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AGRICULTURAL STATISTICAL STUDIES NO 20

EC SUPPLY BALANCE-SHEETS

DETAILED SURVEY

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Foreword

In this study use has been made of experiences acquired during several decades of work with food and supply balances. In the context of changing national and international conditions over recent decades, such balances have formed the basis of many political decisions. In the war and post-war years, they were used in the "management of the scarcity" as well as in the rationing of food and feedingstuffs; later they served as a tool of agricultural policy in the implementation of market regulations for various purposes and, most recently, they have played a part in the "management" of partial surpluses.

Indeed, scarcely anyone has so far equalled Dr Kurt Häfner, who has spent so many years himself developing food and supply balance sheets for the various agricultural products and using them to implement agricultural policy measures at national and international level.

Before and during the last world war, Dr Häfner worked in a research centre in Berlin, and one of his tasks was to compile food balances. After performing similar work in the post-war period, in 1949 he became head of the department for planning and economic analyses in the Federal Ministry for Food, Agriculture and Forestry in Bonn. His tasks included i.a. the systematic development of statistics for food and agriculture, together with the further development of quantitative balances.

The years spent by the author of this study working in international governmental organizations such as the OEEC/OECD, the EEC, the FAO and the International Wheat Council as delegate, temporary president[1)] or expert also find expression in this study. With the growing need for statistical information, the improvement of international comparability, the reliability of the basic data and the necessary aggregation of such data by means of the balance sheets in question constitute a permanent task. This work was and is a good foundation for the further requirements for the harmonization of existing statistics in the European Community.

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1) e.g., of the OECD-Agricultural Committee at official level and of the International Wheat Council.

Within the European Economic Community, Dr Häfner has played a vital role in developing the Common Agricultural Statistics, particularly since he was a prominent participant in the Agricultural Statistics Committee from its foundation in 1960 until his retirement at the end of 1973. His advice was based on his wide experiences in many fields of agricultural statistics.

This study gives full coverage to the subject of supply balance sheets for agricultural products. To begin with, it deals with the growing need for agricultural statistical information and the specific nature of agricultural statistical instruments. It is clear in this context that matters do not depend solely on what is right in theory or desirable in principle, but on what governments can possibly achieve under the current national and international conditions. After describing the "philosophy" of the quantitative supply balances, Dr Häfner gives a critical appraisal of the system of balances of production, market balances and overall balances, and also of balances for feedingstuffs. At the same time he describes in details the various questions relating to the aggregation of individual supply balances to form an integrated account.

Apart from this, the author critically examines the currently still unanswered questions concerning the compilation and utilization of the supply balances. He suggests improvements which the SOEC welcomes, as it does with his partially critical comments on various defects in the agricultural statistics.

In the chapter on the use of the supply balance sheets as an aid to agricultural policy decisions, Dr Häfner emphasizes that the analysis of the agricultural markets could be improved and forecasts and projections made more certain and reliable if market regulating activities could be reflected in the supply balances for the products in question.

Günther Thiede

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1. Supply balances and integrated accounts for all products covered by the system of agricultural statistics

1.1. The increasing need for statistics on agriculture

State intervention to affect conditions and development of the agriculture and food industry is particularly extensive in the modern industrial countries, whereby a principal aim is to ensure that income from agriculture keeps pace with growth in the economy as a whole. For a long time the main policy instrument was a highly developed system of price and market support, but recently this has been supplemented by agricultural social and structural policy and regional structural policy. This has led to an increased need for reliable statistical data on agriculture, essential for analysing the situation, assisting in making the political decisions, implementing the chosen measures, establishing the results of these, monitoring the efficiency of the policies and the means used, and for evaluating the experience with a view to revising policies, if this should be necessary.

R. Wagenführ[1], the first director of the Statistical Office of the European Communities, cited three functions for statistics during the period of integration:

1. to help in selecting starting points for the integration process; a statistical presentation of the problem should be drawn up before regulations for integration are formulated;

2. as an aid to monitoring the course of the integration process; during the course of integration the figures should give advance warning of impending problems and also show the achievement to date;

3. to indicate appropriate means of integration by showing the existing situations and the differences present (indirect role).

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(1) Wagenführ, R. - "Die Vergleichbarkeit der Wirtschafts- und Sozialstatistik zwischen den sechs Ländern der Gemeinschaft" (The comparability of economic and social statistics in the six member states of the Community) in Statistische Informationen 1962, no. 1/2, published by the Statistical Office of the European Communities.

Over a century earlier the following reasoning was given for setting up a system of current statistics of agricultural production in the then newly-formed German Reich:

> "The production, sale and consumption of agricultural products are some of the most important elements in our understanding of the economy ... Where agriculture rightly calls for policies which further its own interests and commercial needs, taking into consideration the strength and capacity which agriculture is forming, for the good of the state as a whole, these demands can only be based on a just and demonstrable appraisal of the prevailing conditions; this appraisal requires a detailed analysis of the relationships concerned, to a degree which is not called for in other sectors of the economy." 1

When the present extent of government - or supranational - intervention in agriculture and the food industry, and the associated large direct expenditure on public measures, and the redistribution brought about by affecting private expenditure on food are all considered, then there should be no need for particular justification of the necessity for reliable statistical information.

1.2 The particular nature of the system of agricultural statistics

1.2.1. A critique of agricultural statistics

Critics of agricultural statistics in the fields of macro-economics and statistical methodology advance the following arguments:

1. it has not been possible so far to record values and quantities of production results at the level of the local production unit

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(1) quoted in: Fürst, G. -"Wandlungen im Programm und der Aufgaben der amtlichen Statistik in den letzten 100 Jahren" (Changes in the structure and purposes of official statistics in the last 100 years) in "Bevölkerung und Wirtschaft 1872-1972" (Population and economy 1872-1972), pub. Verlag W. Kohlhammer, Stuttgart and Mainz, 1972, p. 21.

(holding) and enterprise (by contrast with other industries). In particular, there are no available aggregate value figures for production, net and gross, for turnover, total wages and salaries, investment, stock changes etc, all of which are needed for the production of integrated national accounts;

2. production statistics for agricultural goods do not permit any institutional breakdown of agriculture as a sector of the economy for the purposes of integrated economic accounts;

3. it is further argued that agricultural statistics involve an expenditure of financial and labour resources which is too great, and bears no relation to the contribution of agriculture to the gross domestic product.

The first two objections are certainly justified: agricultural statistics as such are able to provide almost exclusively quantitative data; they are, moreover, largely concerned with the elements of production rather than the production as such.

The global data for value and quantity which are of interest for questions of economic policy and macroeconomic study have to be laboriously derived from a wide range of statistical sources before they can be presented in sectoral accounts. The mass of agricultural statistical data, at first sight daunting in its apparent completeness, in fact provides only part of the information that is required. Despite the criticism of the extensive ambit of agricultural statistics, information on production and utilisation in agriculture and on producer prices of agricultural products is derived largely from the sectors of the economy which supply agriculture or distribute and process its products, rather than directly from agricultural enterprises.

The reasons why agricultural statistics have so far not been able to match the requirements and methods of e.g. industrial statistics are manifold, and vary in their relative importance between countries.

Despite the rapid structural changes there remain a large number of small and undersized agricultural units in the Community, whether operated full time or part time, and only partly integrated into the market economy. Strong traditional influences, the close economic activities of private housekeeping and commerce under the same roof, the sociological and psychological conditions, serious mistrust of officialdom, and the fear that any information on commercial matters could come to the notice of the tax authorities, all these things create tenacious obstacles against the introduction of book-keeping.

The extent of this mistrust is made clear when attempts are made to get farmers' cooperation in random sampling of size and weight of crop yields; their principal worry is that the sample data on their farm should become known to the tax authorities. Further, apart from the obligation to keep books for tax purposes, interest in quantitative assessment of a farm's operation is limited to a relatively minute group of progressive farmers. Statistical assessments of results from book-keeping units in combination with the general agricultural statistics are still in their very early stages in the Community. The overwhelming dominance of lump-sum assessment for VAT in agriculture is due not merely to the large number of tax-payers with small turnover making more detailed accounting too expensive for the tax authorities, but above all else because of the lack of regular accounts in the majority of agricultural holdings.

