number 1847. Washington: US Department of Agriculture, Economic Research Service.

58 For nitrogen, in addition to defensive expenditure, the benefits that might flow from cleaner drinking water can be evaluated through revealed and expressed preference techniques. However the magnitudes of the potential impacts of nitrogen are far from fully established and the official recommendations (such as the minimum nitrogen content of drinking water) are still contentious.

59 In the UK study (Adger, N. and Whitby, M. (1991) no modification of the economic accounts was introduced to allow for the depletion of exhaustible resource stocks by the (combined) agriculture and forestry sector. It was felt that for Great Britain the use of such resources was slight (though account was taken of the pollution externalities of their direct use).

chemical content) and of the depletion of ground-water stocks. Significantly, neither study included landscape or wildlife as forms of natural capital, though these are items of major sensitivity in terms of environmental concern.

Carbon forms a particularly interesting example as, taking agriculture and forestry together, for the United Kingdom there is a net sequestration. Adger et al. (1991)[60] estimate that approaching double the amount of carbon is fixed by the agriculture+forestry sector than it emits. Evaluating this positive net contribution to the environment must rely on indirect methods (with alternative methodologies proposed, for example by Anderson (1991)[61] and Nordhaus (1990)[62]). However, this represents a major positive item of adjustment in the stock of natural capital in the United Kingdom.

And the positive externalities that agriculture and forestry generate must not be forgotten. These take the form of non-marketed service flows (principally for the use of sites in the rural landscape for leisure and recreation but also involving "existence" values). A range of techniques exist by which these non-marketed services can be evaluated, though none is without its detractors. Environmental evaluation estimates remain critically affected by the set of inherent property rights of the public goods involved, as well as the acceptability to consumers of a hypothetical market for the good or service (Adger and Whitby 1991). There are also large differences between estimates of willingness to pay and willingness to accept compensation for the same externality.

Impact of the environmental adjustments

The impression is sometimes given that environmental adjustments to the conventional economic accounts for the agriculture sector will inevitably reduce the value of its contribution. This is not necessarily the case. The size and direction of adjustment will reflect the nature of the activities included within the sector and the coverage and valuation of externalities and natural resources changes.

In the United Kingdom, when forestry and agriculture were combined, the non-market service flows provided by these industries added a large positive item to the integrated environmental and economic accounts for the sector, to the extent that, when combined with the positive impact of carbon sequestration, the environmentally-adjusted Net Product rose by almost a quarter, though the authors give little confidence on the reliability of their calculations, stressing that many adjustments were not included[63]. For the United States, the narrower industry grouping and different range of environmental adjustments lowered "traditional" aggregate agriculture net product by some 6 to 8 per cent (for 1982, 1987, 1992), though the researchers were keen to point out that their estimates suggested that agriculture's contribution to social welfare far exceeded the environmental damages and deterioration of the stock of natural capital resulting from the production of food.

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60 Adger, W. N., Brown, K., Shiel, R. and Whitby, M. C. (1991) *Dynamics of land use change and the carbon balance*. ESRC Countryside Change Initiative Working Paper 15. The University of Newcastle-upon -Tyne.

61 Anderson, D. (1991) *The forestry industry and the greenhouse effect*, Scottish Forestry Trust and the Forestry Commission, Edinburgh.

62 Nordhaus, W. (1990) *To slow or not to slow: the economics of the greenhouse effect*. Yale University mimeo.

63 Adger and Whitby give the following for GB in 1988.

Net product (from national accounts - unadjusted)	4,028.
Degradation of natural capital	+135
Defensive expenditure	-58
Non-marketed service flows	+888
Modified Net Product	4993

MATTERS THAT THE OECD SHOULD CONSIDER

The idea of making good some of the more obvious deficiencies of the standard conceptual framework of economic accounting to take on board broader environmental changes is attractive. For internationally-comparable figures to be generated there would have to be substantial discussion of the basic concepts, such as the items which were to enter into the adjustment process and how they should be evaluated. The situation for the OECD is not helped by the fact that such discussions have not yet started within the official agricultural accounting system of the European Union; methodological progress in the EU is often helpful for wider application. However, the work in the OECD on understanding the linkages between agriculture and the environment, including the development of indicators, is helping to better understand, identify and quantify the beneficial and harmful effects of agriculture on the environment.

Bearing the current state of methodological development in mind, the OECD should consider the following:

1. ***Whether the OECD wishes to take a proactive role in establishing a methodology for creating an integrated environment and economic satellite account for the agricultural sector, additional to the conventional Economic Accounts for Agriculture. This it might do by bringing together experts from OECD Member countries, facilitating the interchange of information on progress.***
2. ***At an early stage, and in order to set a broad foundation, the OECD in consultation with national experts should consider major issues in any such methodology. These include:***

- ***the boundary that should be adopted for any such account. The current OECD data base on the aggregate economic accounts for agriculture applies the conventional boundary which excludes forestry, fisheries and water supply. However, a strong case can be made for an integrated approach to include all these activities in a single account, though this carries implications for the coverage of the data base and the collection process.***
- ***whether the integrated account should aim for a less-than-complete range of environmental adjustments. If so, which adjustments should form the basis of a harmonised methodology to be applied in OECD Members?***

ANNEX 1. THE AIMS OF POLICIES INVOLVING AGRICULTURE

Global aims, involving countries at all levels of economic development

According to the FAO (1996, p5) the main objectives of agricultural policies can be divided into three broad groups as follows:

- securing improvements in the efficiency of the production and distribution of food and agricultural products;
- improving the condition of the rural population;
- raising people's level of nutrition and standard of living.[64]

An alternative FAO formulation of the basic objectives for a policy-maker dealing with food and agricultural activities is (FAO 1996, p53);

- to monitor the current trends of agricultural growth within the process of overall economic development;
- to foresee the impact of various policy measures on agricultural development and the economic conditions of the population dependent on agriculture;
- to help policy-makers achieve optimum results in allocating increasingly scarce natural resources.

According to the FAO, to service this mix of objectives data are required on:

- production, productivity and income accruing from the activities of agriculture, forestry, fisheries and food production;
- the inputs and labour required for carrying out the activities;
- consumption patterns and food habits, along with the nutrient content of the food;
- the status of infrastructural development related to agricultural and food production activities and their financing requirements. (FAO 1996, p6).

Aggregate economic accounts for agriculture are seen as an important component in the agricultural information system. The FAO's System of Economic Accounts for Food and Agriculture (FAO 1996, p5) "is intended to serve policy-makers dealing with the preparation of a production plans for agriculture and food designed to optimise the use of domestic resources, minimise the import of essential

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64 FAO Basic Texts, quoted in FAO (1996) *A System of Economic Accounts for Food and Agriculture*, FAO Statistical Development Series 8. Rome: Food and Agriculture Organisation of the United Nations.

agricultural goods and stabilise the level of prices of food and agricultural products, while keeping in view the impact of these policies on the living standards of the rural population dependent on agriculture".

Aims of policies towards agriculture and food in OECD countries

The aims of policies towards agriculture and food in OECD countries, and hence the statistics required to serve it, can be considered as a subset of the broader aims identified by the FAO. Among OECD countries agricultural policies are largely, though not exclusively, concerned with interventions to assist the agricultural industry itself and, in particular, those persons and household engaged in it. However, there is no single, well-integrated, coherent agricultural policy designed to serve the requirements of the sector as a whole. This applies to the CAP and, to greater or lesser extents, to national policies. Rather, policies tend to have evolved in response to particular problems as and when they arose, with occasional stocktaking to try to resolve the inevitable inconsistencies that this *ad hoc* type approach produces. There are many examples of conflicts arising between single agricultural policies within countries and between agricultural and non-agricultural ones. For EU Member States, having both CAP and national aspects to their farm policies and implementing a mix of measures related to both, dual-level decision-making represents a further source of inconsistency, with overlapping but not identical sets of objectives.

Concern with incomes is only one of a number of interwoven strands in all OECD countries, though it is now evidently the most significant strand in many of them (Hill 1996)[65]. Other common strands have been food security, agriculture's contribution to the balance of payments, improvements to productivity and efficiency, and food prices to consumers. Farming has always been seen as playing a part in the prosperity of rural areas, and since the mid-1970s in the EU agriculture has been used as a vehicle for maintaining the size of the population in areas which would otherwise suffer from depopulation; increasingly farming is used for job retention in rural areas generally (Commission, 1988)[66]. Over time the desirability of higher levels of farm output has waned, to the extent that extra production of most major commodities is embarrassingly expensive in the EU and USA. Improvements in productivity which displace labour are similarly unwelcome when general unemployment is a serious social problem. Since the early 1980s questions of environmental impact have gained importance, with a search for policy instruments which will produce a natural environment more in line with the public perception of what it ought to be and, in some measure, undo the changes for which other parts of agricultural policy can be blamed. Add to the mix the heightened concern with animal welfare, and the balance of strands has demonstrably shifted from those linked to levels of agricultural production - the "productivist" aspect - to those concerned with broader socio-economic issues.

There seems to be general agreement among academics and commentators working in the policy area that income support is now the fundamental objective of agricultural policy in contemporary western Europe and in industrialised capitalist market economies as a group. Incomes hold the key to explaining past policy decisions and, of particular relevance to the 1990s, to the rate at which change is possible. A statistical survey of European agricultural economists showed that the view that "the CAP mainly aims at supporting farm incomes, whereas the other objectives of the Treaty of Rome receive little attention" was

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65 Hill, Berkeley (1996) *Farm Incomes, Wealth and Agricultural Policy.* Aldershot: Avebury.

66 Commission of the European Communities (1988b*), The Future of Rural Society,* COM(88)501, Final/2, The Commission, Luxembourg.

clear-cut (Herrmann *et al.*, 1985)[67]. And specialist CAP-watchers have little difficulty in identifying the significance of the income strand. To quote Fennell (1985)[68], " Concern with the inadequate level of agricultural incomes has been a dominant feature of farm policy in all developed countries since about the mid-1950s...". In a review of OECD countries Winters (1990)[69] confirmed that "The maintenance of farm incomes is probably the major objective of agricultural policy". The "Larsen" report of independent experts to the European Commission on EU agricultural policy for the 21st century (Commission, 1994)[70] left no doubt as to their interpretation of the thrust of policy; "Governments in most developed countries have therefore set out to secure a satisfactory and equitable standard of living for farmers and to stabilise agricultural markets and farmers' incomes" and it goes on to show that this was also the stance of the EU. The OECD has observed that "One of the main motivations which has led to the panoply of interventions which characterise the agricultural sectors of OECD countries has been concern about the income of farmers and their families" (OECD, 1995)[71]. This list of comments on the central importance of farmer incomes to policy could be greatly extended.

Though important within the policy *milieu*, the income intentions of the agricultural policies are rarely defined precisely. The absence of closely defined income objectives means that powers of interpretation must be relied on to distil the intentions of policy-makers. Observation of the practice of policy, the speeches of politicians, the reports and discussion papers of civil servants, and the declarations of farmer organisations and pressure groups on their perceptions of the income problems of agriculture indicate that in the EU there are three broad areas of concern (Hill, 1982)[72]:

- the general levels of income of those engaged in farming compared with earnings in other sectors (termed the *parity issue*);
- the particularly low incomes in certain regions or sizes of farm (the *poverty issue*);
- the variations of income over time (the *instability issue*).

These are the same trio of central components of "the farm problem" that have been identified in the USA by a range of commentators and summarised by Gardner (1992)[73]. It seems highly likely that these are universal problems faced by the agricultures of industrialised market economies, at least in periods of relative peace in international relations.

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67 Herrmann, R., Jensen, U., Schafer, A. and Terwitte, H. (1985), *Views, Consensus and Dissension Among Agricultural Economists: Results of a Statistical Survey*, Erschienene Diskussionsbeitrage des Instituts fur Agrarpolitik und Marktlehre der Universitat Kiel, Nr. 46. Kiel University.

68 Fennell, R. (1985), 'A Reconsideration of the Objectives of the Common Agricultural Policy', *J. Common Market Studies*, 23:3, 257-76.

69 Winters, L. A. (1990*), The so-called non-economic objectives of agricultural policies*, OECD Economic Studies, No 13, Winter 1989-90, Paris. Also published as Winters (1988), OECD Department of Economics and Statistics Working Paper No. 52, OECD, Paris.

70 Commission of the European Communities (1994), *EC Agricultural Policy for the 21st Century* (the Larsen report), European Economy, Reports and Studies No. 4, The Commission, Brussels.

71 Organisation for Economic Co-operation and Development (1995*), A Review of Farm Household Incomes in OECD Countries*, background paper to *Adjustment in OECD Agriculture: Issues and Policy Responses*, OECD, Paris.

72 Hill, Berkeley (1982), 'Concepts and Measurement of the Incomes, Wealth and Economic Well-being of Farmers', *J. agric. Econ*., 33(3).

73 Gardner, B. L. (1992), 'Changing Economic Perspectives on the Farm Problem', *Journal of Economic Literature*, 30 (March 1992), pp.62-101.

Parity and poverty are concerned essentially with the welfare of individual farmers and their dependants, and it is on these two components that most of our attention will be focused in later chapters, where problems of definition and measurement will be faced. Low farm incomes in single years do not throw the recipients immediately into the poverty category; reserves will be drawn on or borrowings made to maintain living standards through times of temporary financial setback. A distinction has to be drawn between those farm households that have to contend with occasional periods of low income and those that suffer hardship from incomes that are persistently low. Instability also has a welfare component. However, when year-to-year fluctuations are anticipated the level of consumption by farmers and their households may have to be curtailed in order to set aside reserves for years of low incomes or to pay for past borrowing in lean years. Farmers may have to be content with generating a safer but lower income, with consequences both for consumption possibilities and the potential for the business to grow.

Both comparability and stability can be interpreted in the business or resource use sense, as well as the personal welfare context. Studies of the relative returns of factors of production in agriculture with uses in other industries have a long history. However, this concern belongs to a period when policy was aimed at expanding total agricultural output by the improved use of resources and with their transfer, especially with the moving of labour trapped in farming to other occupations which offered higher marginal productivities and, consequently, higher incomes. The emergence of agricultural commodity surpluses and a pool of labour unemployment has diminished interest in the comparability of factor rewards. Reasonably stable business conditions are likewise seen as enhancing the efficiency with which resources are employed, including the more rational use of capital. Bearing in mind that some degree of instability is needed if an industry is to respond to changes in supply and demand conditions, including technological advance, there are economic arguments which support the modulation of random short-term variations brought about by external influences like weather and the dampening of price signals which perform no economic function, such as price cycles. However, these issues are distinct from, and now of minor importance compared with, the main thrust of agricultural policy which is directed at the personal incomes of the agricultural population.

When policy makers attempt to interfere with the markets for agricultural products or inputs, they do so primarily with the intent of improving the incomes of farmers. There would be little reason for taking action unless the potential beneficiaries were seen to be disadvantaged in some way - that without assistance they would be unacceptably poor or that there would be an unfair gap between the position of farmers and other members of society. It goes without saying that in the parity issue farmers are typically seen as the relatively disadvantaged group.

Talk of lowering the prices that farmers receive, as a way of reducing production to achieve a better balance in the market, is commonly opposed using arguments which suggest that poverty or unfair comparability would result. It is pointed out that some farm families would be forced to quit because they would be unable to provide themselves with an adequate livelihood. Whether or not this would actually happen on any significant scale, or even if it did, whether this would matter much, is immaterial. As long as it is perceived by people responsible for policy decisions as being the likely result of an action, and the political cost of allowing such an outcome is believed to be high, the short-run poverty or comparability threat will often be sufficient to prevent the change.