1.2.2 The formation of quantitative aggregates in the agricultural statistics

In the light of the criticism which is constantly levelled at the agricultural statistics, it seems appropriate at this point to consider briefly how the main aggregates for the purpose of economic policy and scientific analysis are arrived at in these

circumstances. [1]

At infrequent intervals surveys of the number and structure of holdings (agricultural censuses) enquire into the following quantitative aspects of the means of production: land in use, livestock, machinery owned and employed, labour force (both family and non-family), and ownership and nature of title to the land. This has recently been supplemented by new questions covering social insurance (health insurance, pension arrangements), income from other sources and the relative importance of this in total income. These data are, as far as possible, related to holdings, combined in various ways and broken down according to size. The statistics have recently been extended to include holdings or parts thereof, operated full time or part time with 1 hectare and over of land in use, or with less than 1 hectare in use if their production for the market exceeds a specified minimum value. It has so far not been politically possible to restrict the scope of the surveys (for example to holdings of 5 hectares and over, or to holdings with a larger income capacity). For production as such, however, there are no figures collected directly from the farms, either in quantity or value terms.

Current agricultural statistics include individual and unrelated surveys of developments of means of production (area under cultivation, livestock, labour force, specific machinery - e.g. farm tractors).

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(1) see also in this connection:

Häfner, K. - Die Landwirtschaft in der Wirtschaftsstatistik, (Agriculture in economic statistics) in Die Statistik im Dienste der Wirtschaftspolitik (Statistics as a guide to economic policy) Festschrift für G. Fürst. Allgemeines Statistisches Archiv-Organ der deutschen Statistischen Gesellschaft, vol. 51, 2/3, 1967, and Häfner, K. - Agrarstatistik in der EWG (Agricultural statistics in the EEC) in Agrarpolitik in der EWG (Agricultural policy in the EEC), Heinrich Niehaus zum 70.Geburtstag, pub. Bayerischer Landwirtschaftsverlag München, Basel, Vienna, 1968, p. 91 et seq.

Because of statistical methodological considerations, these figures are as comprehensive as possible (full-scale census or sample census); besides agricultural holdings, they include industrial units and private households. Sample censuses, such as the West German "Betriebs- und marktwirtschaftliche Meldungen" (Report on business and commerce), include optional questions for agricultural managers to be answered on a voluntary basis, for example on stocks of grains, potatoes, hay (monthly, or at the commencement of the crop year or calendar year), on sales and prices of specified commodities, in order to calculate average unit selling prices, or on monthly numbers of hens and their output. Current figures for area under cultivation and for livestock are compiled "one-dimensionally" in reporting or administrative regions rather than in relation to holdings. Area yields are determined on a different basis: estimates by observers for their reporting area, or determination by random sampling, where measured areas are harvested and the yield is actually weighed. From the figures total crop figures are derived for reporting and administrative regions; there is, again, no connection with farms or enterprises.

A similar state of affairs exists in statistics of production of animal products: the agricultural sector as such provides no information on slaughterings, average carcase weight of species, and the derived figures for monthly and annual total output. The data is collected from public or private abattoirs

or the official veterinary inspectorates; this should cover the entire output. Together with figures from foreign trade statistics on trade in live animals, this allows the calculation of output (carcase weight or live weight), subdivided into domestic and foreign animals. The only contribution of agriculture to these statistics is in the livestock censuses, which permit the calculation of changes in total livestock in a reporting period. A reduction in total livestock indicates how much less live (or carcase) weight was actually reproduced than was lost to domestic slaughtering and export of live animals. Conversely, an increase in the stock shows the excess of production of live weight (as embodied in the total livestock) over domestic slaughtering and exports of live animals. Livestock production is accordingly largely derived from figures originating outside the agricultural sector.

Figures for milk production (from dairy cows, buffaloes, sheep and goats) and use in agricultural units raise similar difficulties. They are derived from various sources, varying from one member country to the next. The most important source is deliveries to dairies (and collecting stations); where these cover some 95 per cent of production (as is the case in Holland, Luxembourg and Denmark), the problems of estimating production and its utilisation are less than in countries where the proportion of milk production going to feed, direct consumption and transformation into milk products on farms, and direct deliveries to trade and consumer is still relatively high.

These, and similar methods provide the basis of quantitative data on gross output of agricultural products. Figures for utilisation of production by agriculture are similarly derived at second hand.

This applies also to the most important information, on sales; these are generally derived from information supplied by the purchasers (trade, cooperatives and manufacturing establishments) to the extent that figures are available. Sales of animals for slaughter is treated as equalling commercial slaughterings of domestic livestock plus exports of live animals. Figures from dairies on the quantity of milk supplied by domestic producers are taken as sales by agriculture to the dairy industry. As these sales are between agricultural and non-agricultural firms only, they do not include transactions between agricultural holdings (enterprises).

The same applies to inputs in the sense of integrated economic accounts; these do not show for agriculture the value of goods and services purchased by farms or enterprises (economic units) from units within agriculture or from other industries and consumed during the reporting period for production purposes. Figures for this are derived, again at second hand, from sales by other industries or from official returns (e.g. subsidies on fuel and heating oil), or vehicle registrations (tractors), and at best represent total purchases of all agricultural and non-agricultural final consumers from other industries. Failing any alternative these purchases are ascribed to agriculture (e.g. domestic sales of fertilizers).

1.2.3. Commodity approach - the national farm

All this has two consequences for the integrated accounts:

1. Because figures on the means of production (area under cultivation, livestock) are collected on as comprehensive a basis as possible (the use both within and outside "real"

agricultural units), and because sales of output similarly cannot be broken down by type of production unit, the figures for production for agricultural goods represent total output, both within and outside "real" agricultural units (the so-called "production concept") as distinct to the institutional definition of agriculture as an industry within the context of the system of integrated economic accounts.

2. In the absence to date of figures for internal trade within the agricultural sector of final or intermediate products, sales by agriculture (as defined by a list of agricultural products) cover only sales by agriculture to other sectors and purchases of inputs cover only purchases from other industries (inter-sectoral transactions).

   The "agricultural branch" of a country or region appears in this way as a single unit, having only "external" connections, a single huge farm, a "national farm". This unit differs from the concept of the individual enterprise or single "average farm". The "usable production" of this branch, after deducting intermediate use for production purposes (e.g. seed, eggs for hatching, fodder), is defined as sales to other sectors, including exports, own consumption of producer households, and stock changes on farms; this total is shown as the "final production" or "output" of the agricultural branch. This concept differs from the value of gross production in the system of integrated economic accounts. The value of intermediate consumption of fodder appears indirectly in the figures for sales or consumption of the resulting animal products (livestock, milk, eggs, wool).

This shows how the quantitative figures for output of agricultural products are laboriously built up from detailed secondary sources. To arrive at value figures, the relevant prices must be determined; these should be, as far as possible, the producer prices at the farm gate, the very first stage in distribution. Since the quantity figures for production cover all qualities, the prices used should be the price of the average qualities sold in the country, i.e. the average price per unit amount (unit values). It is sufficient for present purposes to note in passing the particular problems involved in this kind of "prices" as compared with prices in the sense of price statistics (clearly defined qualities and other conditions) used i.a. in the compilation of price indices.

The value of total final production for the agricultural sector is calculated from the quantity of output and average unit value for all products. For this to be a comprehensive total the elements (i.e. the products covered) must also be comprehensive. This process contrasts with the need for only a single figure for the value of output of an industrial concern, which is simply taken over from the accounts and added up by the Statistical Office (or grossed up) to give the total value for that sector.

The calculation of production as "final output" for the "national farm" (for the agricultural sector as a sector of production) formed a pragmatic solution - no more, but no less - to the problem of arriving at any sectoral aggregate figures for agriculture, given the prevalent state of the statistics. It was quite clear that this represented an ad hoc solution rather than a separate concept having particular advantages over the normal framework and methodology of the system of integrated economic accounts. This misunderstanding seems to be ineradicably established among the critics of the system.