Secondary to these three main strands are a range of issues, some of great importance, which are believed to be related to a significant extent to incomes from farming. Among the most prominent of these are beliefs that incomes from farming have a substantial impact on:

i. the level of general economic activity and employment in rural areas, especially in those suffering from unfavourable natural conditions, such as hill and mountain areas, where alternative

employment opportunities also tend to be limited. Support for farming in these areas is seen as a way of promoting the viability of the rural economy.

ii. the pursuit of practices to conserve the natural environment, with the assumption that adequate farm incomes are a prerequisite for conservation at the farm level.

iii. the rate of technological advance. Though not an argument heard so loudly in times of agricultural surpluses, the notion that a prosperous agriculture was necessary to encourage the development of new technology and its uptake through rising levels of investment and capital stocks was built into the thinking of post-war agricultural policy in the UK. A prosperous farming sector produced thriving support industries, with more jobs and income arising from exports of modern machinery and chemicals.

With each of these income-related issues there are alternative ways of bringing about the desired ends other than through changing farm incomes. Indeed, the extent of the dependency on farming is open to question; there may be superior ways of stimulating rural employment or of conservation than by using farming as a vehicle.

ANNEX 2. MAIN THEMES THAT EMERGED FROM THE 1996 EUROSTAT INTERNATIONAL SEMINAR ON INCOME STATISTICS FOR THE AGRICULTURAL HOUSEHOLDS SECTOR[74].

- Statistics on total incomes of agricultural households were widely recognised, by many groups of users of statistics as being of importance to agricultural and other policies, both in the EU and elsewhere and to monitoring and explaining change in the agricultural community. They provide useful information not otherwise available from income measures that relate solely to the residual rewards from agricultural activity (such as Eurostat's Indicators 1, 2 and 3 or FADN's Farm Net Value Added or Family Farm Income). Therefore there is a need for official statistical systems to be active in this area. .

- Macroeconomic statistics can only provide part of the picture of the income situation of agricultural households; complementary microeconomic information is also required to throw light onto the many important issues that concern the distribution of incomes, such as the numbers and location of agricultural households whose total incomes fall below some socially-acceptable minimum (there is evidence to suggest that incomes in agriculture are more unequally distributed that among other groups). Others include the disparities between farms of different sizes and types.

- The provision of statistics based on households (in contrast to the agriculture branch of the economy, or the farm business or holding) presents conceptual and practical challenges to statisticians. These include the choices of the appropriate definition of an agricultural household and of the most suitable definition of income. From a practical standpoint, data sources may have to be drawn upon that are outside the experience of statisticians used to generating production-based agricultural income indicators, involving greater co-operation with non-agricultural institutions.

- In order to facilitate the provision of statistics in an efficient way, policy-makers should be encouraged to make their requirements for information more explicit.. Though a spectrum of views about policy objectives (such as the role of income support) are inevitable in a EU that contains a mix of countries and types of agriculture, a more precise indication of statistical requirements would assist the planning and provision of this information.

- Results demonstrate that assumptions that the operators of farms and their families are solely dependent on farming for their livelihoods and use all their resources on agriculture are no longer tenable. The explanation of farm behaviour needs to acknowledge that farm families allocate their resources between the farm, other gainful activities, maintaining the household and leisure. A narrow approach risks serious error in the interpretation of observed behaviour (such as the productivity of labour used on the farm) and constrains the ability to making predictions. Similarly, the common simplifying assumption that each holding has only one farmer and one household is

74 Taken from Hill, Pfaehler and Cook)(1996) 'Introduction to the Eurostat International Seminar on Income Statistics for the Agricultural Household Sector and a Summary of Its Outcome.' In: Hill, B. (ed.)(1996b) *Income Statistics for the Agricultural Household Sector*. Luxembourg: Eurostat.

clearly invalid in the context of measuring the income of households who are mainly dependent on farming for their livelihoods.

- Taking all income sources into account transforms the income situation of farmer households, which has an impact on the way that the income problem of the agricultural community is perceived. According to the TIAH statistics, on average agricultural households (those where the reference person has farming as their main income source) have total incomes that in most EU Member States are near or above the national all-households average. Non-farm incomes add a degree of stability to household incomes, and farmer-households tend to cope with variations in income by saving or dis-saving rather than by altering the amounts they spend on consumption.

- The heterogeneity of households that operate households was underlined in the results. TIAH statistics demonstrated that among groups of households where the head is *not* primarily dependent on farming for a livelihood - and these account for more than half the holdings in the EU - the household as a whole receives very little of its income from farming. Changes in the prosperity of farming make little difference to total income. Other, more complex typologies of agricultural households may be appropriate for studying, for example, response to policy reform.

- For many farmers there seems to be no real income problem. Where it exists it is likely to be confined to particular sets of circumstances. Blanket forms of income support are unlikely to provide an appropriate way of tackling these problem cases and are inefficient as a means of welfare transfer. A divergence of views exist as to whether *agricultural* policies are suitable as mechanisms for achieving income-distribution (*social*) policy aims, though participants agreed that in practice the CAP has important social connotations in many Member States.

- The more complex pattern of income sources presents a greater challenge to statisticians in describing the income situation in agriculture and to policy-makers in their decisions on the need for policy action and the most appropriate alternative means to achieve goals..

ANNEX 3. PROBLEMS WITH THE CONCEPTS OF THE CURRENT ECONOMIC ACCOUNTS FOR AGRICULTURE (EAA) UNDER THE SNA 1968 AND ESA 1979

The concept of the agriculture branch consisting of Units of Homogeneous Production (UHPs) has proved a useful basis on which to construct aggregate Economic Accounts for Agriculture (EAA). Factors contributing to the preference for a branch approach were (a) the relative simplicity with which goods could be unambiguously labelled as agricultural; (b) the relative ease with which the value of production could be estimated from data on physical output (such as censuses on areas of crops and surveys of yields) and data on prices, and intermediate consumption could be identified from other external sources of information (deliveries of animal feeds etc.). Much of the EAA could be built up without recourse to data collected from actual farm businesses. Such a method of calculation enabled an account to be constructed quickly, with provision results for calendar year *t* being available before the end of the current year. Perhaps too, at the outset, statisticians were under the impression that agricultural holdings did approximate to UHPs.

The passing of time has made these bases of the EAA unsatisfactory for the following reasons:

- the use of the agriculture branch concept, consisting of fictitious UHPs, is increasingly distanced from the reality of production units that are engaging in a range of economic activities producing goods that are not on the NACE/CLIO list of agricultural commodities. From a policy standpoint this poses problems of interpretation.

- the accounts for agriculture are on a different basis for those of other industries, requiring adjustments to conform to the wider conventions of national accounts and of complicating comparisons across industries. For some countries this involves adjusting statistics that relate to observable institutional units to relate to the fictitious ones, something that exacerbates existing problems of disharmony between countries in their attempts to apply an agreed methodology.

- The uniqueness of the previous treatment of agriculture has been thrown into prominence by the general revisions to the accounting framework of the SNA 1993 and ESA 1995 and the need to make changes in the EAA to conform to these. There have been related changes to the industry classification system; the NACE Rev 1 is the new General Industrial Classification of Economic Activities and there is a CPA (Classification of Products by Activity) for use in input-output tables.

- criticism of the concept of the national farm, and in particular the measurement of output that it involves that does not measure total output. Details are given in Box A3-1

- concern with the validity of the income indicators as calculated from the EAA by Eurostat, and in particular Indicator 3 (net income from agricultural activity of family labour input per unit of family labour input), in the light of the structure of agriculture in the additional Länder of the enlarged Germany.

Box A3-1. Reasons for dropping the national farm concept

1. To improve the economic analysis of the accounts for agriculture

The current method for measuring output and intermediate consumption in the EAA introduces a bias in the economic analysis of agricultural activity. This is particularly important when calculating technical coefficients and value-added rates and their development over time. Indeed, the latter refer to the measurement of the factors of production relative to the final output of, and not to the total output, the grand. This only gives a partial picture of economic reality since, for instance, costs for items such as fertilisers are related to the total output of crop production and not only to the part which is sold outside the national farm.

2. To improve the consistency of the accounts

The national farm concept does not enable consistency between the elements of the production account and those of the generation of income account and income account (and with other related statistics such as the labour input statistics) to be ensured. The distributive transactions accounted for in the generation of income account and in the income accounts (compensation of employees, subsidies, taxes, rents, interests..) are not only related to final output but also to the output consumed as intermediate consumption within the national farm

3. To improve the comparisons of technical coefficients and value-added rates between sub-branches and Member States

Because of the different levels of intra-branch consumption between activities and countries, the national farm concept does not enable consistent and homogeneous comparisons of technical coefficients to the undertaken between agricultural sub-branches, between the agricultural branch and other branches of the economy and between the agricultural branch of different Member States.

Source: Eurostat working paper Doc. F/LG/310. "Consequences of the ESA revision on the EAA/EAF methodology: Measurement of output". Nov. 1995

ANNEX 4. CHANGES AND IMPROVEMENTS IN THE 1993 SNA, AS RELEVANT TO THE ECONOMIC ACCOUNTS FOR AGRICULTURE

The 1993 revision of the System of National Accounts retains the basic theoretical framework of the 1968 SNA but incorporates changes designed to enhance the usefulness of the SNA in the day-to-day work of planners and policy-makers in all fields. Some of the features of the 1993 SNA that are directly relevant to the compilation of the aggregate economic accounts for agriculture are as follows[75]:

(a) The 1993 SNA partitions the production account of the 1968 SNA into two accounts: a Production Account, where the balancing item is "value added" and a Generation of Income Account, with "operating surplus/mixed income" as the balancing item (after the deduction of interest and rent payments from value added).

(b) The 1993 SNA includes production accounts for all institutional sectors in addition to a production account for establishment-based industries of the 1968 SNA. In order to link two types of production accounts, the 1993 SNA recommends a cross-classification of output, intermediate consumption, gross value added and its components by type of sector and industry.

(c) The 1993 SNA introduces a distinction, not made in the 1968 SNA, between the operating surplus of certain unincorporated enterprises owned by households and the surplus of other enterprises. For this purpose, it introduces a new name for the net operating surplus arising from the production activities of unincorporated enterprises owned by households (except for the surplus arising from the production of housing services for own consumption by owner occupiers) which is called "mixed income" and represents a mixture of two very different kinds of value added components i.e. compensation of employees and operating surplus.

(d) The 1993 SNA introduces a distinction between an analytical unit and an observable unit, when referring to the unit of classification in the production account, in the supply use and in input output tables. An analytical unit is defined by the 1968 SNA in reference to one activity and one location, but for practical reasons the 1993 SNA introduces an observable unit version of the analytical unit which, in addition to its main activity, may also cover secondary activities of different types.

(e) The 1993 SNA recommends that in agriculture the statistical unit and the definition of output should be the same as those proposed for other market producers. The establishment in agricultural activities refers to the agricultural holding. As in the case of other activities, the output includes transactions among agricultural holdings but excludes products for intermediate consumption within the same agricultural holding. (Statistical information in agriculture is often not available in this form and it may be necessary to use either the gross-gross measurement of output, which includes products used for intermediate

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75 From FAO (1996) *A System of Economic Accounts for Food and Agriculture*. Annex 1.1, pp103-4.

consumption in the same agricultural holding, or the concept of the "national farm", in which agricultural products used in either the same or other agricultural holdings are entirely omitted.).

(f) The output of agricultural, forestry and fishery sectors includes the growth of so-called cultivated assets including the growth of livestock and fish stocks, vineyards, orchards, plantations and timber tracts, as well as the growth of agricultural crops and fruits that are products of plantations and the like. The 1968 SNA included only the natural growth of livestock and fish stocks as output (and subsequently as gross capital formation). Output of agricultural products, orchards and timber tracts were recorded at the time of harvest. In the 1993 SNA, the growth of agricultural crops, orchards and timber tracts, prior to the use of products, is recorded as work-in-progress during growth if this exceeds more than one period/year.

(g) The 1993 SNA recognises the distinction between formal and informal sectors of the economy, although clear criteria for distinguishing one from the other have not been described yet. It has been recommended, however, that this distinction be used for presenting data for analysis and policy making in specific country circumstances.

(h) The production boundary in the 1993 SNA is slightly different from the 1968 SNA. The 1993 SNA distinguishes between goods and services and includes the production of all goods in its production boundary, while only those services that are exchanged in the market and/or generate income for economic units are included as production. The 1993 SNA clearly indicates the coverage of own-account production has been clearly indicated, such as the storage of agricultural goods produced by the household, and includes it in the production boundary.

(i) The 1993 SNA has also suggested that, for more refined analysis of the production process, use may be made of an analytical unit of production which is not always observable. The production unit is termed the "Unit of Homogeneous Production" (UHP) and covers no secondary activities. (Agricultural commodities for which data are collected directly from the field come under this category, and the production account, similar to that prepared for agricultural establishments, can also be prepared for this group of "homogeneous industries" for the formulation of economic plans on the pattern of input-output tables.)

ANNEX 5. LABOUR INPUT STATISTICS IN RELATION TO ECONOMIC INDICATORS

Introduction

Statistics on labour in agriculture are needed for a variety of purposes. Labour statistics are an aid to policy-makers in identifying emerging structural issues, in evaluating the need for policy intervention, and in assessing the outcomes of existing policies. There will be interest for economic reasons in what is happening to the volume of labour used in agriculture, its share in total usage by the economy and in the differential rates of change seen in farms of different types, locations and sizes. A separate but related set of issues will centre on the individuals, households and families supplying the labour - composition by age, sex, skill, employment status and proportion of working time allocated to agricultural use. As such, labour statistics form part of the OECD's Structural Indicators Project within the larger framework of the Main Agricultural Indicators (MAI) Project.

Published labour statistics show some interesting trends. Taking the EU as an example, between 1973 and 1993 there was a pronounced decline in the volume of labour used by agriculture (in Annual Work Units - described below) for the EU as a whole, falling from 13.45 million to 6.88 million AWU (EUR 12 with Germany as constituted before 3/10/1990). The most rapid fall between 1973 and 1994 was seen in Spain (with an annual average rate of change of -5.3%) and the smallest in the Netherlands (-2.0%); in the latter the volume of hired labour actually rose, though this was more than offset by a fall in non-hired labour. Overall the proportion of the labour input contributed by non-hired (that is, family members) was 77% (1994, including the enlarged Germany). However, the proportions vary widely between countries (40% in the UK, 20% in France and 12% in Luxembourg) and there have been contrary movements in the shares. In the UK the agricultural industry become more dominated by family (non-hired) labour as the result of a faster exit of hired workers, a pattern shared by Greece, Italy and Portugal. In four others the share provided by the family fell (Denmark, France, Luxembourg and the Netherlands) whereas in the another four it remained about the same (Belgium, Germany, Spain and Ireland)[76]. These figures do not correspond to the numbers of persons solely engaged in agriculture (some may be less than full-time) or where agriculture is their main occupation[77]. And, while the general direction of change is clear, the details of these series showing estimated labour input should be treated with some caution, for reasons touched on later.

Here attention will be focused on a particular need for labour input statistics - their use within the context of deriving economic indicators for the agricultural sector.