It is relevant here to note the current considerations to rebuild the national and community censuses of agriculture and systems of book keeping to make it possible to use the resulting statistics in combination to calculate data for an institutionally-delimited agricultural sector. This is not so far practicable.[1]

In the course of these discussions it has emerged that agricultural statistics in all countries are concerned to achieve the most comprehensive coverage possible of the employment of the means of production - "area under cultivation", "livestock" - and of production of agricultural goods of vegetable and animal origin, and this irrespective of the "institutional framework" within which production takes place. The need for statistical completeness here was justified by considerations of the national supply situation. The agricultural statistics relating to the "branch agricultural products" (as it is called in the current terminology of the economic accounts system) are, in their present conception, a self-enclosed, balanced set of data; the notion of the "national farm" is a logical consequence of the way in which agricultural statistics at present are compiled.

The Statistische Bundesamt (Statistical Office) in West Germany in preparing the price indices for agriculture (base 1970: index of producer prices of agricultural products and index of purchasing prices), has attempted in the course of calculating the weights used in the index to take account of both the sales to other sectors and the estimated intra-sectors transactions between agricultural holdings (e.g. seed, domestic cattle and

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1) Attempts are being made to solve these problems within the research project on "Konkurrenzvergleich landwirtschaftlicher Standorte" (A comparison of competitiveness in agriculture in different locations) conducted by the Deutsche Forschungsgemeinschaft.

breeding stock). The same approach was followed when constructing the weighting system for the index of purchasing prices for agricultural supplies and equipment from expenditure data. As a result, the relative importance of these products in the weighting scheme increased. The Statistical Office believed that this approach corresponded to the "average farm" (i.e. enterprise) basis as opposed to the "national farm" basis,[1] and this was specially noted in the footnotes to the West German tables in the "EC-Index der Erzeugerpreise landwirtschaftlicher Produkte" (EEC Index of Producer Prices of Agricultural Products, rebased on 1970).[2]

While it may be permissible to incorporate estimates of intra-sector transactions with figures for sales to other sectors when constructing weighting systems for price indices, this procedure does not suffice to transform "final output" of the "national farm" into "gross output" in value terms, in the sense of the national accounts system.

1.2.4. Agricultural statistics are too expensive

An accusation that is repeatedly levelled against the system of agricultural statistics is that it requires too great an expenditure of money and labour, and that its relative share in expenditure on statistics bears no relation to the relative importance of agriculture in the gross domestic product.

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1) Weinreich, Günter - Preisindizes der Landwirtschaft auf Basis 1970 (Agricultural price indices, base 1970) in Wirtschaft und Statistik, 1976, vol. 2, p. 87 et seq, pub. Statistisches Bundesamt, Wiesbaden.

2) EUROSTAT, 1976, pp. 12, 25, 45.

A brief review of the gaps and limitations in compiling important quantity and value aggregates would rather lead one to believe that not enough statistics are available in the field of agriculture. Until the present, European agricultural statistics have been limited by historical, psychological and political grounds to determing quantitative aspects of the means of production. It was most reasonable, given the large number of agricultural holdings of the most widely differing types, to approach the problem via a wide range of specific statistics with greater and lesser application: this led to the production of statistics on use of land, area of arable land under cultivation by type of plants, statistics on numbers of fruit trees, orchards, vineyards, livestock censuses etc. In manufacturing industry one or two questionnaires produce more data. Rationalisation in the collection of agricultural statistics has been continuous and can only be welcomed, provided that no information is thereby lost. The agricultural statistics are, was as illustrated, more of a jigsaw-puzzle or mosaic, where the loss of a single piece has serious consequences for the whole picture; any "reduction" is, therefore, only possible if the agricultural sector can be turned into an industry which is fully accessible through its records and accounts. This, in turn, would place the system of agricultural statistics on a completely new basis.

Agricultural policy requires considerable public resources for its implementation: formulating and carrying through policies, assessing the results and efficiency of these, both require large amounts of statistical information. Cost-efficiency criteria would confirm that the ratio of expenditure on agricultural statistics to expenditure from public funds on agricultural policy is very low, and that the agricultural statistical system is a relatively cheap aid to optimal deployment of public expenditure.

2. Balances and quantitative integrated accounts

2.1. Quantitative supply balances for major products and product groups

2.1.1. Preliminary remarks

Not only academics and statisticians but governments and politicians declared early their interest in the concentration of the manifold quantitative statistical data on agriculture and the food industry into quantitative integrated accounts also in the form of quantitative supply balances.

In the economic crisis of the Thirties, there developed along with the growing movement for intervention in agriculture a corresponding apparatus, including import quotas, offsetting customs duties, price equalisation levies, export subsidies, and national market controls aimed at stabilising markets in the interest of national supplies. Later these measures were used to support farm incomes, and also to stabilise the balance of payments. This was accompanied by a growing interest in and need for supply balance sheets, particularly as a framework for forecasts, "plans" and projections for current and future periods. They acquired a special significance during times of regulation and rationing of food and feedingstuffs.

As a result of this early one-sided interest and its purely sectoral nature, it seems likely that certain statistical methods have developed which may in part be too traditionally oriented and no longer correspond entirely with the definitions and concepts of modern methodology. Some such methods have already been mentioned which arose from the specific conditions which restrict the possibilities open to agricultural statistics. In order to be able to aggregate figures in quantitative form, a common denominator of a "reference product" is required, usually a basic product so that processed forms of the product can be transformed for statistical purposes into units of the basic product through the use of technical conversion factors (products of the

so-called first and second stage of processing).This process involves problems of definition.

The quantitative supply balances for major products or for more or less homogenous product groups (e.g. total grains) comprise figures showing supply and utilisation in a given reporting period within a specified geographical area.

Attempts had already been made earlier to produce figures for the gross amount available for domestic consumption by adding the figures on production (or supplies) and the net balance of foreign trade in a given period, even where no figures were available on stock changes. Such stock changes are normally short-term fluctuations, and cancel out when averages of several periods are taken.

Figures from fiscal and excise returns similarly provided indications at an early stage for calculations of consumption. Even today they are an important source in compiling supply balance sheets.

2.1.2. The elements of the supply balances and balancing equations

The entries or elements of the resources and uses sides of the supply balance sheets are largely standardised internationally; they are derived from the internationally agreed form (FAO, OEEC/OECD) of "Food Balance Sheets", which have the advantage of showing on a single sheet the most important data on the foodstuffs available for human consumption for a given country and period. The columns show, for each product, the total available for human consumption (derived from domestic production, balance of foreigh trade and stock changes) and separate entries for domestic uses (seeds, animal feed, losses, industrial uses

and processing, and human consumption). The entries under industrial uses and processing are expanded in their own balance sheets (e.g. there are separate balance sheets for oils and oilcakes, in the case of oleaginous seeds and fruits).

This system of supply balance sheets was extended to include columns showing "net"[1] total use and consumption per capita, and the nutrient content and ingredients per head and per day (calories, animal and vegetable protein, fats, carbohydrates etc), and eventually also the vitamin content etc.

The food balance sheets are laid out in such a way that they lead naturally to the "net human consumption". In the case of the supply balance sheets discussed below, the columns for consumption per capita and per day and for the nutrient content are usually not included. The supply balance sheets do, perhaps, give a "neutral" picture of resources and uses. As, however, these also cover in the agricultural sector the supply of foodstuffs and fodder (as a basis for the production of foodstuffs of animal origin), the difference in emphasis is not particularly significant, and the information content is similar.

Food balance sheets and supply balance sheets are synoptic summary tables, no more and no less; they should not be expected to provide more information than their synoptic form permits. Every entry in a balance sheet is the result of an underlying complex of data from which it is derived; these underlying data may in turn be the subject of explanatory

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(1) e.g. the quantity of cereals available for consumption is shown in terms of "flour equivalent" by applying milling extraction rates.

supplementary tables. All international organisations, including EUROSTAT, share the problems of publishing and finance posed by the presentation of balance sheets and the associated background information on a number of products, by member country and regional grouping, and for as many reporting periods as possible (long time series). The resulting data, however, clearly provide only part of the information required for detailed analysis of markets. The results published in EUROSTAT are the fruit of years of work in harmonising and improving comparability of member country statistics.

Although there is international agreement of the entries in food or supply balance sheets, all possible ways of combining these into "balance equations" are to be found in practice.

The most logical approach is firstly to add up all the entries referring to available quantities on one side of the balance: initial stocks + production + imports; these are offset against the entries under exports and under domestic uses (consumption) (fodder, seeds, incubation, losses, industrial uses and processing for non-food purposes, processing by the food industry, direct human consumption). This approach is followed by, for instance, the Internationl Wheat Council in making projections of quantities of wheat available in the major exporting countries for export and of final stocks.

If the initial and final stocks are not shown separately and stock changes are estimated, or else only stock changes are given in order to avoid disclosure of actual stock levels, it is possible to regard stock reductions as part of the available quantities, along with production and imports; conversely, stock increases could be shown on the uses side of the balance sheet. This form of presentation is not satisfactory for Community purposes, as it is possible for positive and negative stock changes to be occuring in different countries

in the same reporting period, and the total available quantities would not be evident.

EUROSTAT has adopted a method of presenting supply balance sheets for the individual member countries and the Community as a whole during recent years where one side shows "total resources" including the entries for "usable production" and "imports" and the other side of the sheet shows "total uses", comprising "exports", initial and final stocks and "change in stocks" and finally "total domestic uses" separately.[1]

Where stocks increase this is a reasonable form of presentation, giving three types of entry for uses; where, however, stocks fall (in principle a source of supply along with production and imports) the EUROSTAT presentation gives rise to the curious situation that "total uses" becomes smaller than "total domestic uses" if the reduction in stocks is greater than exports. In this event it becomes rather difficult for users of the statistics to interpret them, as both total supply and total uses are basically larger than the balance sheet indicates.[2]

The clearest presentation, in the opinion of the writer, and the one least likely to give rise to misunderstandings, is the format employed for the food balance sheets; these show on the uses side only the quantities available for domestic use, and on the resources side the corresponding entries: usable production, imports, exports (and possibly the trade balance), initial and final stocks and stock changes. This

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(1) This was done in order to meet the needs of the Directorate-General for Agriculture of the EEC Commission for projecting balance sheets, and up-dating these.

(2) In the combined edition of the supply balance sheets for 1973/74 and 1974/75 (or 1974 and 1975) pub. EUROSTAT, Agrarstatistik 1976, the line "total uses" is omitted.

has the advantage that all data on foreign trade and stocks are grouped together. The domestic uses and sub-headings of this entry are the most important entries, and the supply balance sheets are largely concerned with producing these. EUROSTAT also seems to regard usable production and domestic use as the most important figures, as these are shown in bold type in EUROSTAT publications, and not merely because the "degree of self-sufficiency" is derived from these. The balance sheets for cereals are, for example, published in this form up to 1971/72.[1]

2.1.3 Balances for agriculture, market balances and total balances for individual products

The compilation of supply balance sheets for individual products or product groups is facilitated and the possibility of checking on the reliability of individual entries improved where separate balance sheets are produced for production and uses by "agriculture" as well as the "market" and these are combined for the total balance sheet.

The production of separate "production" balance sheets is particularly to be recommended for products of which a significant fraction is used directly in agriculture as seed, fodder (intermediate consumption) and for private consumption by producer households, and only the remaining part is sold. This requires knowledge of the state of residual stocks in agriculture (first hand). The separate entries of those "production" balance sheet are required for the compilation of other quantity and value aggregates (balance sheets on gross production of the soil and its uses, feed balance sheets, calculation of agricultural "final output" for the "national

(1) see EUROSTAT, Agrarstatistik, 1/1973.

farm" for use in the economic accounts for agriculture, quantitative framework for indices of agricultural production and producer prices etc).

The term "usable production" used by EUROSTAT indicates immediately (or should imply) a state of standardisation and comparability of national production statistics. The official national figures can, for example, be regarded as gross figures which contain an element of losses in agriculture or require other statistical corrections. The extension of "usable production" to the national statistical level and the correction of crop and harvest figures for the smaller administrative districts involves an unjustifiable scale of effort in the case of a national statistical office in a country with a federal structure.[1]

The concept of "usable production" provides a possibility of a transition to the Community level without the need of unnecessary involvement with the national statistical systems.

The so-called "market balance sheet" shows on the resources side the quantities sold by the domestic agricultural sector[2], imports (possibly also exports and the balance of trade), commercial stocks owned by the trade and processing industries as well as public stocks and publicly-subsidised stocks in

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(1) Similar difficulties occur in national statistics, e.g. subsequent transfer of results of infrequent checks by random samples (land use, livestock censuses) or of yields per hectare for some fruits, determined by regular random sampling; carrying over results from the national (regional) level from the random sampling to smaller administrative areas involves a number of conceptual difficulties for many statisticians.

(2) These should, according to the statistical sources, strictly be regarded as purchases by other sectors.

private ownership (initial and final stocks and stock changes).

The entries on the uses side of the market balance sheets immediately make clear the extent of detailed information required from the processing industries, which has to be brought into internal agreement. The entries also show statistical lacunae, and where efforts are needed to fill these. This applies with increasing force the more attempt is made to produce supply balance sheets for processed products as well. The balance sheets can begin by showing the primary agricultural products of vegetable origin, live animals, products of live animals (milk, eggs, wool), and fish, and go on to show products at the first stage of processing (e.g. milling products in the case of cereals, oils and oilcake and meal for oleaginous fruits, sugar and related products in the case of sugarbeet, carcase weight and offal in the case of animals for slaughter, milk products in the case of milk). Products at later stages of processing (e.g. in exports) are then converted for the balance sheets concerned via technical conversion factores into terms of the "equivalent unit" of the relevant balance sheet. It is admittedly a matter of definition whether separate balance sheets for by-products at the first stage of processing (bran, oilcake, molasses, starch) should be treated as belonging to the second stage of processing. At all events this brief illustrative exposition has already shown the extensive nature of the detailed figures complicated by the attempt to break down resources and uses according to the origin of the goods (products of domestic origin or imports), even though the origin is obvious for many products).

2.2. Aggregation of supply balance sheets or of some of these elements

The supply balance sheets for individual products or homogeneous product groups already involve an extensive degree of aggregation of quantitative data, even where one product (product group) is involved. Processed products are converted into terms of the basic product through technical conversion factors (equivalent units). Further extensive condensing and breaking-down of the basic data (independent of individual products) is also required for particular purposes and to simplify presentation. This involves a decision on the common denominators for converting non-homogeneous inaggregables to units which can be added (monetary or physical weights), which is a problem that is further dealt with below. There are a number of other methodological questions, some of which will be dealt with now.

Aggregate accounting for agriculture and the food industry to be found in current practice are roughly as follows:

1. Vegetable production (gross production of the soil)
2. Balance sheets for fodder
3. Total final output of agriculture
   - as a quantitative framework for the economic accounts for agriculture
   - for use in calculating production indices
4. total consumption of food (food balance sheets)
5. Calculation of the degree of self-sufficiency for the totals
   - usable production - "gross" and "net" - as a percentage of total domestic use
   - food consumption from domestic production - "gross" and "net" - as a percentage of total food consumption (domestic market share)

6. Other combinations of totals
   - share of sales by agriculture in total consumer expenditure on food of domestic origin
   - gross margin between total value of foodstuffs at the consumer and producer stages.

2.2.1. Vegetable production (gross production of the land)

This total is a sum of all the gross amounts of vegetable products produced on the land area under cultivation; it can be roughly broken down into:

1.0. Products ready for marketing (market crops)

1.1. Arable crops for food and/or fodder

1.2. Special crops: vegetables, fruit, wine, industrial crops like hops, tobacco, hemp and flax, inedible horticultural produce (flowers, ornamental plants, nursery products)

2.0. Fodder crops (usually not marketed): arable fodder crops as main and auxiliary crops, crops from permanent pasture land, usually consumed on farms where grown.