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76 Analysis taken from paper by Edward Cook (Eurostat, F1) *Agricultural Labour Input Statistics* to a training course for Bulgarian statistician, Wye College, July 1995.

77 For example, in Ireland in 1989 there were 163 000 persons whose main occupation was in agriculture (Employment statistics on agriculture), 311 900 who were working on agricultural holdings (Farm Structure Survey) and the labour input to agriculture used in the context of estimating income indicators 243 000 AWUs.

Reasons for requiring statistics on labour for income monitoring purposes

Aggregate measures of income derived from the Economic Accounts for Agriculture (EAA) relate to a resource base that is not constant over time. Hence changes in aggregate income may be associated with either a change in the rewards to the activity of agricultural production (resulting from a shift in relative prices of outputs and inputs, or from gains or losses in productivity) or from a change in the volume of resources used. From a policy standpoint it will be necessary to isolate these two sources of change, since a major interest will be the average rewards earned in agriculture, how these are changing and how they compare with the average rewards available elsewhere in the economy.

Conceptually it should be possible to express income aggregates per unit of resource. In practice this is less than simple because of contrary movements in factors; typically the amount of labour used by agriculture has been in decline while the amount of capital in use has increased.

One way in which this problem might be tackled would be to express income per producing business (that is, per farm or holding). These represent combinations of factors that are thought appropriate at particular points in time. Income per business is a common indicator used by surveys of farm accounts (such as the EU's Farm Accountancy Data Network/RICA's measures of Farm Net Value Added per holding and Family Farm Income per holding and the USDA's Farm Costs and Returns Survey's several income concepts). While these may be suitable for indicating short-term income movements, their use over more protracted time periods is sometimes criticised on precisely the ground that they incorporate the upward drift in farm sizes. Other objections include the following:

- it is difficult to define what is meant by a single business. The EU's Farm Structure Survey defines and agricultural holdings as "a single unit, both technically and economically, which has a single management ....." but this still permits a wide range of interpretation, as does the criterion of being "under one operating arrangement" used in the USDA FCRS;

- many businesses engage both in agricultural activity and in other forms of production, so that it may be difficult to designate a *farm* business (all of them that are engaged in some agricultural activity, or only those where agriculture is the main activity?). If income from non-agricultural activities is excluded from the measurement process, the resulting income per unit of labour may not be reliable if the resources used cannot also be excluded with the same degree of certainty (which is often the case);

- changes in numbers of farm businesses can reflect short-term adjustments in business structure made to accommodate taxation or other legislative changes (such as attempts to limit the amount of subsidy per farm, which will encourage farmers to split their businesses);

- the wide dispersion of farm sizes makes averages per business of little meaning in a policy context. If polarisation in business sizes is taking place (as seems the case in some countries), then the average income could remain unchanged but the numbers of units with low incomes could be increasing.

In the EU in practice agricultural income is usually expressed in relation to the volume of labour engaged in this industry. A justification given for this is that the Treaty or Rome which established the CAP and set its objectives refers to the aim of increasing the *individual earnings of people engaged in agriculture.* The Treaty ignores the complications of a more precise definition of earnings or of being engaged in agriculture. The way that this is carried out is to express income indicators (both Eurostat's aggregate Indicators and FADN/RICA's microeconomic results) per unit of labour input measured in

Annual Labour Units (AWU). In the cases of Indicator 3 (and FADN's Family Farm Income) the denominator is the labour input of the non-hired labour (usually labelled, erroneously, family labour, since some member of families can be hired in that that they have contracts of employment) since payment for hired labour will have already been deducted.

It should be noted that what is measured by AWU is the simple volume of labour, and no account is taken of the quality of labour. Thus the input of an unskilled person of limited education, ability and enthusiasm counts equal to that of a person of much greater productive capacity (and presumably of greater opportunity cost and higher potential transfer earnings).

Even the volume of labour input of self-employed person, who dominate the labour input in most EU (and OECD) countries is notoriously difficult to measure, perhaps to the extent of it being meaningless, especially when the function of the farmer is primarily one of management rather than physical labouring. Management decisions are not confined to within a statutory working week and may be made while nominally doing something else; it may be hazardous to attempt to distinguish between activity that is domestic, leisure recreation or "real" work (though claims by farmers that they are always working should also not be accepted at face value). And where farming is carried on in parallel with some other gainful activity (especially where this other activity purports to be full-time, or where it is another form of self-employment) providing data on time allocated to agriculture may not be feasible.

While an attempt to measure labour input in AWU may be appropriate for employed workers who are hired for a proscribed period, its application to self-employed farmers and other family members whose work fluctuates over the year, who may be pluriactive and where non-work time may not be easily separated from work time may result in statistics of questionable validity.

Measures of labour input used in the EU

The amount of labour used by EU agriculture is expressed in AWU. The description of an AWU in the SNA 1993 is a follows:

> *Full-time equivalent employment in country X, which equals the number of full-time equivalent jobs, is its total hours worked divided by the average annual hours worked in full-time jobs within its economic territory. (...) (SNA, 1993. p412)*

It follows that the duration of an AWU:

- can change over time, as social developments affecting the working week occur, and this is likely to be reflected in the number of hours defining an Annual Work Unit. This may cause a discontinuity in the number of AWU between adjacent years, with a consequence for the apparent rate of change of income per AWU;
- will vary between sectors of the economy within any given country;
- is likely to vary between countries.

It is also possible for the AWU of a self-employed person in agriculture to have a different duration from that of a hired worker, as laid down in a contract.

The need for reliable AWU data

The significance of the measure of the volume of labour input to the way that income is currently monitored in the EU cannot be denied. The problem for the microeconomic measures are rather different from those of the macroeconomics Indicators. In FADN/RICA data on the number of hours worked on the survey holding by each category of labour is collected (regular unpaid, casual and seasonal unpaid, regular paid labour, casual and seasonal paid labour) and the number of annual work units estimated in relation to the normal annual working time of a full-time worker in the region under consideration and on the same type of holding. There is some adjustment for persons incapable of performing normal duties[78]. Fractions of a work unit are counted where the number of hours is less than that of a full-time worker, but no-one is deemed to provide more than 1 AWU of labour input, even if the hours worked are greatly in excess of those that are normal in the region on that type of farm.[79] Within these conventions the problems centre on the accuracy with which survey data reflect actual labour input and in particular, whether Member States operate different conventions which could influence the level of incomes per unit, or if labour measurement is bias by type or size of farm (as might happen if a sub-sector which consisted of many part-time farms was contrasted with one where there was very little off-farm activity). Though changes in "normal" working weeks are likely over a run of years, which could affect the number of AWUs estimated, in reality FADN/RICA results are rarely used to trace income developments over more than a few years. There is also the matter of change in labour input figures resulting from the turnover of the sample - an identical sample is not maintained for comparison, even between pairs of years - so apparent movements in average income could arise from this source.

The perspective with respect to labour and the aggregate income indicators derived from the EAA is rather different, because here the emphasis is on change from year to year. The figures in Table A5.1 show that the positive change in average income (NVA/AWU in real terms) for EUR 12 between "1981" and "1991"[80] were heavily influence by the fall in labour input. Aggregate NVA had fallen, but the rate of this was exceeded by the shrinkage in labour input.

Table A5-1 Average annual growth rate between "1981" and "1991" for EUR 12 in real terms

Net value added at factor cost in agriculture	- 1.8 %
Agricultural labour input (in AWU)	- 3.1 %
Net value added at factor cost per AWU	+ 1.4 %
Source: Eurostat	

With much political attention being paid to changes in Indicators 1 to 3, there is clearly an imperative to ensure that the measures of change in both the income aggregate and the labour input are reliable. When considering changes in the indicators, attention has usually focused on the former In part this reflects the division of responsibility within Eurostat; for the statisticians responsible for the EAA and the calculation of Indicators 1 to 3. (Unit F-1 Agricultural Accounts and Structures) changes in labour input had to be accepted at face value, even when changes were somewhat unexpected. However, in February 1993 the responsibility for statistics on agricultural labour input were passed from Unit E-2

78 This is apparently not in accord with the Eurostat approach to measuring AWUs.

79 See Commission of the EC (1989) *Farm Accountancy Data Network: An A to Z of methodology*. Document series. Also Commission of the EC (1984) *The Farm Accountancy Data Network Handbook of Legislation, Instructions, Notes for Guidance. Section III: The Farm Return.*

80 Inverted commas imply three-year averages centred on the year indicated.

(Employment and Unemployment) to Unit F-1. This initiated a review of methodology and how the statistics might be reactivated. In particular, it has involved an inventory of how Member States were currently providing the information, the establishment of a harmonised EU methodology (which had not existed before) and a comparison between the target methodology and current practice. This target methodology (Box A5-1) is expected to be formally adopted in 1996.

Box A5-1. Proposed outline of methodology for Statistics on the Volume of Agricultural Labour Input

The definition of work
Agricultural labour input should include all work actually performed in connection with the production of agricultural produce, including produce which is used (again) within the branch of agriculture

Unit of measurement
Agricultural labour input must be expressed in Annual Work Units (AWUs). The working time of an AWU should correspond to the number of hours actually worked in a full-time job within agriculture.

Method of measurement
- The working time of an AWU is partly determined by the social factors at play in the country concerned and could perhaps vary from one Member State to another. In the same way, the working time of an AWU will inevitably vary over time with the changing nature of national provisions governing contracts of employment. However, sudden and large changes in the working time of an AWU should either be avoided or taken into account when compiling this statistical series so as to be avoid a definitional discontinuity in the series and to give a clear picture of trends in agricultural income.
- No single agricultural worker can be counted as more than one AWU, despite the fact that the number of hours actually worked might be known to be higher than is usual for full-time agricultural employment. Therefore, the constrain of a worker to 1 AWU must be imposed.
- The number of hours worked by a person should not be adjusted by a coefficient because of age or sex.
- Agricultural labour input by non-family workers should be congruous with the item *Compensation of employees* as recorded in the EAA.

Coverage of these statistics
In order to establish the correct level of the income indicators, the volume of agricultural labour input (the denominator) should correspond to that carried out in order to generate the agricultural income (the numerator) recorded for a particular year. In this respect, agricultural labour input must be linked to the value of output, intermediate consumption and value added as recorded in the Economic Accounts for Agriculture (EAA).

Timing of the supply of these statistics
Annual series on agricultural labour input for total, family and non-family members of the workforce are required. Estimates for the current year should be supplied at the end of the current year so that the income indicators can be calculated.

Source: Eurostat (1996) Doc. F/LG/335 'Statistics on the Volume of Agricultural Labour Input.' June 1996

An implication of the above is that Member States have not necessarily been using the same methodology for estimating agricultural labour input. Though within countries there may have been general consistency from year to year, there were nevertheless some periodic revisions of methodology that resulted in changes in labour input estimates that were not matched by reality.

Some critical issues in the methodology

(a) Different definitions of AWUs between countries and over time

The SNA definition of an AWU allows for differences in duration between countries (e.g. currently 1900 hours per year in the Netherlands but 1 800 per year in Ireland and most other EU Member States). This will affect comparisons in absolute terms of income per AWU between countries. However, a more difficult problem is the impact of revisions of the hours contained in the AWU. In the guidelines for the EU's Farm Structure Survey the definition of an AWU was reduced for the 1989/90 from 2 200 hours to 1800 hours. How countries adapt their estimates of labour input to such guidelines (and to their independent findings on average hours worked) can have an impact on numbers of AWU and income per AWU. Instances of increases in apparent AWUs going into agriculture following a shortening of the defined duration can be found. The proposed methodology refers specifically to the need to take such definitional changes into account, to take smoothing action when necessary and to limit changes that have an impact on income per unit to those that are real ones.

(b) The constraint of the AWU to 1

By definition no-one is deemed to contribute more than 1 AWU. It must be acknowledged that many self-employed people would claim to work longer that the duration of the standard week for employees. Some countries (Sweden is an example) have previously allowed self-employed farmers to count as more than a single AWU. The measurement of the labour input of self-employed farmers is notoriously hazardous (see above). This constraint represents a compromise between the claims by farmers that they are always working and some evidence of under-employment on farms (such as unexpectedly high labour/land ratios on small farms) and an acknowledgement of the difficulty of precise measurement of hours worked in agriculture.

(c) Coverage

The measure of labour input for use in calculating income indicators should relate to the activity that gives rise to that income. For example, if the aggregate income indicator excludes the production of Christmas trees, or on-farm tourism, then the labour input should not include these activities either. This may pose difficulties. Under the previous "pure" branch approach for the Economic Accounts for Agriculture, consisting of Units of Homogeneous Production, all agricultural production was covered, where-ever it took place, but secondary non-agricultural production was excluded. However, the sources of data on labour input do not exactly correspond to this UHP "pure" branch approach; these sources are principally the EU's Farm Structure Survey (conducted every two or three years) updated between survey years and augmented by the annual Labour Force Survey (which only records persons who state that agricultural activity is their main occupation) and other national surveys. For example, the FSS applies a minimum threshold that may exclude units where labour changes are occurring (UK, 6 ha, France 1 ha, Greece 0.1 ha) and it may be impractical to exclude labour used for non-agricultural production. The shift in the methodology of the EAA to a branch based on LKAUs (which permit the inclusion of non-agricultural secondary activities, and the exclusion of production purely for own-consumption) will bring

the coverage of the EAA nearer to that of the labour input recorded in the FSS, though the FSS will need to be reviewed to ensure that the labour input to non-agricultural non-separable secondary activities is covered. (The new branch approach is also intended to cover the agricultural secondary activities of LKAUs whose principal activity is non-agricultural; how labour in these LKAUs is to be measured is not clear at present, though presumably the labour input should only relate to the agricultural activity, even though by definition this cannot be separated from the rest).

ANNEX 6. INCOME STATISTICS FOR THE AGRICULTURAL HOUSEHOLDS SECTOR - BASES FOR CLASSIFYING HOUSEHOLDS INTO AGRICULTURAL AND NON-AGRICULTURAL GROUPS

Perhaps the most significant part of any methodology that attempts to isolate sub-sectors within the households sector, and one which can have a substantial effect on the results, is the system used for classifying households as agricultural or belonging to some other socio-professional group. Various criteria have been put forward (Hill 1990)[81] including *inter alia* dwelling on a farm, ownership of agricultural real estate or business, labour input or deriving an income from farming. Various criteria can be applied to these bases (such as the share of all assets owned that are agricultural, the proportion of time allocated to farming or the share of income derived from it).

While the main income of the entire household is the preferred basis of classification within the framework of national accounts (SNA 1993 / ESA 1995), the use of a reference person system is also seen as an alternative. The SNA is clear that the reference person should be chosen on economic grounds and should be normally the person with the largest income, although the reference person could also be the person who makes the major decisions with regard to the consumption of the household (SNA 4.155). While the SNA mentions that households could be grouped according to the main source of income of the reference person, but also puts forward other criteria (such as the main occupation of the reference person or the industry in which he/she works), the ESA is explicit in its insistence that an income-based system for the reference person is the second-best solution and does not mention the main occupation approach. However, the ESA remarks that other criteria may be appropriate and needed for different kinds of analysis or as the basis for policy-making, e.g. breakdown of households as entrepreneurs by activity: agricultural households; non-agricultural households (industry, services for sale, services provided free). Any further breakdown of the group of households comprising employers and own-account workers into agricultural (farmer) households and other self-employed people clearly falls within the frameworks proposed by the SNA/ESA.