The aggregation in terms of physical units (fodder units, wheat equivalent units, starch value, primary calories, protein content) yields a figure for total vegetable production; this can be divided by the area under cultivation to give the yield of nutrients per unit area. This can be compared for different regions and periods, taking due account of the relevant reservations and restrictions required, to yield valuable conclusions.

Market crops are generally dealt with in supply balance sheets; the division mentioned above into "production balance sheets"

(i.e. resource and uses in agriculture) and a "market balance sheet" facilitates the calculation of the amount going to fodder as a residual, as well as the calculation of total final production in the agricultural sector.

The fodder crops (after deduction of losses in harvesting and correction for such information on stock changes as may be available for the agricultural sector, and after allowing for sales to other sectors) can be incorporated in the feed balance sheets as a principal part of resources.

2.2.2. Feed balance sheets

The published supply balance sheets provide under the item "animal feed" only part of the information required, and this usually for basic products only used directly as fodder (e.g. cereals, potatoes).

Where products from processing are the subject of separate balance sheets, e.g. oilcake, molasses, skimmed-milk powder, these sheets provide information on quantities available for fodder. The remaining fodder arises during the processing of agricultural primary materials (e.g. in mills, breweries, distilleries and starch and sugar production) and must be derived from separate calculations. It is clear that the sum of all the entries under feed in the supply balance sheets alone is not an adequate expression of the total resources for feed; these include fodder which is not generally marketable, and is to a great extent consumed as fodder on the farms where grown.

Since the whole discussion on the compilation of feed balance sheets for individual member countries and for the Community as a whole has been revived by EUROSTAT's publication of

"feed balance sheet: resources" (Agrarstatistik 1976) a more detailed consideration of some points is included here.

2.2.2.1. Aims and uses of feed balance sheets

The "fodder economy" is the connecting link between production of vegetable crops and production of produce of animal origin. The largest part by far of vegetable crop production goes to feeding animals, and products of animal husbandry represent by far the largest element in agricultural final output in value terms. Supplies of feed from domestic sources are supplemented by imports of concentrated high-energy and high-protein feed. The latter especially improves and supplements domestic supplies of bulky, relatively protein-deficient feed.

Feed balance sheets bring together in juxtaposition the resources and uses of feed in the most various forms; they provide a presentation within the framework of integrated accounting of the connection between "soil production" and the supply of animal products. This form of break-down contributes extensively to the improvement of our knowledge of the structure of agricultural production, and particularly to our understanding of the animal husbandry and the structure of supply in regions, countries and groups of countries. The sheets provide above all an idea of the importance of imports of feed as an additional source of supply of energy and protein, which is an essential prerequisite for intensive animal farming and the manufacture of animal products. These imports occur directly or indirectly as by-products of imported products, processed domestically after import. These imports also give an indication of the relative importance of individual types of feed or groups thereof. This information provides agricultural policy-makers and others involved in this branch of industry with the means of estimating the impact of abnormal factors, e.g. losses in harvesting, or a

decline in quality because of too much, or too little rain, or disruptions in supplies of protein feeding stuffs from the world market (scarcity of Peruvian fish meal or the reduction in soya-bean deliveries from the USA in 1972/73). Exaggerations disseminated by interested parties and speculative operations can then be recognised for what they are, and ill-founded policy decisions avoided, or their effects reduced.

2.2.2.2. Quantitative measurement of supplies and utilisation

The resources or "availability" of feed should be considered as a particular form of use of products which are suitable as and available for fodder; a precondition for establishing the extent of their use as "feed" is the existence of the relevant utilisation balance for these products, from which the figures can be taken over for the tables on resources of feed. This also holds, in principle, for products meant exclusively for feed and used solely for this - the so-called "pure fodder" - as these products are also subject to harvest and other losses, as well as stock changes (and, possibly, also involve exports and imports), all of which must be taken into account.

Supply balance sheets have already been developed for the more important agricultural products (usually marketable) and these have been compiled for some time on a Community basis. "Feed" appears as an entry under the uses side of the balance sheets. Production of feed balance sheets does, however, require in addition that the figures should include the vegetable crops, bulky, low in nutrients, and hardly marketable, which are mostly directly consumed on the farm where they are grown. When this is done, virtually the entire vegetable output from the area under cultivation in agricul-

ture is covered by the statistics. A logical development of this is the production of a balance sheet for resources and uses in agriculture of the output of all agricultural products of vegetable origin (output of the soil).

It is particularly difficult to record the quantities of these products which are not usually marketed; this especially applies to permanent grass land crops (meadows and pasturage). The various uses (hay-making, green fodder and pasturage) involved do not lessen the difficulty of the task, even when these crops are expressed in terms of hay equivalent. The great importance of these uses of permanent grass land means that this is the principle problem affecting the reliability of the resources side of the feed balance sheets. According to the first EUROSTAT publication on feed resources in the Community in 1970/71 - 1973/74[1] the meadow and pasture lands produced over 54 per cent of domestic resources and almost 48 per cent of total resources, converted into feed units and averaged over the four crop years. The variation between the member countries was from c. 25 per cent in Denmark and 34 - 35 per cent in Italy and Holland to over 80 per cent in the Republic of Ireland. We shall return to this point below.

H. Langen[2] has extensively discussed the problem of the concepts and statistical methods involved in drawing up the resources side. Representatives of the member states have discussed these in the Working Party on Supply Balance

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(1) EUROSTAT - Agricultural statistics 1976: "Feed balance sheet: resources"

(2) Langen, Hubertus: Methoden zur Aufstellung von Futterbilanzen in den Mitgliedsstaaten der Europäischen Gemeinschaft (Methods of compiling feed balance sheets in the member states of the European Community), Agrarstatistische Studien 1973, vol. 11, EUROSTAT.

Sheets. For the first four crop years (1970/71 to 1973/74) the figures for feed resources were supplied by the member states (resources from domestic production, imports and total resources by individual products). Imports were shown under imports from other member states and from non-member states, in order to make it possible to produce a figure for the Community as a whole, which process requires the déduction of intra-Community trade. EUROSTAT then converted these into "feed units" and total nitrogen content (raw protein), following the work by J. Delage and D. Sauvant (Paris)[1], in which form the results were published.

For most member states this was a first attempt. The experience brought to light methodological problems of the most diverse nature, and highlighted gaps in the system of agricultural statistics.

The real test of the feed balance sheets is in compiling the uses side, and in the final balancing of resources and uses. This is not merely an indicator of the reliability of the feed balance sheet per se, but also a test of the quality and harmony of the statistical systems in the Community for the agriculture and food industries.

The procedure used by both Langen and EUROSTAT expresses domestic consumption of feeding stuffs within a given period in terms of their product weight, irrespective of the method of production, form or origin. Mixed feed is not shown as such, but is entered in the resources figures under its

(1) J. Delage and D. Sauvant: Etudes sur les unités de conversion à utiliser dans les bilans fouragers; a study for EUROSTAT. Duplicated original, 1975. (A study of the units of conversion used in the feed balance sheets).

components (e.g. cereal, oilcake, bran, fish and meat meals, milk powder etc); this is because the supply balance sheets for the marketable products at this stage of processing show an entry for "animal feed". This means that the already existing data for most of the largely marketed products can be used.

At this point it is relevant to consider further the following four points, in supplementing the studies mentioned above:

1. compilation of import figures for feedstuffs
2. choice of reporting year
3. feed standards per unit on the uses side
4. questions on the EEC standard conversion unit.