In countries where alternative classifications can be compared, the numbers of households, and income levels, can differ markedly. At the time when Eurostat was drawing up the methodology for its statistics on the Total Income of Agricultural Households (TIAH), the national accounts methodology for the European Union as a whole had not developed such a classification system. Nevertheless, it was clear that it would have to be capable of allocating all households in a systematic way using the same basic criterion. For example, it would not be satisfactory to classify agricultural households on the basis of occupation of agricultural land, but to classify households of waged workers according to their main income source. The possibility would exist of one household being included in two groups or being left out of any.

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81 Hill, Berkeley (1990b), 'In search of the Common Agricultural Policy's "agricultural community"', *J. agric. Econ.*, 41(3), 316-26.

The use of a reference person system

The intention of TIAH statistics was to adopt the system proposed by SNA/ESA, based on the income composition of the entire household.. However, this proved impractical for most Member States, and a decision was made to harmonise on a reference person system and to allocate to socio-professional groups on the basis of the person's main source of income. Only where this was impractical was allocation to take place on the person's main occupation or where most time was spent. This system allows a complete and consistent allocation of households to occupation groups for the purpose of drawing comparisons. Thus an agricultural household is one in which *the main source of income of the reference person is from independent activity in agriculture*.[82] Some Member States, that cannot at present use an income criterion, substitute the main declared *occupation* of the reference person.

In the context of the EU's TIAH statistics this definition of an agricultural household is sometimes labelled "narrow" since it excludes those households which operate a holding but where farming is not the main income of the reference person (or the person's main occupation). Of course, when measuring household income the incomes of all members are summed, but these additional incomes are not considered at the classification stage. All EU Member States (except the Netherlands) now use this reference person system in calculating their TIAH results.[83]

Use of a reference person system can result in some households being classed as agricultural where farming contributes only a minor part of the household's total income, but such cases have to be accepted as a price of the greater practicality of such a system. This is particularly the case when the process for identifying the reference person is not based on the largest contributor to the family budget. Typically the determination of the reference person, or head of the household, is subjective and self-declared, though there are examples of countries where explicit criteria are applied. For example, in such circumstances an elderly person who declares himself as being the head of household and also as being a farmer may have living in his household many younger people whose main income sources and occupations are off the farm. While the household may be classed as agricultural using a reference person system, it might be non-agricultural in terms of its overall income composition.

Short-term fluctuations

There is the possibility under any definition of an agricultural household that uses a criterion of income composition of substantial year-to-year changes taking place in the numbers of households. This could make income results difficult to interpret. A system which only looks at income figures for a single year is likely to result in many temporary reclassifications at the margin due to the fluctuating nature of farm prosperity. Not only will the number of agricultural households change; their average income will be affected, though it is not clear if this results in an overstatement or an understatement of the position relative to that of a more consistent group of households[84]. Averaging incomes over a run of years would present the basis for a

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82 Where possible the group of agricultural (farmer) households should not include forestry or fishery households.

83 In the Netherlands classification is based on the income composition of the entire household, but the socio-economic characteristics of households with agricultural holdings means that this departure from the harmonised methodology is of little significance, though the extent of this will be regularly monitored.

84 Situations could be set out in which either possibility might arise. Also a distinction has to be drawn between those circumstances in which the number of agricultural households remains unchanged and those where the same individuals remain in the group. Taking a rather extreme case, if falling agricultural incomes are restricted to households with low total incomes, marginal reclassification could result in a rise in the average income for the remaining agricultural households. Conversely, rising agricultural incomes could cause a fall in the overall average if many previously-excluded low income farms are brought in.

more stable classification; analysis of farm-level data in Germany suggests that taking a three year period removes most of the unpredictable variation in incomes. Taking longer periods gives more stability, but there is an increasing danger that changing farm structure (changes in the size distribution of the farms concerned) will affect the long-term trend in income variability[85]. Classifying according to the main occupation (defined according to time spent) of the reference person may show more stability, but this system has other major disadvantages; there is plenty of evidence to show that the proportion of time spent on farming is not a satisfactory guide to the proportion of income derived from it, especially among small farmers. In addition, time allocation does not correspond to the ESA 1995 methodology as a basis for allocating households to socio-professional groups.

The EU's TIAH methodology encourages the use of classification involving the averaging of incomes over time. While at present income measurement systems are rarely set up in ways which enable this to be carried out formally, in practice an element of averaging seems to take place in most Member States. For example, when information on the main source of income involves some subjective judgement by administrators (such as is used in the UK by taxation authorities in allocating taxpayers according to their normal main income source) a form of averaging is already being employed Most Member States operate mechanisms that give a degree of short-term stability to households that comprise the agricultural group.

A shrinking sub-sector

Even if the effects of short-term fluctuation in the income of farming on the numbers of agricultural households are smoothed out, the households which are covered will not form a constant group over time. In the long term numbers will be expected to fall, in line with the historic pattern. If the policy interest were to be to trace the development of income of people who started any given period as members of agricultural households, some attempt would have to be made to retain these in the group. For example, the households which are most successful in diversification into non-agricultural activities can be expected sooner of later to fall outside the agricultural group (defined in the "narrow" sense) and to join some other. Under the present arrangement, farmers who face a fall in their income from farming will eventually be excluded from the agricultural category as their welfare transfers grow in relative importance. Thus when commenting on income developments over time, changes in the composition of the group of agricultural households must be borne in mind.

Household of hired workers

It should be noted that households headed by hired workers in the agricultural industry are not included within the agricultural household group under any of the classification systems put forward. In practice, only farmer-households are covered. This may represent a significant departure from the intentions of agricultural policy which may have as its target both the independent (self-employed) and dependent (employed - waged) groups. although in practice the overwhelming majority of policy spending appears to go to farmer- households. Some measures used in the USA have covered both groups, but

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[85] See: Cordts, W., Deerberg, K. H. and Hanf, C. H. (1984) Analysis on the Intra-sectoral Income Differences in West German Agriculture. *European Review of Agricultural Economics*, 11(3), 323-42. Using estimates of the coefficients of variation in farm profits for single years (over the period 1968/9 to 1979/80) and for profits averaged over from two to twelve years, it was shown that for single years the average coefficient was 0.78, for two years 0.68, for three years 0.64 and for four years 0.61. Over twelve years it was 0.55. Some 60 per cent of the total reduction was achieved by averaging over three years. More reduction (83 per cent) was achieved by taking five year averages, but in the opinion of the authors, farm growth had probably become significant by then.

statistics on these have depended on raising survey results rather than starting from aggregate household accounts. While it might theoretically be possible within the framework of national accounts to add to the sub-sector of employers (and self-employed workers) an equivalent sub-sector comprising agricultural employees, the low profile of the latter in policy and their relatively small numbers in many countries suggests that the additional resources needed to do so would not be well-spent.

Farmer households with corporate farm businesses

A specific problem which has had to be tackled in the classification system is that of farmers who run their farm businesses as corporate institutions (companies). These are of numerical importance only in a few countries (most notably in the UK) but tend to be in the largest business size groups. Their operators might therefore be expected to have relatively high incomes. In practice these farms may behave as if they were operated in non-corporate form; the structural arrangements are often made for taxation convenience rather than to secure other advantages. Taxation data form an important information source in countries where these farms are found. However, farmer-directors of such farms will normally be treated in taxation statistics as receiving income as employees of their own businesses, rather than as receiving income from independent activity (self-employment). Consequently, they may escape inclusion as agricultural households; they may be classed among the large group of dependent households (wage or salary earners).

From the conceptual standpoint of national accounts, such households do not fall within the sub-sector of employers and self-employed workers. In contrast, from an agricultural policy perspective, these households would form part of the target group. Within the EU's TIAH statistics special arrangements have been made in the methodology to cover such households, in which they are an "add-on" to the unincorporated sector (that is, they are treated as if they were unincorporated businesses). Data sources in some countries draw no distinction between incorporated and unincorporated farm businesses; in these situations the "add-on" cannot be separated off. This treatment marks a departure between the TIAH and ESA methodologies.

Choice of other socio-professional groups for purposes of income comparisons

The objectives of statistics serving agricultural policy explicitly or implicitly involve comparisons between agricultural households and other socio-professional groups (developments of income and absolute levels of income). Comparisons between the situation of agricultural households and the all-households position (or all non-agricultural households) are often felt to be not sufficiently detailed to answer policy questions. Some EU Member States already divide their "private households" sector into sub-sectors for national purposes within the framework of their national accounts (France and Germany in the disaggregation of their household sectors, and the Netherlands within its related Socio-Economic Accounts). Eurostat also publishes results from national family (household) budget surveys in Member States as "comparative tables" using standard socio-economic categories for the head of household.

For use within its TIAH statistics, Eurostat has adopted a list of socio-professional groups for the purpose of disaggregating the household sector and the drawing of comparisons. This list is expressed in two levels, a "minimum" list (shown in **bold** in Box A6-1) and an indication where the first level of expansion should take place (shown in normal print). EU Member States that wished to use a more detailed breakdown with the existing (1990) TIAH Manual instructions, where possible the group of agricultural (farmer) households should not include forestry or fishery households.

When comparing households in different socio-professional groups according to their levels of disposable income, there appears to be no strong reason why restrictions should be placed *a priori* on the selection of groups. Though there may be a particular policy interest in seeing how the incomes of agricultural households compare with, for example, the incomes of small retail traders, there is little inherent reason why their potential spending power should not be compared with household headed by employed persons, or by persons who are retired or mainly dependent on social transfers for their income. Real differences in costs of living (especially of housing, food and transport) may require caution when drawing inferences about relative potential consumption levels, but this also applies to many other forms of comparison (such as disparities in the costs faced by rural and urban households, which may be large). These cost differences are not in essence related to the manner in which the income is generated. Nevertheless, when interpreting comparisons it should be borne in mind that the income from farming differs in its economic characteristics (including risk) from, for example, income from employment, and that satisfactory data are often less easy to obtain for income from self-employment, not least because the concept of income is more complex and involves the identification and evaluation of a greater volume of items which are taken as income in kind.

Box A6-1. "Minimum" list of socio-professional groups, and first level of expansion

(a) Employers and own-account workers (main income of reference person from independent activity)

- ***(i) Farmers***
- ***(ii) Others***
  - *(x) retail and wholesale distribution: accommodation and catering*
  - *(y) services (including professions operating as own-account workers)*
  - *(z) others (including manufacturing industry)*
- ***(iii) All self-employed [(i)+(ii)]***

(b) Employees (main income of reference person from dependent activity):

- *(i) Manual workers in agriculture, industry and services*
- *(ii) Non-manual workers*
- *(iii) All employees ((b)(i) + (b)(ii))*

(c) Others

- *(i) Recipients of property income*
- *(ii) Recipients of pensions*
- *(iii) Recipients of other current transfers*
- *(iv) All others*

(d) All households except farmers ((e) minus (a)(i))

(e) All households ((a) + (b) + (c))

ANNEX 7. NOTES ON THE DEFINITION OF NET DISPOSABLE INCOME (WITHIN THE ESA'S DISTRIBUTION OF INCOME ACCOUNT, AS APPLIED IN EUROSTAT'S TOTAL INCOME OF AGRICULTURAL HOUSEHOLDS - TIAH - STATISTICS)

The TIAH statistics uses a presentation of income that corresponds to the Distribution of Income Account for the households sector in national accounts. This has some consequences. First, in the flow of resources to agricultural households, the reward from independent activity (self-employment) is shown in the form of operating surplus (value of output minus costs of hired labour). In the SNA/ESA this is termed "Mixed income" as it arises from unincorporated enterprises owned by households (though there the surplus arising from the production of own-account housing services is still termed operating surplus). In the TIAH this term is avoided because of the proximity of other income concepts. Rent and interest costs (property and entrepreneurial income paid) are deducted later, among the list of negative items. However, in practice many countries deduct these two at the level of Item 1, showing what is in effect an income figure. The end result is the same, but there are implications when looking at the composition of total income.

Second, accident insurance premiums and claims (receipts) are shown as separate items. This is explained by the fact that the Distribution of Income Account for households, as part of the ESA, has to record flows between all the various sectors; one of these is the Insurance Enterprises sector. On the negative side, at the individual household level insurance premiums would normally be regarded as a cost to be deducted before the calculation of disposable income, but receipts from claims, especially for the replacement of assets destroyed by accident, probably would not. This is a specific example of a general point; in microeconomic approaches some items would not normally be regarded as elements in the calculation of disposable income although they appear in the list in the macroeconomic approach.

Third, in the TIAH methodology all interest charges are treated as negative items, whether the borrowing is for business purposes or to finance consumption goods. This reflects the dual role of agricultural households within the SNA/ESA as both production and consumption units. Again, a family budget approach might accept the former as being a cost associated with independent activity, but would probably claim that payment of interest on consumer borrowing should be made out of disposable income, and not treated as a cost in its determination. However, even if the methodology required a distinction between the two, for agricultural households it may be impossible in practice for surveys to separate them in any meaningful way because of the close association of business and personal wealth.

Net disposable income should not be interpreted as bearing a direct relationship with standards of living for reasons that include the following:

- No account is taken (at present) of the consumption of goods and service provided by the state without direct cost to the individual, such as public health care or education. In the revised version of the TIAH methodology, following changes in the SNA 1993/ ESA 1995, there is provision for the concept of Net adjusted disposable income, the nature of the adjustment being social transfers in kind, which include *inter alia* publicly provided education and health services. This concept is

intended to improve the comparability of disposable income figures over time and space, such as between countries, between socio-professional groups and between time periods that include changes in the extent of public sector activity.

- While there is an attempt within the existing Net disposable income concept to cover goods and services taken from farms by their operators in non-money forms (farmhouse consumption of farm products, the rental value of owned accommodation), it is by no means certain that these are either adequately captured or correctly valued.

- Net disposable income is only a measure of current flows, and no account is taken of capital gains which, according to some conventions, could form a part of personal income.[86] Capital gains can be realised in many ways other than by sale, and it has been found that farmers with capital gains can adjust their consumption spending (or sums set aside for pensions) to reflect these gains.

- Wealth, which represents a potential source of purchasing power and therefore of economic status, is also ignored.

Hence Net disposable income must be regarded only as a partial measure of the command which agricultural households have over goods and services.

Particular care must be taken when drawing comparisons between the income levels of agricultural households and those of other socio-professional groups. Here the coverage of income in kind taken from the farm is a particularly sensitive issue. Farmers have a greater opportunity than household in general to consume directly the output from their productive activities (food, fuel), and to treat some items of personal consumption as business expenses. Often farmers live in houses which would command substantial rental values; there is an impression among the statistical authorities of EU Member States that, where this item is included as a form of income, the value of owner-housing on farms is often understated. In some countries the estimate of own-consumption is too low, as it is valued at farm-gate prices whereas perhaps it should be measured at retail prices, with appropriate reductions to allow for any lack of processing, presentation and so on. On the other hand, the costs of consumer goods are often higher in rural than urban areas, so that a given disposable income could indicate lower physical consumption[87].