2.2.2.3. Figures for feed imports

A major aim in producing feed balance sheets is to show the relative importance of imports of feedstuffs. Supply balance sheets are generally so laid out that the uses of total resources (from production and imports together) are broken down by the different kind of uses. The division of an important use ("feed") into domestic and foreign origin basically implies in principle the additional division of the customary supply balance sheets into production a) at home and b) abroad. This applies not only to the quantities shown in the column (row) "animal feed" in the particular supply balance sheet (e.g. cereals), but also to byproducts from processing and industrial uses, and to parts under the heading "consumption" (e.g. bran). Such disaggregated figures have been prepared, for example in West Germany by the Federal Ministry for Food, Agriculture and Forestry (BML), for internal use; they are a logical extension of the national feed balance sheets which have been produced for a number of years, and

involved reference to all available statistical information and estimates of varying degrees of dependability. There are some elementary cases where the products used for feed are directly imported (oilcake, bran, fish and meat meals etc.) or where processed products are clearly of foreign origin (oilcake from imported oleaginous fruits). The inferior (subsidised) uses of products for feed (e.g. bread grains, skimmed milk powder) should also be shown by origin. Where estimates are necessary, the allocation to individual use headings should remain constant over the years (so far as possible) in order to avoid sudden shifts which have no obvious explanation.

In view of the undoubtedly larger role of estimates in the balance sheets broken down by origin, compared to the normal supply balance sheets, the former are used solely for internal purposes by the BML and not published.

The extent to which estimates are used increases further in the case of the production of a feed balance sheet for the Community, as this requires member states to further break down their imports into imports from other member states and from non-member states. Even in this case, however, the type of approach outlined above in connection with the allocation of uses to domestic production and imports yields relatively dependable figures.

2.2.2.4. Choice of reporting year

National feed balance sheets have, to the best of the author's knowledge, been compiled on a crop year basis. Langen (vid. sup.) similarly recommends adoption of this basis for the Community, and EUROSTAT also reached the same decision in its first publication on feed resources 1970/71 - 1973/74. An argument for this on the resources side is that feedstuffs

are largely of vegetable origin, and in particular that frequently more than half of all fodder comes from vegetable products which are not usually marketed. There are hardly any figures for such products on stocks on farms. The working hypothesis used is that stocks from the previous harvest will be lowest at the beginning of the new crop year, and that stock changes compared to the previous year will therefore also be smallest at this date; their ommission will hence involve only a relatively small error.

The exact timing of this twelve-month vegetation period varies according to the product and climatic conditions in the individual member states in the Community (the yield commences at different times in the Spring). For a large part of the marketable feeding stuffs of vegetable origin the supply balance sheets for the Community show the required figures or the basic data on a crop year basis (in the case of cereals from 1.8 to 31.7, for other products from 1.7 to 30.6).

It is more difficult to arrive at figures on a crop year basis for foodstuffs of animal origin. The EEC statistics for milk and milk products are produced on a calendar year basis; the figures for uses of milk in agriculture (only available on a calendar year basis) show the use as feed of whole milk, skimmed milk and buttermilk, and the supply balance sheets for milk products - again on a calendar year basis - show the use of skimmed milk powder as animal feed. It is, however, to be assumed that most member states also have available data on a crop year basis, even when these do not have to be supplied to EUROSTAT. The same should apply to the use of fish meal and other fish products, and also of meat meal etc, particularly where these products are almost entirely imported.

In the case of the uses side of the balance sheets, however, it would be more difficult to produce the required material on a crop year basis. A division of the feed resources among the species of animal and nature of the product (meat, milk, eggs, wool, labour) is effected via the feed requirement of the individual products (reproduction quota). For the meat production (domestic slaughterings of animals of domestic origin, exports of live animals) the determination of the live weight produced in the reporting period (possibly converted to carcase weight) must take into account the changes over the reporting period in the livestock population. Livestock censuses are carried out under Community rules in December for cattle, and at the beginning of April, August and December for pigs. Not all member states carry out summer censuses, particularly of cattle, and it is here that stock changes have greater significance than for pigs or poultry, because of the lower rate of turnover relative to total output. Changes in the livestock (on a live or carcase weight basis) have to be estimated for some member states on a crop year basis, and also for other species on a calendar basis.

As there are monthly reports available on the supply of meat ("gross domestic production") it is possible to draw up figures on a crop year basis, even where the supply balance sheets are drawn up on a calendar year basis.

Monthly reports on milk and milk products are restricted to the dairy industry. Milk production in the Community is shown for calendar years. Not all countries produce monthly statistics on milk production. Estimates of milk production for the crop years can be made from (presumably) known figures for monthly deliveries to dairies and total milk production on the calendar year basis.

Egg production is reported and published in the supply balance sheets on a calendar year basis only; it would depend on what data was available for the individual member states whether reliable data or estimates of production on a crop year basis would be possible.

The question of the choice of the reporting year - crop year and/or calendar year - is discussed in general terms below (see section 4.2); the present comments on the problems with the individual headings on the resources and uses sides should demonstrate that the decision on the reporting year is by no means simple. There is above all the consideration that "crop year" is not a period which can be uniquely determined for feed resources as a whole. The natural growing seasons vary according to the geographical location (northern or southern part of the Community) and the type of feedstuff.

2.2.2.5. Standard feed requirements per unit of output

The use of the mathematical product of the nutrient requirement per unit of output and the quantity of output in a given period to allocate feed resources among types of animal and output is a process of approximation to the true state of affairs. As a first stage standard feed requirements would be taken over from scientific experiments on nutrition, carried out in optimum conditions; these represent a minimum requirement. Results from regular checks in progressive farms (weight increase, milk yield) provide further benchmarks for estimating likely feed requirements per unit of output on a national average basis. Considerable assistance here is provided by sample suveys of farmers concerning the consumption of feed on their farms, somewhat on the lines of the West German "Betriebs- und Marktwirtschaftlichen Meldungen" (Report on some commerce and

business questions). The resulting national averages are dependent on a number of factors (breed of animal, yield capability, feed utilisation, climate, size of livestock holding and conditions in which livestock is kept, managerial ability, quality of feedstuffs, intensity of feeding etc.) and, as Langen recommends, is calculated separately for each member state, as the prevailing conditions are too disparate. The difference between the feed input per unit of production as a national average and the scientifically-determined minimum levels varies between countries and products. This difference should be smallest in the case of pig and poultry raising and egg production, where large-scale modern methods, efficient feeding procedures and purchase compound-feed are used, in contrast to other forms of production and traditional methods of farming.

Reconciliation of overall feed resources expressed in feed units and feed requirements poses particular problems; the nature of the discrepancy will indicate where the corrections should be made, and whether on the resources or uses side, or both.

West German experience has shown that the supply of feed crops shown on the resources side (from permanent grassland or as principal crops or secondary crops on arable land) is generally considerably underestimated. In view of the importance of feed crops which are not usually marketed, relatively minor adjustments are usually sufficient, but these must be shown to be reasonable (comparisons with yield ratios in other crops). Some discrepancies are attributable to variations in nutrient content and quality (protein content) resulting from climatic and harvest conditions (on the resources side) and flexibility on the uses side ("waste" through carelessness at times of abundant feed supplies, and the varying efficiency

of cropping by the animals, which improves in times of scarcity). Errors can, of course, also occur in the determination (or estimation) of the quantity of animal production. These errors can either cancel each other out or cumulate. It is clear that the statistician responsible for the national feed figures requires a considerable degree of experience to produce from the multitude of individual calculations a set of feed balance sheets which are consistent over the years and also appear plausible.

The figures for standard feed requirements per unit of output must periodically be revised to keep abreast of changes in breeding, stock-keeping, industrial feed production etc.

2.2.2.6. Problems of the standard conversion units in terms of nutrient content

Since the natural quantities of the various feedstuffs are incommensurable, a common denominator is hence required for aggregation, both on the resources and uses (feed requirement) side. Various conversion units are in use in international practice: grain equivalent, starch unit, digestible protein, feed unit, crude protein, digestible crude protein etc. EUROSTAT, following the above-mentioned work by Delage and Sauvant, decided to use the "feed unit" (FU) as a measure of the net energy content (1 FU = net energy content of 1 kg barley) and the "crude protein content" (proteins, aminoacids, albumin), and used these in its publication "Feed balance sheets: resources" for the crop years 1970/71 to 1973/74. The accompanying notes stated that the published balance sheets were "essentially a trial", as there were numerous problems

and difficulties in collecting data which were still to be overcome. It may be assumed that the trial extended to the choice of conversion units.

In choosing conversion units for nutrient content - a problem which is, in my opinion, a matter for statisticians as well as for experts in food and animal nutrition which must be acceptable to all member states, the question arises whether the units should be chosen and used simply for Community statistical purposes. If so, they should be applicable not only to the feed balance sheets but also to other statistical aggregates of natural units of agricultural products. This would make it possible to show clearly the structure of vegetable production (gross product of the soil) and its uses in agriculture, feed balance sheets and final output of agriculture, and could possibly also be used in a consolidated supply balance sheet.

It is, however, not clear that the use of such units for purely statistical purposes at the Community level would be sufficient, and that the efforts involved in the process of harmonisation would be justified. To my knowledge the evolution of the different systems of units for nutrient content in the individual member states has been concerned with providing information for the individual farmer on feedstuffs and feeding; these units have been nationally accepted for scientific research, in the feedstuffs industry (declaration of content of proprietary feedstuffs), and in the laws relating to feedstuffs, and always in relation to the individual buyer of feedstuffs. The idea of using these for presentation of aggregate statistics, e.g. national feed balance sheets, is a later development.

If the present position where various conversion units are

used at the national level does not change, a series of conversion tables should be drawn up at the statistical level for conversion from the systems in national use and the system chosen by EUROSTAT for its statistical purposes, and vice versa.

According to Delage and EUROSTAT 1 feed unit is equivalent to ca 0.7 starch units, averaged over all feedstuffs, and can be used in the same way; this is one example of such a conversion factor. The "grain equivalent" in use in West Germany is similarly defined, so that the net energy content of one unit of average grain (the composition of this is weighted on the basis of harvest results in West Germany over a number of years) corresponds to ca 0.7 starch units. If the starch units here are equal, 1 feed unit must correspond approximately to 1 grain equivalent. This shall be verified in the feed calculations for West Germany, where the figures from the EUROSTAT publications (in feed units) and from national statistics (in grain equivalents) are available for the years 1970/71 to 1973/74. It is assumed that both sets of calculations use the same schedule of feedstuffs and the basic natural quantitative data, since the sources are the same for both (Federal Ministry for Food, Agriculture and Forestry) (cf table 1).

Averaging the figures for feed resources (total) for the four crop years, we arrive at a value of 0.77 starch units per grain equivalent (GE) and 0.687 starch units per feed unit (FU); 1 GE therefore corresponds to 1.12 FU (conversely, 1 FU = 0.89 GE). Other totals yield somewhat different ratios. It must be noted that the total is available in starch units only for the German calculations: the starch content factors are not necessarily identical for the individual products in EUROSTAT and BML practice. The grain equivalent conversion

factors in use in West Germany, revised in 1970, are based on "the net energy content of products, expressed in starch units, and the corresponding ratio to the net energy content of grain"[1].

The energy content of the average grain equivalent (weighted for the four main types of grain - wheat, barley, rye and oats - according to normal harvest proportions) lies between ca. 710 and 720 starch units (SU) a kg. "On this basis two cwt of products with a yield of roughly 710 SU per kg correspond to two cwt of grain units"[2].

The feed unit (cf. Delage[3]) is calculated on a slightly different basis to the starch equivalent, and the conversion factors for the individual products accordingly vary slightly for the two different bases for calculation.

The ratio 1 FU = 0.7 SU holds only for the average of all feedstuffs; the "standard gross composition" of the individual products used by Delage and EUROSTAT are not necessarily identical with the West German figures. Further, the values used for the grain equivalents are probably rounded off and averaged to varying degrees.

All these factors combine to frustrate the attempt to convert one basis of calculation into the other by means of average conversion factors (corresponding to the rate of exchange

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(1) EUROSTAT Agrarstatistik: Working Party "Supply balance sheets" document Doc. F/V/266 dated 20.11.72 - Bericht über die Ueberarbeitung des Getreideeinheitsschlüssels in der BRD (Report on the revisions to the grain equivalent conversion factors in West Germany), Prof. Woermann and Dr. Padberg.

(2) see above

(3) Delage, P.J. and Sauvant, D., vid sup, p. 20 and appendix

for currencies); nevertheless the factors used should be available to the users of published statistics. EUROSTAT "Methodological note", in the publication on feed resources[1], explains that "crude protein units" (proteins, aminoacids, albumin) is used in calculating protein content rather than figures for digestible crude protein, as the feed balance sheets refer to "species of animal with varying ability to convert protein". Instead, the feed unit proposed by Delage is used, which takes account of the variation in digestibility of the various nutrients, including protein, for ruminants - a feature which Delage himself emphasises. This appears to lead to a contradiction, which may perhaps be resolved when EUROSTAT publishes the uses side of the balance sheet, and the standard values used for nutrient input per unit of output. No overall judgement on the relative advantage of the feed unit system, compared to other conversion systems (grain equivalent, starch unit, digestible protein etc). is possible pending such publication.

It is worth noting in passing that the published EUROSTAT figures in tables B 1-4 show a surprisingly high level of production of oilcake from soya beans from indigenous sources compared to imports.

(1) EUROSTAT, vid sup, p XIII

Table 1

A comparison of different methods of calculating feed resources in West Germany for the average of the period 1970/71 - 1973/74

	domestic	imports	total
A. BML calculations [1]			
in 000 t grain equivalent	41,228	9,294	50,522
in 000 t starch units	32,226	6,658	38,884
in 000 t dig. protein	4,879	2,106	6,985
B. EUROSTAT calculations [2]			
in 000 t feed units	46,995	9,583	56,578
in 000 t crude protein	7,062	2,405	9,467
C. Conversion factors (calculated from A and B)			
1 grain equivalent = SU	0.782	0.716	0.770
1 feed unit = SU	0.686	0.695	0.687
1 grain equivalent = FU	1.14	1.03	1.12
1 feed unit = GE	0.8877	0.970	0.893
dig. protein : SU = 1:	6.61	3.16	5.57
protein : FU = 1:	6.64	3.98	5.98
dig. protein: crude protein = 1:	1.45	1.14	1.36
dig. protein as % crude protein	69.0	87.6	73.8

(1) Statistisches Jahrbuch f. Ernährung, Landwirtschaft und Forsten, (Statistical yearbook for food, agriculture and forestry) 1975, p. 101, BML

(2) "Feed balance sheet: resources" EUROSTAT 1976, p. 54 et seq.

2.2.3. Final production of agriculture

2.2.3.1. A quantitative framework for a system of economic accounts for agriculture

As has already been stated above, there are no figures available for the volume of gross production in agriculture based on information from the individual farms (or for the value of intermediate consumption); such figures have to be built up from data on output of individual products in quantity terms and average prices (unit values), and reconciled as far as possible with the definitions of the integrated economic accounts.

This quantity data is usually only available for total output of individual products (the commodity approach) and not for an institutionally defined type of farm. The treatment of agriculture as a whole as one large farm (the "national farm") makes it possible to use the methods of the integrated economic accounts system to a large extent. These include the concept of gross output, which includes all products leaving the national farm (including food consumed by producer households) and used by other sectors and the foreign sector (exports).

Final production is accordingly defined as available production including stock changes within agriculture but not including intra branch consumption of domestic agricultural products for production purposes (e.g. consumption on farms of origin, or movements directly between farms, of seed, feed, livestock, eggs for hatching etc.). The elements of final production comprise products consumed by producer households, sales to other sectors (including exports), stock changes in agriculture (including changes in livestock population), certain agricultural products processed by farmer (grape must, wine and olive oil) and wages in kind.