It is also evident that the income of agricultural households differs in the nature of the rewards it represents from that accruing to households in general. Income from independent agricultural activity (the main source for farmers) is a mix of rewards, being the residual available to the owned capital and land, and the unpaid labour of the household, including an element for the risk-taking function of entrepreneurship. In contrast, the main source of income of households in general is from dependent activity (that is, wages) alone. While not denying the different economic function of the main income source, this is not a valid reason for objecting to comparisons between the disposable income of farmer households and other groups, even those whose income comes entirely from state welfare benefits. Net disposable income is essentially an indicator of potential for spending on consumption and/or saving. Whether one group is relatively disadvantaged compared with another will depend on the level of disposable income, not its composition (though composition may be used as a means by which the groups

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86 For a discussion of the definition of personal income, and the relevance of different form of income measurement to agricultural policy, see: Hill, Berkeley (1989) *Farm Incomes, Wealth and Agricultural Policy*. Aldershot, UK: Gower.

87 In practice it seems that the net effect of these factors is to lower the cost of living of farmers as a group, requiring a correction factor to applied to their income when attempting to comparisons with other members of society. In the USA the official poverty income for farmer households is set at 85 per cent of the non-farm level. In Australia the 1973 Henderson Poverty Enquiry used a farmer poverty line 20 per cent below that for all families.

to be compared are defined). For policy purposes there may be special interest in drawing comparisons of income levels between farm households and the households of, for example, other independent businessmen, but again this has nothing directly to do with matching the mix of factor returns. This is an important point.

ANNEX 8. CONVERGENCE BETWEEN THE EU'S AGGREGATE ECONOMIC ACCOUNTS FOR AGRICULTURE, AS REVISED FOLLOWING THE SNA 1993 / ESA 1995, AND THE EU'S MICROECONOMIC DATA SOURCE ON AGRICULTURAL PRODUCTION - THE FARM ACCOUNTANCY DATA NETWORK

Though ideally macroeconomic and microeconomic systems of accounting should complement each other, within the EU the differences between their respective methodologies have proved troublesome, even to the extent that few official comparisons of their results have been attempted. Many of the changes in the aggregate Economic Accounts for Agriculture (EAA) that flow from the SNA 1993 /ESA 1995 will reflect an increased convergence of concepts between the EAA and the Farm Accountancy Data Network (FADN / RICA).

- By adopting a statistical unit such as the LKAU, which may approximate to an agricultural holding (business), the concept of production in agricultural accounts will converge with that of FADN (in issues such as trade between holdings, inclusion of non-agricultural activities closely linked to agricultural activities). Similarly the time of recording output will be almost identical in the two systems.

- The recording of some products used in the same holding as intermediate consumption is similar to the accounting method used in FADN for output for own use.

- In the case of some distributive transactions such as subsidies, the time of recording laid down in the revised ESA corresponds with that of FADN (e.g. FADN records subsidies when the credit has been decided definitely both "in principle and in terms of the amount").

- Rules for treating plantations, livestock and land improvement, the valuation of Gross Fixed Capital Formation and Fixed Capital Consumption in the agricultural accounts are very similar to those of FADN.

Nevertheless disparities remain, in terms of coverage, valuation methods for stock changes, work in progress and own-consumption by the farmer and his family, payment in kind, treatment of non-life insurance premiums, VAT flat-rate refunds, and tenancy payments.

ANNEX 9. ALTERNATIVE METHODS BY WHICH A DISTRIBUTION OF INCOME ACCOUNT CAN BE ESTIMATED FOR THE AGRICULTURAL HOUSEHOLDS SECTOR

The methodology of EU's Total Income of Agricultural Households (TIAH) statistics recognises that, while a common set of conceptual definitions has to be applied when making estimations in the interests of harmonisation, there are different ways in which these statistics can be generated. A degree of flexibility has to be allowed to cater for the different sources of basic data found in EU Member States.

Subdivision of the households sector account (macroeconomic approach)[88]

This approach is within the macroeconomic framework of national accounting, and consists of disaggregating the Distribution of Income Account(s) for the households into separate accounts for the agricultural households sub-sector and for other socio-professional groups. A prerequisite is an account for the entire households sector. This approach starts from the economic aggregates in the sector accounts (for example, the global interest received by households) and allocates each aggregate between the various sub-sector accounts.

In practice macroeconomic data sources rarely distinguish between payments or receipts from people who are members of the agricultural households sub-sector and those from other household sub-sectors. Sometimes alternative indirect methods can be used to deduce amounts; for example, the age composition of agricultural households can be used to estimate the receipts from pensions and some other social benefits. Often a distribution agent is used to allocate an economic aggregate between classes of recipient. For example, data from family budget surveys or tax records of income from self-employment, though perhaps underestimating the level of income, might be used to distribute the equivalent income figure taken from national accounts. The choice of distribution agent to allocate the operating surplus (or income) from agricultural production to agricultural households and other institutions (including non-agricultural households) is of particular importance in view of the large contribution this item is likely to make to the former's total income. Standard Gross Margin (or Income) for different types of household, derived from farm structure surveys, is sometimes used in this context.

The overall quality of this approach will depend on both the quality of the aggregate (which will reflect the sources used in its construction and the existence of means of checking and reconciling them) and that of the distribution agent. In the present context the latter poses the bigger problem.

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88 Within the EU's TIAH statistics Member States using this approach include Belgium, Germany, Greece, Spain, France, Italy, the Netherlands and Portugal.

Grossing-up microeconomic data[89]

Accounts leading to disposable income of the agricultural household sub-sector and others sub-sectors can be obtained by grossing-up microeconomic data, as collected in household budget surveys, taxation records (total or samples) or farm accounts surveys. The last will only generate results for the agricultural households. The FAO envisages that this survey-based approach will form a major way by which accounts for the agricultural households sub-sector will be developed, as set out in its 1996 *An System of Economic Accounts for the Food and Agriculture Sector.*

A survey-based approach faces some major problems in generating results that are compatible with the aggregates of national accounts. Each pre-existing data source will have its own set of definitions and conventions, including the classification system used to place households in socio-professional groups. They share the microeconomic approach to components of income, which uses definitions of items that frequently differ from those used in national accounts (even if the names are the same) and omits some of the items in the list . In particular, the microeconomic approach tends not to use operating surplus as a concept, but substitute income net of rent and interest and insurance payments. Where disposable income is estimated, this would be before the subtraction of some items (such as voluntary contributions to religious bodies) which are treated as deductions in the target macroeconomic methodology.

A brief mention must be made of the types of microeconomic data sources that may be used as the basis of distribution agents or to provide primary data and their usefulness in constructing a Distribution of income account. A more detailed inventory will be given in Annex 13. Annual farm accounts surveys are commonly found in OECD countries. One reason for Member States in the EU to carry them out is the commitment to contribute harmonised data to the Community's Farm Accountancy Data Network whose results are published regularly by the Commission[90]. There is no requirement in FADN to cover information on income from outside the farm business, though this may be collected for national purposes. The administrative requirement that these surveys should achieve a high coverage of national production in an economic way means that they leave out many small farms which fall below some imposed minimum size threshold and which contribute relatively little to total output. Nevertheless, these small farms may be the main source of livelihood or occupation of their holders and should therefore form part of the agricultural households sub-sector. Furthermore, they may form a substantial element of "the farm income problem".

All EU countries also undertake family (household) budget surveys, co-ordinated by Eurostat, as do many other OECD members. The methodology within the EU is not completely harmonised, but

89 Within the EU's TIAH statistics Member States using this microeconomic approach include Denmark, Ireland, Austria, Finland, Sweden and the United Kingdom.

90 The basic harmonized methodology is described in: Commission of the European Communities (1989) Farm Accountancy Data Network: An A to Z of methodology. Document series. FADN results are published regularly in a separate report, the latest being Commission of the European Communities (1990) Economic Results of Agricultural Holdings No 5 - 1986/87: Farm Accountancy Data Network. Document series. Summary results also appear in the annual Commission of the European Communities Agricultural Situation in the Community reports.

similar approaches are taken by Member States[91]. However, these surveys are often widely spaced in time (with intervals of up to seven years between surveys), are frequently weak in terms of income data, especially from self-employment (independent activity) since they were not set up with income measurement primarily in mind (their focus was expenditure information needed to construct indices), and the number of cases formed by farmer households is, at least in the northern countries, often too small to be statistically reliable.

Among the other sources encountered, taxation records are a potentially valuable source of basic data where the taxation system is based on actual accounts, though information will usually only relate to those items that are deemed to attract taxation. Within the EU their usefulness is hampered by incomplete coverage and, in many Member States, by regimes that levy tax at a flat rate per hectare (the "forfait" approach) rather than on actual income. However, these are a major source of primary data in Denmark, Finland, Sweden and the United Kingdom. Outside the EU taxation records are a particularly valuable source of data in Canada and the USA. Other information sources found in a few countries included social security schemes and occasional surveys. Perhaps not unexpectedly, some countries have several good microeconomic data sources while others have none.

A particular version of constructing an account for agricultural households must be mentioned here. Termed a **Hybrid Model,** this combines a macroeconomic approach for deriving the income from agricultural activity of agricultural households with a microeconomic approach towards the other components in the target list leading to disposable income. It recognises the difficulty in collecting reliable details on the income from independent activity in agriculture through surveys of agricultural households by substituting an estimate derived from the accounts of the branch agriculture. Where macroeconomic sources allow estimates for other forms of income and outgoings corresponding to agricultural households to be made, these are used, but the principal data source on all these other items will tend to be a survey of agricultural households. This may be the household budget survey, or a survey mounted specially. The results will be grossed-up and, if not repeated annually, will require extrapolation. Member States using this approach include Greece and Luxembourg.

All the above are capable of producing absolute figures. In addition, methods are needed where direct estimates of disposable income or of individual items in its calculation are not available for particular years but have to be extrapolated from a base of absolute figures by applying rates of change to the various components. This process is sometimes called a Base-line and Mover system. Then indicators of the rates of change for the individual components would be sought from the most appropriate sources which, suitably weighted, would enable the change in overall disposable income to be estimated.. Where direct annual estimates exist or become available for individual components, these would be substituted for the extrapolated figures.

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91 The basic methodology for the latest round of surveys is described in Eurostat (1990) Family Budgets: Methodological handbook. Theme 3 Series C. Results are given in Eurostat (1990) Family Budgets: Comparative tables. However only the methodologies and results for six countries (Germany, Spain, France, Ireland, Italy, Netherlands) are covered. For a more complete account reference should be made to the earlier round of surveys, made in about 1979, and reported in Eurostat (1985) Family Budgets: Comparative Tables - Federal Republic of Germany, France, Italy, United Kingdom and Eurostat (1986) Family Budgets: Comparative Tables - Netherlands, Belgium, Ireland, Denmark, Greece, Spain. Both Theme 3 Series C. Luxembourg: EEC.

ANNEX 10. POLICY-RELEVANT FINDINGS IN MICROECONOMIC AGRICULTURAL RESULTS

(a) Patterns observed among farm accounts (in the EU's Farm Accountancy Data Network results)

The EU's Farm Accountancy Data Network results permit a multitude of analysis useful in different ways to policy-makers and policy analysts. This includes comparisons of income levels between Member States, something that is usually avoided as being *non-communitaire.* Two terms are used in this context, *disparity* and *dispersion*. The former is concerned with the differences in average levels of income when farms are grouped by country (or region), by type of farming or by size. *Dispersion* is concerned with the variation found within groups, that is the extent to which individual farms are distributed around the average.

Only a small selection of the most significant patterns in FADN results can be presented here (based on Commission 1993[92]; Hill and Brookes 1993[93]). These use Family Farm Income per farm and per Family Work Unit as the income measure, as this is generally recognised as being superior to NVA as a proxy for the income from farming. It is important to note that FADN results only cover farming activities; other income is ignored.

Differences in income between countries and regions

Great disparity exists between countries in the absolute levels of income from farming per farm business and rankings were very similar at the end of the 1980s to what they were at the beginning. At one extreme, in 1989 the Netherlands had an income per farm business almost four times the EUR 12 mean. At the other was Portugal, with an income per business only a third of the mean and one eleventh that of the Netherlands. On the basis of income from farming per person (FFI/FWU) the Netherlands again emerged with the highest income, followed by Belgium, both having levels at least three times the EUR 12 average. Portugal again had the lowest income. France and Germany had levels between one third and one half greater than the EUR 12 average, Ireland was close to the average, and Italy was somewhat below. The disparity between the highest and lowest average incomes per person (Netherlands and Portugal) was about eleven to one, the same as when expressed on an income per business basis.

When farms are grouped by regions the disparities widen. The highest farming incomes per person (FFI/FWU) over all FADN regions (and single-region countries) in 1989 were found (in descending order) in the Champagne-Ardenne (France), the Netherlands, Niedersachsen (Germany), Belgium, Nordrhein-Westfalen (Germany) and Eastern England, all with incomes 2.7 or more times the EUR 12 average. At the other extreme, in 1989, were eight regions with incomes less than half the EUR 12 average (Makdonia-Thraki in Greece, Galicia and Asturias in Spain, Campania in Italy, and four of the

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92 Commission of the European Communities (1993), *Farm Incomes in the European Community 1990/91 including selected results for 1986/87 to 1989/90*. Document series. The Commission, Luxembourg.

93 Hill, Berkeley and Brookes, Bernard (1993*), Farm Incomes in the European Community in the 1980s,* Document Series, The Commission of the EC, Brussels.

five regions of Portugal, the exception being the Alentejo e do Algarve). Lowest incomes in the Community were found in the Galicia region of Spain, but the next four poorest regions were all in Portugal.

Taking the extremities dramatically illustrates the magnitude of the differences in the incomes from farming seen in the Community; the average absolute income per person in the highest income region(Champagne-Ardenne in France) was twenty-two times greater than that in the lowest income region (Galicia in Spain).

However, there is considerable overlap of regional income among Member States. Even in countries where the national average farming income per person is not high, there are likely to be some regions which perform comparatively well. Of all the countries in 1989, only Greece and Portugal did not have at least one region whose average FFI/FWU was above the average EUR 12 position. This overlap underlines the importance of analysing incomes by region as well as by Member State.

Though the European Union applies a Common Agricultural Policy across Member States, including the setting of common support prices (in ECUs), this clearly does not result in common income levels from farming in different parts of the Union. A large part of the explanation must be the diverse nature of the farms, including the size and type composition of the agricultural industry found in each country.

Differences in income between sizes and types of farm

When farms in the FADN are broken down by economic size and farming type the main conclusions (Hill and Brookes, 1993) are that:

a. within each farming type the larger farms had far higher incomes from farming per Family Work Unit than the medium or small farms.

b. the incomes per person (FWU) of large farms appeared to increase slightly relative to those of small farms over the 1980s. Typically the incomes of small farms remained steady or declined a little whereas the incomes of large farms improved, especially in the last three years.

c. for most of the period covered, the absolute incomes per person (FWU) from farming on pigs and/or poultry farms (all sizes together) were clearly far above those of other farming types. Incomes on horticultural holdings and vineyards were also comparatively high. Each of these, however, accounted for only relatively small numbers of farms. Among the more numerous types, the income per person on dairy farms was noticeably greatest. Mixed and general cropping farm incomes were consistently below the average.

Results for 1989 showed that, as one moves from the smallest to the largest farm businesses, there was a progressive increase in not only the group average level of farming income per business, as would be expected, but also in FFI per Family Work Unit. Income per business among the largest (open-ended) size group (100 ESU and over) was almost twenty-three times the level in the smallest size group (below 4 ESU). On the basis of income per person (FFI/FWU), in 1989 the disparity between the largest and smallest farms, at fourteen times, was less but still substantial.

When the figures are disaggregated by both economic size group and by country, the disparities become very large. On the basis of FFI/FWU, there was a ratio of 1:40 between the lowest positive average farming income (found in the smallest size class in Portugal) and the highest income (in the

largest size class in Spain, though for a small sample of farms). Average Family Farm Income was negative in Denmark for farms below 16 ESU and for farms below 8 ESU in the United Kingdom. However, in both countries the familiar pattern of increasing incomes per person with farm size was still observed. An interesting feature was that, among Member States where large farms of 100 ESU and over were represented in the FADN sample, their group average income in each country was at least three times the EUR 12 all-sizes average (9,305 ECU in 1989). In all countries other than Greece, the average income of farms in the next group (40-100 ESU) was typically at least double the EUR 12 all-sizes average. Among the smaller sizes, only in Belgium did farms of less than 16 ESU manage to reach the EUR 12 all-sizes average. This suggests that location is not a handicap in achieving high incomes if business size is adequate.

Dispersion of incomes

Both the way that incomes from farming are dispersed between income levels and with the way that this dispersion is changing over time are of interest. Analysis of the FADN for 1981 and 1989 found that there were large numbers of farms with low incomes and a progressive decline in farm numbers as higher incomes were reached. Each country tends to have its own characteristic pattern of distribution by income level. However, a surprising feature was the close similarity of the distributions of income in 1981 and 1989, both at EUR and Member State level. For EUR 10 the percentage of farms in each income band remained unchanged or shifted by not more than two percentage points. However, it would be unwise to conclude too firmly that polarisation has *not* taken place. Other influences must be borne in mind. Nevertheless, these two years do not offer any *prime facie* evidence that there *has* been polarisation of farm incomes within the FADN's field of observation.

Location of high income and low income farms

Another aspect of dispersion which is of relevance to agricultural policy is the location of farms where incomes are particularly low or high. Such information can be useful to decision-makers in any attempt to be selective in support. It is clear that cases of income extremities are not evenly spread throughout the Community. In 1989 Italy, Portugal and Spain were the countries with the three largest concentrations of low income farm businesses; together these accounted for over two-thirds of all FADN farms with incomes per person of 2,500 ECU or less. If low levels of FFI/FWU are associated with household income problems, it is clear that these farms in these countries should receive appropriate assistance. However, Spain also had about as many high income farms (with FFI/FWU of 30,000 ECU or more) as Germany and the Netherlands, and substantially more than the UK. France and Italy remained the countries with the greatest numbers of high income farms.

Incomes averaged over three years

Farm incomes in the FADN, as in most microeconomic data systems, are measured over the period of a year. This is not entirely appropriate in an industry subject to random effects of weather and other natural phenomena but which farmers can anticipate and plan accordingly. Individual years of particularly low incomes do not necessarily indicate a permanent income problem. Special analysis of FADN data, using a constant sample, has found that the average income from farming of low income farms in the 1987 FADN (FFI under ECU 5,000) was raised by 31 per cent when their three-year average income 1987-89 was measured, though this improved income was still not high compared with the income generated by the more successful farms in the survey (Hill and Brookes, 1993). In some countries the

effect was spectacular; in Belgium a small average negative income of this group (FFI - 933 ECU) was turned into a positive one of 13,446 ECU and in the Netherlands the change was from -12,269 ECU to 3,895 ECU. While in line with expectations, these modest explorations require further development of a technique that enables constant samples to be drawn with greater ease.

(b) Patterns seen in household income results - EU and other OECD countries

Microeconomic data on the economic characteristics of farmer households, covering income from all sources, is far less developed than that on farm businesses, and no common set of definitions or conventions are applied in such statistics, even within the EU. This point will be developed later. Nevertheless, the patchy information enables some important characteristics to be detected, often drawing on data from the USA[94], Canada, Germany, the Netherlands, Denmark, Japan and a few others. The prime findings (summarised in Hill 1996) are as follows:

- When farms are ranked by size, as would be expected, the income from farming (per farm, which for simplicity is often assumed to correspond to per household) increases across the spectrum, although the relationship may be affected by the measure of size that is used. The pattern of non-farm income and total income is not so straightforward. Non-farm income tends to be greatest in absolute terms among the smallest and largest farms, though its relative importance declines across the size spectrum. When farm income and non-farm incomes are combined, there is a tendency for total incomes to rise with farm size, but the smallest farms do not always have the smallest average total incomes.

- Non-farm income transforms the income situation among small farms, so that on average their total incomes are frequently satisfactory. There is some suggestion that lowest total incomes are associated not with the smallest farms and those generating the smallest incomes from farming but with those somewhat larger, typically those which are too large to be operated on a part-time basis but too small to generate an adequate income from farming to support a household..

- The wide disparity of incomes found if only the income from farming is considered is made substantially more homogeneous once the non-farm incomes are taken into account. The tendency for the disparity of farming incomes to widen is to some extent modified by the growth of non-farm incomes, though the evidence is not clear-cut.

- The impact of non-farm income is not uniform across the enterprise types, and this is reflected in regional differences (though other factors may be at work here too, such as degree of rurality). For example, because dairy farming in relatively labour-demanding and exacting in timeliness, this restricts opportunities for off-farm activity, so that the total income of farm households may be low, even where farming incomes are relatively high (as in the Netherlands). Conversely, the total incomes of large crop farms are often high because other activities can be carried out in parallel though this form of farming may not be particularly profitable.

- When farm households are grouped according to the age of the reference person (typically the head of the farm household) up to a certain age, total income rises with the farmer's age, peaking between

94 In particular from Ahearn, M. C., Perry, J. and El-Osta, H. S. (1993), *The Economic Well-Being of Farm Operator Households, 1988-90,* Agricultural Economic Report, No. 666, USDA ERS, Washington.

the age of 40 and 50 in Germany and Sweden, a little earlier in Denmark (35-45 years) and a little later in the US (45-55 years). Thereafter, total income declines.

- There is a suggestion that income disparities among agricultural households are wider than among households in general. Consequently, adequate average incomes among agricultural households may be consistent with greater relative proportions of farm households that fall below a given poverty line. However, it is by no means certain that agricultural households display any wider a disparity than other groups, such as household headed by other self-employed persons.

- Low total incomes in one year may be transitory, a point already made above. Thus a distinction should be made between those farm households where incomes taken over a run of years may be satisfactory, though single years may be low, and the smaller number of those who face a more permanent income problem. In those few instances where information exists, it is clear that farmers' consumption expenditure is more stable from year to year than is their income, again pointing to the need in a welfare context to look at incomes over a longer period.

In the light of these findings it seems incontrovertible that low household incomes cannot be assessed on one part of income alone, especially as the income from farming seems to be a particularly unreliable guide to total income on small farms where income problems could be most anticipated. And the comparability of the incomes of farmers with those of other groups in society cannot be judged in the almost total absence of reliable statistics.

ANNEX 11. THE POLICY ROOTS OF AGRICULTURAL MICROECONOMIC DATA SOURCES

There is a clear need to consider distributional issues when analysing the problems of agriculture and the effectiveness of policies directed at them. Single, national indicators are inadequate to explore the complexity of many policy situations. For example

- the heterogeneous nature of agriculture in most countries will mean that any national aggregate figure will hide many differences within the industry that may be highly important from a policy standpoint;

- farms in different locations, of different types and of different sizes (resource bases) will exhibit different economic characteristics (such as average efficiency or output per unit of labour, investment and, in particular, levels of business profit and personal incomes) so breakdown will be needed if problems of poor performance and low incomes are to be identified and addressed. Performance and income levels will be linked with the viability of the farm business, which has knock-on affects for the farm family, such as influencing their ability to adjust to external factors, their diversification of labour and other assets between agriculture and other uses, and their ability to continue in the industry and the social implications of their decision to leave agriculture.

- changes in the global agricultural economy will not be evenly distributed among farms of different types or situated in different regions or even of different sizes;

- a distribution of farms by income level will be useful in identifying where agricultural policy's main thrust of income support should be mostly directed

In the past it has usually been assumed that the necessary information can be secured by a survey of farms or farm business, and the presumption has been made that this is an acceptable proxy for information about the households that operate those farms.

Farm accounts surveys are found in most (if not all) industrialised countries. Their origins are with the need to know more about the farming industry for policy purposes. At European Union level the farm accounts surveys of all the Member States are brought together under the co-ordination of the agricultural Directorate-General of the Commission (DG VI) as the Farm Accountancy Data Network (FADN), also known by its French acronym RICA. It now covers more than 60,000 cases in EUR 15. FADN was established in 1965 "with the specific objective of obtaining data enabling income changes in the various classes of agricultural holding to be properly monitored" (Commission, 1982). The justification for FADN was rooted in policy, in that "...the development of the Common Agricultural Policy requires that there should be available objective and relevant information on incomes in the various categories of agricultural holdings and on the business operation of holdings coming within categories which call for special attention at Community level"(EEC Regulation 79/65). FADN is therefore not a single survey but is an amalgamation of national surveys carried out by Member States. In some countries

these predated RICA (as in the UK with its Farm Business Survey and Germany with its system of "test holdings"), but in others (for example, France, Spain) they were started from scratch. The nature of FADN is in part a reflection of the approaches inherited from these pre-existing surveys. Ways of collecting the data vary from country to country, but there is a fundamental harmonised methodology which applies to the concepts of income employed and, increasingly, to the selection of the sample (Commission, 1989)[95]. The main income concepts are Farm Net Value Added and Family Farm Income (FNVA less actual interest, rent and costs of hired labour), expressed per farm business and (more frequently) per unit of labour input (total and non-hired respectively).

To take one example of a pre-existing national farm survey, in the UK the Farm Business (Management at its outset) Survey had overt policy aims. According to the preface of the first FMS report, covering 1936 and 1937, the Survey was intended:

a. to be of service to agriculture and to the State in the framing of public policy in regard to the industry,

b. to supplement official statistics by collecting information annually of the capital, equipment and labour employed, purchases of requisites and sale of produce,

c. to ensure that an adequate picture will be secured of the economic conditions of farming, of changes in output, costs, organisation and equipment,

d. to enable co-operating farmers and others to increase their efficiency and to organise their farms on a more profitable basis,

e. to supply the means for local and national research into the main economic problems of the industry.

Early in the life of the FMS four main objectives emerged, based on the above. Through the detailed monitoring of events the FMS was to assist in:

- the framing of national policy
- improving efficiency of individual farms
- the conduct of local and national research
- teaching (a later addition perhaps implicit at the outset)

These aims have been repeatedly affirmed by internal reviews, with the amplification that the Survey should be capable, as far as it is possible, of providing the data bank from which answers to the policy questions of tomorrow can be based.

In the USA, while the present Farm Costs and Returns Survey dates from only 1985, it replaced previous surveys. This change mirrored an increasing awareness of the importance of the distribution of income to agricultural policy, and that this required a large, statistically representative micro-data base that could be used to produced results raised to national levels. Furthermore, it needed to adopt a methodology in common with the aggregate accounts of the branch agriculture to allow integration with the

95 Commission of the European Communities (1989), *The European Farm Accountancy Data Network: an A-Z of Methodology*. Directorate General for Agriculture, Unit A-3, Analysis of the situation of Farm Holdings, The Commission, Brussels.

macroeconomic parameters (Baum and Johnson, 1986[96]). These are important reasons for reform of statistics in light of the lack of integration of macro and micro in the EU. However, it should be noted that, unlike FADN, the FCRS does not confine itself to questions relating to the farm businesses; questions on non-farm income are also included. The usable sample size is now about 12,000 farms each year. Farms are classified into size groups based on the value of their (expected) sales, and information on the income of operators from farm and non-farm sources by farm sales class is available from 1960 (based on the old methodology) (USDA, 1988[97]). The FCRS consists of multiple versions; since 1988 the Farm Operator Resource (FOR) version has been dedicated to collecting special data on farm operator households.

The microeconomic data sources were developed when the main interest of policy-makers was still that of encouraging further production and where there was relatively little concern with the other activities in which farmers and their households engage. Thus it could be assumed that only the agricultural activities of farmers were of concern - a simple view in the light of the known dependence of many farms for their viability and levels of investment on the non-agricultural activities and resources of their owners and operators. However, the conceptual framework that lies behind the farm-business statistics is not adequate for a time when problems are more complex and when policy is concerned with more issues.

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96 Baum, K. and Johnson, J. (1986) 'Microeconomic Indicators of the Farm Sector and Policy Implications,' *Amer. J. agric. Econ*., 68(5),1121-29.

97 USDA (1988), *Major Statistical Series of the US Department of Agriculture: How they are constructed and used. Vol No 3 Farm Income*, Economic Research Service, USDA, Washington.

ANNEX 12. MICROECONOMIC DATA SOURCES ON THE OVERALL INCOME` SITUATION OF AGRICULTURAL HOUSEHOLDS

Table A12-1. Data sources on the overall income situation of agricultural households in EU Member States

Member State	Farm accounts survey	Family (household) Budget Surveys	Taxation records	Other
Belgium		Yes, but few agricultural cases	Yes, but income not on an accounting basis	
Denmark	Accounts of the Farmers' Association (19,000); Smallholders' Association (4,600); Institute of Agricultural Economics (2,000)		Income Statistics Register System (mainly tax based)	
Germany	Test holdings (11,000)	Survey of incomes and expenditure (5-yearly)	3-yearly	Annual population microcensus
Greece		Yes, but difficulty with incomes from self-employment	Farmer coverage small	
Spain		Yes, but with difficulty with incomes from self-employment		
France		Some 500 farmer households covered	Two levels of sample enquiry (general and agricultural) but incomes mainly not on an accounts basis	Special farm survey (CERC) in 1978
Ireland	Not normally covered, but linked with the Family Budget Survey in 1987	1,300 farmer-households in 1987 survey. Income data good	Farmers not well represented	Social assistance records (not analysed)

continued

Member State	Farm accounts survey	Family (household) Budget Surveys	Taxation records	Other
Italy		Continuous, with many agricultural cases, but income data not of high quality		Bank of Italy survey of households
Luxem-bourg	Special questions added in 1989 only	Few agricultural cases	Most farmer's incomes not on an accounts basis	Poverty survey of households (CEPS)
Nether-lands	Two annual surveys; one (CBS) used to build the national production account (3,000 cases), the other (LEI) part of FADN (1,500 cases)		An annual panel study, the Personal Income Distribution Statistics	
Austria	Sample of 2,500 holdings	Only carried out once every 10 years		
Portugal		Difficulties with income from self-employment	Few farms are covered	

continued

Member State	Farm accounts survey	Family (household) Budget Surveys	Taxation records	Other
Finland	Profitability Study of Agriculture (FADN Finland) (1,100 holdings). In principal the entire household is covered.	Yes, but from 1994 the sample is being reduced	(a) Enterprise and Income Statistics (15,000 cases) with data taken from tax forms; (b) Income and Taxation Statistics for the Finnish Farm Economy (c) Income Distribution Statistics (tax based) covering all households, with 700 agricultural cases	
Sweden	Farm Economics Survey (JEU) with 600 holdings, but questions about non-farm incomes dropped in 1990		(a) Taxation Statistics of Agriculture (DU), with 2,700 cases from 1991. Not carried out in 1994. (b) Survey of Income Distribution (HINK), taxed based, covering all households, with about 600 agricultural cases in 1992.	
United Kingdom	Non-farm income of farmer and spouse covered by the Farm Business Survey from 1988/89	Yes, but few households headed by a farmer (about 60)	Agricultural cases (less than 2,000) taken from the Survey of Personal Incomes (from tax records of self-employment income). Farmers with businesses run as companies are not covered (technically they are not self-employed).	Family Resources Survey (new); first results expected in 1996 for evaluation

Table A12-2 Data sources on the overall income situation of agricultural households - selected other OECD Members

Country	Farm Accounts Survey	Family (household) Budget Survey	Taxation records	Other
USA	Farm Costs and Returns Survey (USDA) (usable sample about 12,000 farms)	Money Incomes of Households, Families and Persons in the US		Census of Agriculture/ Current Population Survey
Canada	Farm Expenditure and Income Surveys/ Farm Financial Survey/ National Farm Survey	Survey of Consumer Finance	Taxation Data Programme	
Australia	Austrian agricultural and grazing industries survey (AAGIS) ("broadacre" industries) Australian dairy industry survey (ADIS)			Henderson Poverty Enquiry (1973)
Japan	Farm Household Economic Survey			
Mexico		Household Budget Survey identifies "rural" households, and the money incomes of those employed in different sectors		
New Zealand	Surveys on a sectoral basis: NZ Meat and Wool Board's Economic Survey/ NZ Dairy Board			Special 1992 national survey covering pastoral and horticulture, aimed at off-farm income

continued

Country	Farm Accounts Survey	Family (household) Budget Survey	Taxation records	Other
Norway	Survey of accounts of farmers whose main income source is farming (sample of about 1,000)		Agricultural Statistics - survey of farmers' income and wealth based on taxation records and an annual sample survey of agriculture/ Income and Property Statistics - tax-based survey of income and wealth covering the whole economy	
Switzer-land	Survey of full-time farmers (sample about 3 500); only 27% of farms are covered.			

Derived from OECD (1995*), A Review of Farm Household Incomes in OECD Countries*, background paper to *Adjustment in OECD Agriculture: Issues and Policy Responses*, OECD, Paris.

ANNEX 13. CALCULATIONS OF CAPITAL CONSUMPTION, AND IMPLICATIONS OF SNA 1993 / ESA 1995

Estimates of capital consumption reflect two main parameters - the size of the gross stock and the rate at which it is consumed. Estimates of the stock can be made directly by survey - in which case a valuation of gross stock can be obtained by multiplying the physical assets found by prices of replacement assets - or by using a "perpetual inventory" method, in which the gross stock is taken as the sum of a series of gross capital formation (in constant prices) ending in the year in question, less withdrawals of assets that have passed the end of their productive life. Both methods require information on price indices for capital goods and face the problem of how to treat embodied improvements in the quality of capital. Perhaps obviously, there will be a need to identify what is a capital asset used by agriculture; what happens to assets that may be used both in agriculture and in some other productive use or in consumption (such as private motor vehicles) or farm dwellings?

Critically, both face the problem of knowing the pattern of capital consumption - for each type of capital (type of machine, form of building, drainage system etc.) the number of years involved, the shape of the consumption curve over time (equal instalments "straight line" or some other pattern) and, where appropriate, due allowance for deviations from the mean. Measures that view income *ex post*, the normal way in which accounting systems at both aggregate and microeconomic levels operate, rate at which it is actually consumed. (When viewing income *ex ante*, such as in investment appraisal, it may be appropriate to assume that capital is consumed over a shorter period than is historically supported). It should be noted that physical life and economic life may differ greatly, and that the latter will reflect *inter alia* the rate of technological change and obsolescence, which may vary between countries and types of capital. In principle actual lives can be established by survey, although in practice this may not be easy where history is not a good guide to the present rate of consumption for the present stocks over the remainder of their productive lives. Rates of consumption for apparently similar assets can vary between countries, reflecting their different environmental conditions, pace of technological advance and to on.

There are many other technical problems associated with estimating capital consumption. These include how to treat:

- the depreciation of capital in the form of breeding livestock or milking cows, and of plantations. The latter were assumed not to give rise to capital consumption in the EU's current EAA but under the ESA 1995 (from SNA 1993) they do. It is Eurostat's proposal not to estimate consumption for productive animals in general though this would be done for particular situations;

- intangible assets, such as computer software for agriculture (under ESA 1995 to be included in capital consumption);

- the value of capital formation by the farm itself (such as the build-up of breeding herds), building and other non-agricultural activities by farm labour, and of the "natural growth" of items such as timber;

- the borderline between maintenance of existing assets and spending that constitutes improvements that should really be regarded as new capital, and the extent to which maintenance spending compensates for capital consumption;

- land improvements (drainage, irrigation etc.) - in the current EAA these are deemed not to give rise to consumption but are incorporated in the value of the land; under the ESA 1995 soil improvements are to be included as an item in consumption;

- costs associated with the transfer of assets (under the 1995 ESA included with the cost of the assets themselves),

- catastrophic losses of capital items that do not form part of normal expectations f consumption;

- capital items that represent small sums (hand tools etc.).

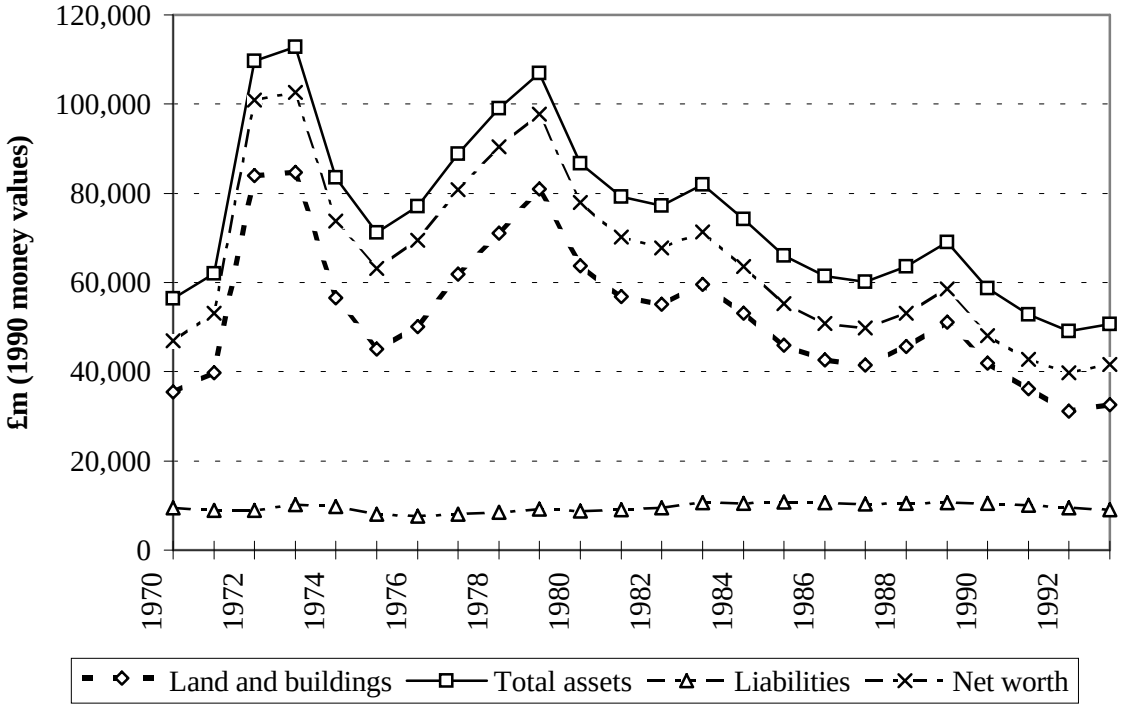
Few of these are likely to be of major significance. However, the sheer volume of data required to make calculations is likely to lead to disparities of methodology between countries that may undermine the validity of international comparisons and between statisticians responsible for national accounts and for microeconomic, farm level results. The agreement on details of the methodology and its applications present a substantial challenge to agricultural statisticians.

ANNEX 14. EXAMPLES OF INDUSTRY-LEVEL BALANCE SHEETS - THE UNITED KINGDOM AND THE UNITED STATES OF AMERICA

The UK and the USA provide typical examples of the official approach to balance sheets for the agricultural industry. As noted in the main text, they make simplifying assumptions about the assets and liabilities belonging to the households who, predominantly, own and operate farm businesses. The division between agricultural and non-agricultural assets and liabilities is problematic and, in many circumstances where households are pluriactive, artificial. The consequence is that neither the full asset position nor (probably) the full liabilities of these households are fully captured, and much of relevance to explaining the behaviour of the farm businesses and farm families is left out.

The balance sheet for the UK, as calculated by the Ministry of Agriculture, Fisheries and Food, is presented in graphical form in Figure A14-1 after the removal of the effects of inflation. It is evident that the pattern of Net Worth has followed closely that set by the value of land and buildings. Liabilities were somewhat higher in real terms in the 1980s, but the main explanation for changes in Net Worth is on the assets side. Twin peaks in the early and late 1970s have been followed by a decline in Net Worth in the 1980s. The total Net Worth figure for 1993 was somewhat lower than that for 1970. Assets other than land and buildings formed 37 per cent of total assets in 1970 and 1993 (years of low land prices) but only 24-25 per cent in 1973 and 1979, high land price years. Since 1993 there have been large rises in land prices, reflecting the improved profitability of farming following the withdrawal of Sterling from the European Union's Exchange Rate Mechanism and the consequent rise in support prices (which are set in ECUs) and the land prices that reflect incomes from farming.

Figure A14-1 UK: Equity position of UK agriculture, 1970-93.
Aggregates deflated to 1990 money values



Even if the conventional approach to the balance sheet is accepted, in which "non-agricultural" assets and liabilities are excluded, there is room for dispute over the manner of calculation on both sides (Johnson, 1987[98]). For example the official UK estimates for land and buildings excludes the value of residential housing on farms, whereas these are usually thought of as an inseparable part of the property, sold together with the land and buildings used for production. Including houses raised the total asset value in 1986 by 20 per cent and lowered the liabilities-to-assets ratio from 18 per cent to 15 per cent. This distinction has particular relevance for the 1980s when land values were falling but domestic house prices continued upwards. The value of milk quotas is included by implication in the prices of the land to which it relates, but a separate valuation is probably needed now that quota has become marketable in its own right. The introduction of payments per hectare on land used for cereals, oilseeds and protein crops as part of the reforms to the CAP started in 1992 also implies the creation of an element in the value of land that could be scaled down or removed by administrative action under political pressure. However, in both of these instances the market value of land incorporates the perceptions by farmers of the likelihood of policy changes, though this could change rapidly in the light of what they see as shifts in the attitudes of agricultural ministers and the Commission to the permanence of quotas, area payments or other similar quantitative restrictions on production.

Information on the assets and liabilities of US agriculture is more detailed and covers a longer period, being available on an annual basis from 1939 to the present. Series are published including or excluding "operator households"; the latter removes estimates of the assets and debts relating to the domestic aspects of the farms. On the asset side this means that the value of the houses of farm operators is excluded, as are the private shares of farm cars and trucks. On the liabilities side borrowings for private

98 Johnson, C. (1987), 'The balance sheet of British agriculture', in Statistics Users Council (1987) *Agriculture and Food Statistics: Proceedings of the Conference of the Statistics Users Council.*

purposes are excluded, such as for operator housing. The differences are not large in relation to the total sums involved and the relationships between assets and liabilities are little altered, as the following figures for 1985 show (Table A14-1). Nevertheless this flexibility of presentation is advantageous when attempting to distinguish the branch of the economy designated agriculture from the sector of the population consisting of agricultural households.

Table A14-1. USA: Balance sheet for US agriculture, 1985 and 1995 (billion $ current values)

	1985		1995
	Operator households		Operator households
	Included	Excluded	Excluded
Real estate	607	560	726
Livestock	46	46	68
Machinery and vehicles	98	92	87
Crops	37	37	23
Household equipment and furnishings	26	-	
Financial assets	53	37	48
Total assets	867	771	957
Real estate debt	105	97	79
Non-real estate debt	100	94	72
Total debt	205	192	151
Equity (Net Worth)	662	579	806
Debt/Assets (%)	24	25	16
Debt/Real estate (%)	17	17	11
Debt/Non-real estate (%)	38	45	31

Source: Economic Indicators of the Farm Sector 1985, USDA: Agricultural Outlook June 1996

ANNEX 15. EXAMPLES OF ESTIMATES OF AGGREGATE CAPITAL GAINS AND LOSSES

Figures for aggregate gains and losses in the *USA* from 1970 are shown in the annual Farm Sector Review. Throughout the 1970s real gain took place and at rates which exceeded Net Farm Income. For earlier US estimates it is necessary to turn to non-official sources. Bringing the various earlier estimates together suggests that capital gains started to become important in US agriculture in about 1968; from then on real estate started to yield more substantial and regular gains than in the earlier post-war years and these gains were at levels which had only been seen occasionally before (1950, 1956 and 1958). Most of the gain came from real estate. Unlike the period up to the mid-1969s, farm debt later became a significant source of real capital gains,. partly because of its growth, but mainly because of more rapid general price inflation. Similar estimates were made for the entire USA economy by Bhatia (1970, 1971, 1972)[99]. In most years capital gains did not form such a large proportion of personal income as in the farm sector. This led to the observation, important to this study, that "if all capital gains are included as income, and incomes of the farm and non-farm sectors are compared, the farm sector will fare much better than what similar comparisons based on conventional measures of income would indicate" (Bhatia, 1971 p505).

The size of capital gains to agriculture in *Canada* has received a substantial amount of attention, showing a similar pattern of rising importance compared with income over the 1970s as exhibited in the neighbouring USA (Brinkman, 1980[100]; Chase, 1980[101]). From 1960-72 real capital gains averaged 25 per cent of income. After 1973, gains assumed a much greater importance in relation to current income and in four of the last six years of the 1970s they exceeded net farm income.

Denmark is unusual among EUR 12 member states in that it has published estimates of capital gains and losses as part of its annual official survey of the agricultural industry. Figures for 1981/82 to 1986/87 are shown in Table A15-2. These estimates take account both of changing asset values and of liabilities, and are expressed in real terms by adjusting according to the general level of prices. The heavily indebted nature of Danish agriculture makes the inclusion of gains and losses on financial assets particularly important. Though the estimates are restricted to the assets and liabilities of "active" farmers, a comparison of the gains and losses with current income shows the implications of taking both into account when assessing the year-to-year change in economic status of farmers. Capital gains are far more volatile than current income, in some years substantially adding to current income and in others, when losses occur, largely wiping it out. *Sweden* also has a history of estimating capital gain, including those on agricultural real estate and liabilities (Gulbrandsen and Lindbeck, 1973).

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99 Bhatia, K. B. (1970), 'Accrued Capital Gains, Personal Income and Saving in the United States 1948-64,' *Rev. Income and Wealth*, 16(4), 363-78. Bhatia, K. B. (1971), 'On Estimating Capital Gains in U.S. Agriculture,' *Amer. J. agric. Econ*., 53, 502-6. Bhatia, K. B. (1972), 'Capital Gains and the Aggregate Consumption Function,' *American Economic Review*, 62, 866-79.

100 Brinkman, G. L. (1980), 'Reflections on Farm Incomes in the 1970s,' *Can. J. agric. Econ., Proceedings of Annual Meeting, 1980.*

101 Chase, L. (1980), 'Inflation, Capital Gains and Farmers' Economic Well-being', *Can. J. agric. Econ*., *Proceedings of Annual Meeting, 1980.*

Table A15-1. Denmark: Real capital gains and losses in agriculture, 1981/2-1986/7
Million DKR

	1981/2	1982/3	1983/4	1984/5	1985/6	1986/7
Farm real estate	-12.6	-6.6	10.3	7.5	22.6	-2.6
Other assets	-0.5	0.7	0.3	-0.7	1.4	-4.4
Liabilities	4.1	-2.6	0.0	2.1	-5.2	9.5
Real gains total	-9.0	-8.5	10.6	8.9	18.8	2.5
Total current household income	8.9	13.0	10.5	16.7	15.4	15.8

Note: Total current household income includes non-farm income and is net of transfers and interest payments but before the deduction of taxes

Source: The Danish Agricultural Economy, Autumn 1987.

ANNEX 16. THE PERSONAL WEALTH POSITION OF FARMERS AND THEIR FAMILIES

Evidence on the personal wealth of farmers, taking into account both their farming and other assets, is only fragmentary. Harrison (1975[102]) produced raised estimates of the farming net worth of farmers in England and a distribution by size of net worth, drawing comparisons with the wealth holdings of the rest of the community. In 1969 the 1 per cent most wealthy farmers (taking only their farming assets and liabilities) held 12 per cent of farming's total net worth. The top 5 per cent accounted for 30 per cent of the total. Comparisons with other parts of society are notoriously hazardous, but given that both Harrison's estimates for farming and those of the Inland Revenue for all wealth holders ignore the value of state and private pensions and do not properly deal with personal assets and consumer durables, they are of broadly similar coverage. With that in mind, it was evident that the net worth per person in the farming community (farmers and their dependent adults) was substantially above the general level. Some 16 per cent of the farming community had net worths above £20,000 (current prices) whereas only 1.7 per cent all wealth holders were above this level.

Germany provides a rather more precise indication of the relative wealth of its farmers. Agricultural households owned about three times the average amount of capital (304 per cent); though much more wealthy than wage-earners (56 per cent of the all household average) they were exceeded in holdings by other self-employed households (477 per cent) (Gebauer, 1982[103]). Much of the wealth of agricultural households consisted of real estate.

In the *USA* the average full-time farmer in 1988 had a net worth of $1,016,000; it should be noted that "full-time" in this context is a measure of farm size (sales of $100,000 and over). In contrast, all-households average (in 1986) was $78,734 with about half of all households being worth less than $32,677. Such figures led Knudsen *et al.* (1990)[104] to conclude that "The average full-time farmer has a net worth almost 13 times greater than that of the average American family, and a net worth over 30 times greater than half the families of America. Even farmers in the part-time, $40,000-$99,999 sales class have a net worth of $426,487 - over five times greater than the average American family". In another analysis, and without applying a size criterion, it was found that the average farm equity of households where agriculture was the main income source and where farming was the main occupation of the operator (which accounted for 40 per cent of all farms in the 1986 Farm Costs and Returns Survey) was $319,690. Even where agriculture was *not* the main family income source and where farming was *not* the main occupation of the operator - a combination which accounted for 33 per cent of farms - the average equity

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102 Harrison, A. (1975), *Farmers and Farm Businesses in England*. Miscellaneous Studies 62, Department of Agricultural Economics and Management, University of Reading.

103 Gebauer, R. H. (1982*), Die Problematik intersektoraler Einkommenstver-gleiche*. Gottinger Schriften zur Agrarokonomie, Gottingen.

104 Knudsen, O., Nash, J., Bovard, J., Gardner, B. and Winters, L. A. (1990), *Redefining the Role of Government in Agriculture for the 1990s*, World Bank Discussion Papers, No. 105, The World Bank, Washington.

was $139,546, double the national all-households average (Ahearn and Lee, 1991[105]). Cross-sectional analysis of the 1990 FCRS by age of holder found that farm net worth increased sharply with increasing age up to the 45-54 age band and stabilised thereafter (though both farm income, off-farm income and total incomes all peaked at this band and declined among older groups)(Ahearn *et al.*, 1993)[106]. In 1990 the average farm operator household had net worth of $411,681 compared with the all-household figure of $92, 017.

The UK, German and USA data represents a widespread (though ill-documented) perception of the relative wealth of farmers in industrialised countries. The high wealth-low income combination, particularly found among elderly farmers, should concentrate attention on how wealth enters into the assessment of economic status and the criteria for public support. It may suggest ways in which wealth can be drawn on to provide current spending power, avoiding the transfers for other sectors which most other policy mechanisms

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105 Ahearn, M. and Lee, J. E. (1991), 'Multiple Job-holding among Farm Operator Households in the United States'. In: Hallberg, M. C., Findeis, J. L. and Lass, D. A. (eds.)(1991) *Multiple Job-holding Among Farm Families.* Ames: Iowa State University Press.

106 A word of caution is needed. When analysis takes place of farms broken down by the age group of the farmer, it is almost always according to that of the sole or principal farmer or occupier on the holding (see, for example, the analysis for the EU's FADN in Hill and Brookes (1993) and the USA's FCRS in Ahearn, Perry and El-Osta (1993)). This simplifying assumption that each farm has one family and one farmer is coming under increasing challenge, particularly for socio-economic studies (Boxley, 1989). There seems to be an increasingly common practice to involve younger generations in the business as partners, more so than in the past. This inevitably clouds the influence of age as a factor effecting the income as the younger person takes a more prominent role in the management of the farm business, often initially with responsibility for technical aspects but progressing to financial aspects of perhaps a single enterprise (Hastings, 1984).

ANNEX 17. MEASURING THE ECONOMIC STATUS OF FARMERS

Measuring the economic status of farmers involves combining their current incomes with annuitised values of their net worths; the annuitising formula was given in the Section IV of the main report . The concept has been around for many years. Applying the technique to farmers in the US for 1966, Carlin and Reinsel (1973[107]) found that the distribution of well-being among farm families became more equal when annuitised wealth was added to current income to give a joint measure, and that disparities between the farm and non-farm sectors were narrowed as the position of the farm families improved. Similar results were reported for farm families in North Carolina for 1970 (Gardner, 1972[108]). In Australia investigations into the poverty of farmers in three regions of Victoria (Vincent, Watson and Barton, 1975[109]) found that the numbers of families falling below an income-based poverty line was substantially reduced if annuitised wealth was also considered. In Canada the method was applied at aggregate (agricultural household sector) level (Chase, 1980; Chase and Lerohl, 1981[110]) using a range of interest rates, based on farm credit rates in the private and public sectors, and several life expectancies. The estimates relate to a time when capital gains were being received, and the conclusions were that over the period 1967-77 net worth constituted a rising proportion of the total economic well-being (status). In 1967 the average farm annuity added approximately 47 per cent total economic well-being (farm and non-farm income) and in 1977 the figure was 57 per cent.

However, a problem of assessing economic status is that it provides only a notional measure of economic welfare. Chase and Lerohl pointed out that current annual income must be independent of net worth in order to add the two streams, something they achieved by removing the reward to land and capital from their estimates of the income from farming. Attempts at evaluating economic status at household level have to tackle the problem that farmers cannot in practice realise annuities based on net worths without losing the assets which form the basis for their current income. This is not the case when other forms of personal wealth are considered, with the notable exception of owner-occupied housing, where the income in kind would be lost on sale. However modification to the methodology are possible which allow for the retention of a current income-earning capacity. These are attractive for consideration because they are less open to criticism of being unrealistic and, moreover, they indicate channels by which the wealth of farmers may be released in practical agricultural policy aimed at income support. Farmers are free to sell up and exchange the proceeds for annuities, formally with financial institutions or informally by making assessments of their own life expectancies and consuming accordingly, but it is

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107 Carlin, T. A. and Reinsel, E. I. (1973), 'Combining Income and Wealth: An Analysis of Farm Family Well-being', *Amer. J. agric. Econ*., 55, 38-44.

108 Gardner, B. L. (1972), *Measuring the Income of Rural Families: Results of a Survey of Sampson County, North Carolina*, Economics Research Report No. 20, Dept. of Economics, North Carolina State University, Raleigh.
Gardner, B. L. (1975), A *Full Income Approach to the Measurement of Rural Poverty*, Economics Research Report No. 34, , Department of Economics and Business, North Carolina State University, Raleigh.

109 Vincent, D. P., Watson, A. S. and Barton, L. M. (1975), 'Poverty Among Farmers in Three Districts of Victoria. Commission of Inquiry into Poverty', in *Financial Aspects of Rural Poverty*, Government Publishing Service, Canberra.

110 Chase, L. (1980), 'Inflation, Capital Gains and Farmers' Economic Well-being', *Can. J. agric. Econ., Proceedings of Annual Meeting, 1980*. Chase, L. and Lerohl, M. L (1981), 'On Measuring Farmers' Well-being', *Can. J. agric. Econ*., 29.

clear that this is not a common practice, at least in the UK and north America. In Denmark the custom of retiring farmers selling their land to the next generation (rather than making an outright gift) is one step in this direction, but such a system is exceptional and only applies when land is relinquished; methods of farm take-over in the EU are reviewed in Cornet *et al.*, (1991[111]).

Two principle ways of expressing the income equivalent of net worth while retaining agricultural assets to generate current income present themselves. The first is a forward sales contract arrangement under which a farmer mortgages his property in exchange for an annuity based on the net worth of the property, but the mortgagee only assumes title to the property after the death of the farmer. Under this arrangement the value of the assets to the mortgagee, and thus the sum on which the annuity is based, is not the current sale price of the assets but rather the price at the death of the farmer, discounted to the present. Several approaches to estimating this discounted land value are possible; for Australia Sexton and Duffus (1977[112]) assumed that present land values were solely determined by future farm income flows so that the present value of a future land value could be found by deducting the discounted income flows to be received over the expected life of the farmer. When factors other than farm profits determine land prices, as in the UK, it might be preferable to make assessments of the likely future land prices and a rate of interest on alternative investment opportunities to discount these values to the present. In the Australian example the annuity value was added to the sum of the current incomes of all family members, including off-farm earnings, investment income (from other property, which did not enter the annuitisation) and non-taxed types of income (child allowances and so on). An arbitrary interest rate of 6 per cent was used.

The results of including a forward-contract annuity arrangement on the number of Australian farms deemed to be in poverty was marked. The proportion of families in the dairy sector with incomes of less than $4,000 in 1974 fell from 19 per cent to 5 per cent. In the dried vine fruit sector the fall was from 25 per cent to 14 per cent and in the apple and pear sector from 29 per cent to 9 per cent. When classifying by age of farmer, though reduction in the proportion of low status were observed among all groups, consistently high reductions were in evidence among families having a household head of retirement age (60 years) and over. In the dairy sector 30 per cent of families with a head of 60 years old were below the arbitrary $4,000 line on a current income basis, but only 1 per cent after annuitised net worth was included. If a practical scheme for exchanging net worth in the form of land were implemented, it would clearly have greatest significance among the older farmers.

The other land-retaining alternative, in countries which have a cash tenancy system, would be to sell the land on a sale-and-leaseback arrangement, remaining in occupation of the farm but paying a rent to the new owner. An estimate for the UK (Hill, 1982) assumed that owner-occupied farmers sold their land at prevailing tenanted-land prices (rather than at vacant possession prices) and annuities were calculated on the sums realised. For farms in the 1977-78 Farm Management Survey adding an annuity for the owned land raised the all-farm level of income by one third and lifted about half the farms with incomes below an arbitrary £2,000 to above that line.

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111 Cornet, P. P., Blanc, M., Cavailhes, J., Dauce, P. And Le Hy, A. (1991), *Farm Take-Over and Farm Entrance within the EEC*, Document series, The Commission of the EC. Brussels.

112 Sexton, R. N. and Duffus, G. W. (1977), 'On Economic Welfare and Farmer Annuity Schemes', *Quarterly Rev. agric. Econ*., 30(2),117-32.

ANNEX 18. CHARACTERISTICS OF THE SEEA

The United Nations' System of Environmental-Economic Accounting (SEEA) is a system that is capable of containing accounts that are drawn up in physical as well as economic terms (UN, 1993)[113]. The objectives of setting up the SEEA are shown in Box A18-1 (after Bartelmus 1992, 1996)[114]:

Box A18-1. Main objectives of the SEEA

(a) Segregation and elaboration of all environment-related flows and stocks of traditional accounts.
This permits the estimation of the total expenditure for the protection and enhancement of the different fields of the environment. A further function of this is to identify that part of the gross domestic product which reflects the costs necessary to compensate for the negative impacts of economic growth (i.e. the so-called defensive expenditures)(Liepert 1989)[115]

(b) Linkage of physical resource accounts with monetary environmental accounts and balance sheets
These physical accounts cover comprehensively the total stock or reserves of natural resources, and changes in these stocks, even if these stocks are not yet affected by the economic system.

(c) Assessment of environmental costs and benefits
"The SEEA expands and complements the SNA with regard to costing the use (depletion) of natural resources in production and final demand and the changes in environmental quality, resulting from pollution and other impacts of production, consumption and natural events, on the one hand, and environmental protection and enhancement on the other" (Bartelmus 1996).

(d) Accounting for the maintenance of tangible wealth
SEEA extends the concept of capital to cover not only man-made but also natural capital.

(e) Elaboration and measurement of indicators of environmentally adjusted product and income
The consideration of the costs of depletion of natural resources and changes in environmental quality permits the calculation of modified macro-economic aggregates, notably an environmentally adjusted net domestic product (EDP). Discussions are underway about the possibility of introducing an environmentally adjusted national income (ENI) concept by accounting for further welfare effects of environmental impacts and environmental protection.

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113 United Nations (1993) *Integrated Environmental and Economic Accounting*, Interim version. E.91.XVII.18, New York: UN.

114 Bartelmus, P. (1992) Accounting for Sustainable Growth and Development. *Structural Change and Economic Dynamics*, 3:241-260. Bartelmus, P. (1996) Green Accounting for Sustainable Development. In: May, P. H. and da Motta, R. S. (eds.) *Pricing the Planet: Economic Analysis for Sustainable Development.* Columbia University Press.

115 Leipert, C. (1989) National income and economic growth: the conceptual side of defensive expenditure. *Journal of Economic Issues*, 23843-56.

The SEEA handbook proposes three versions of adjustment, depending on the category of monetary valuation applied to the environmental costs.

- The first version applies a *market valuation* approach which rearranges only environmental changes already contained in the asset accounts of the conventional SNA. Costs include the depletion of natural resources, to the extent that underlying environmental impacts are reflected in changed market values of these assets. Only natural assets that have a market value are covered, all others being ascribed a zero economic value. Thus assets such as air, wild land and species are not included.

- The second version uses a *maintenance valuation* which estimates the costs that would have been required to keep the natural environment intact during the accounting period. This provides a more comprehensive picture than the first version of changes in the value of the environment, due to losses of its environmental functions, in particular its waste absorption ability. (Bartelmus 1996 p186);

- The third version combines the market valuation of the first with a *contingent valuation* approach "in order to assess the environmental costs borne by industries with those borne by households" (Bartelmus 1996 p 183). This is subject to the well-known problems associated with contingent valuation (free-riders, shortened horizons of consumers etc.) and, in reality, does not seem to be very applicable within the framework of national accounts.

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