Particular care is called for in removing all elements of double counting in the intermediate consumption of domestic agricultural production, and this involves considerable statistical problems. It is implicit in the concept of the national farm that agricultural output must be free of all intra-branch consumption of domestic products, leaving only the final output. The supply balance sheets still show e.g. feed of domestic origin under sales, where they are broken down into production and market balance sheets. The EUROSTAT published balance sheets for grain for 1970/71 and 1971/72 show in comparison with the supplementary statistics that total use for seed and feed of domestic origin is larger than the figure given in the production balance sheet[1]. If agricultural basic products leave the national farm as goods sold and return either unprocessed or after processing as mixed feed, or as byproducts, (e.g. bran, oilcake, derivates from breweries, distilleries, the starch industry etc), then those products must be shown as purchases by agriculture of feedstuffs together with imports (domestic processing of foreign raw materials and direct imports of feedstuffs) in the agricultural economic accounts (under the heading "feed" in the intermediate consumption section). This will remove the double counting element in the value of final production and give the correct balance between final output and input as the gross value added.

The aggregates of the agricultural economic accounts (values of gross output, intermediate consumption) can be used (with only a little additional information) on a constant price basis to produce an index of the volume of agricultural output (i.e. output exclusive of all intermediate agricultural products of domestic origin which are used, either in the same

(1) see EUROSTAT - Agrarstatistik/1973, Supply balance sheets for grain, pp. 62-77 and 107-111.

or in a processed state, for the production of agricultural commodities). This calculation would require a subdivision of purchases of production means of agricultural origin into those which are directly imported as such or domestically processed from imported raw materials and into those which stem from sales of domestic agricultural products and are repurchased by agriculture either unprocessed or after processing.

It is useful when preparing feed balance sheets to separate marketed feedstuffs into those of domestic and foreign origin; this breakdown would also serve as a quantity basis for breaking down the purchases of feed when calculating the value of intermediate consumption.

The figure for agricultural final production in the agricultural economic accounts when reduced by sales of those elements of production of domestic origin which are subsequently repurchased (e.g. feed, seeds) would correspond to the value of output of the agricultural sector, i.e. production after removal of all elements of double counting. This final product can then be separated into vegetable and animal products. The latter, after subtraction of the remaining elements of intermediate input required for the production of animals and animal products, yields the figure for the net output of those categories.

2.2.3.2. A quantitative framework for calculating indices of production

Figures for the output of agricultural products net of intra-branch consumption of domestic origin (seeds, eggs for hatching, feedstuffs) in some common unit (physical units, value in constant price terms) make it possible to construct indices of agricultural production such as are compiled by the FAO on a

country, region and world basis and by the OECD for member countries. The same principles, or similar ones, are followed by the national bureaux, subject to differences in details caused by variations in coverage of products, the extent of coverage of intermediate consumption and the weighting systems involved.

FAO refers to a number of types of indices of production, depending on the underlying production concept, and the necessary information for their compilation arises either wholly or largely from the information on the physical product flows in the supply utilisation balances[1]:

A. Based on information available for the national farm

1. gross production of agricultural products broken down into products of vegetable and animal origin
2. total output excluding losses (on farms) and intra-branch consumption (see 2.2.3.1.) for current production not purchased from other sectors of the economy
3. as 2 above, but deducting also inputs of raw and processed agricultural products (seed and feedstuffs) of domestic origin for current production purchased from other sectors, i.e. products which appear first as sales by the national farm and are then (perhaps after processing or as by-products) repurchased as feedstuffs
4. as 3 above, but deducting also inputs of raw and processed agricultural products of foreign origin purchased from other sectors.

(1) FAO "Preparation of supply/utilisation balances for food and agricultural commodities (commodity balances - recommendations regarding methods, concepts, definitions and classifications) ESS: AGS/AF 71 - 2, August 1971 (standard text for regions, supplemented for the African Commission on Agricultural Statistics)

B. Total gross domestic output on the basis of the integrated economic accounts.

5. as 4 above, but excluding also inputs from purchases of all other goods and services from other enterprises, and separated into production of agricultural products by agricultural enterprises and production outside the agricultural sector. This requires further data on intermediate consumption within agricultural enterprises and on transactions between agricultural enterprises for the purposes of production (intra-sectors transactions).

The statistical data required for the last definition above is currently not available for any member states, either for the production or for intermediate consumption. The figure produced by EUROSTAT in the national agricultural accounts as "gross value added" should, however, be a close approximation of the "production branch" concept in the usual national accounts frame-work.

The production concept set out in A.3 should be the basis of indices of agricultural production where sufficient statistical information is available.

The figure for total gross production of vegetable and animal origin, excluding intermediate consumption of domestic agricultural products, represents the total final production. Final output of products of animal origin can be shown separately, also total output of agricultural products for human consumption, after subtraction of non-food products (e.g. tobacco, fibres, wool).

These figures still contain production involving inputs of agricultural products from abroad, seed, eggs for hatching, feedstuffs or cattle and breeding stock. It is of interest for various reasons to know what proportion of total pro-

duction derives from domestic inputs and what proportion of output of animal products is attributable to conversion of feedstuffs of foreign origin. Total output corrected for imports of feed is designated "net output" (excluding output from imported feed); this should not be confused with "value added".

This "net output" does not take account of non-agricultural imports, such as fuel, commercial fertilisers and raw materials for same, agricultural machinery and other imports which may be more important to total domestic agricultural output than imported feedstuffs.[1]

One example of national figures on gross and net output (in terms of grain equivalents) are figures for the Federal Republic of Germany produced by the BML; these are described as "production of foodstuffs", a not quite accurate although reasonably acceptable term, and include non-edible products such as hops, tobacco and wool, which account for less than 1 per cent of the total. (These items should in future be disregarded for the sake of clarity.) The total for production is broken down into products of vegetable and animal origin. Subtraction of imports of feed from the products of animal origin total (which is expressed in terms of the feed required to produce it) yields a figure for "net output" of products of animal origin and for "net production of foodstuffs" generally. These various totals are presented as a time series in index form. The heading "products of animal origin" for imported feedstuffs corresponds to the resources of feed from imports, a figure that is taken over from the feed balance sheet. The underlying production concept used corresponds to

(1) cf also: OEEC, "The measurement of agricultural production and food consumption", Paris 1955, p. 14 et seq.

the definition in A.3 above. Products which are originally included in sales by agriculture and are then repurchased as feedstuffs or seed are also deducted, as is consumption of processing by-products and waste from raw materials of domestic origin, such as bran, oilcake, beetpulp, molasses, skimmed milk and skimmed milk powder, vegetable and potato waste and other waste products of processing industry (breweries, distilleries, starch industry). These totals also are taken from the feed balance sheet.

The British Ministry of Agriculture, Fisheries and Food likewise takes specific account in its figures for output under the heading "intermediate output" of the return flow into the agricultural sector of feedstuffs and seed, which is then deducted from "gross output" to give "final output".[1]

2.2.4. Human consumption (food balance sheet)

2.2.4.1. Definition of human consumption in the supply balances

The figures under the heading "human consumption" in the supply balance sheets require some explanation to avoid misunderstandings in their use, even in aggregate form. To begin with it should be remarked that the products shown under "processing" in a supply balance sheets pass through further stages of processing (in the course of transformation to the final state where they are ready for consumption) and then appear in separate supply balance sheets for the processed products, finally appearing in their final state under the heading "human consumption".

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(1) Ministry of Agriculture, Fisheries and Food, "Output and utilisation of farm produce in the United Kingdom" 1968/69 to 1974/75, London 1976, table 2, line 2.

This heading shows the gross quantity available for final consumption; this includes direct consumption by producer households not passing through the market. In the case of the marketed goods available for consumption, these are chosen to be as close as possible to the stage in which they are finally consumed. As there are no figures available for the economy as a whole for stock changes or losses in consumer households and in the retail trade, the quantities shown are gross amounts available for final consumption at (roughly) the wholesale stage.[1]

A distinction should be made between the "human consumption" in the supply balance sheets, covering gross amounts of products available for consumption as close as possible to the "retail trade stage", and the figures for purchases of foodstuffs from special sample surveys on budgets of private households or diet surveys which are concerned with food "on the table", and have as their final aim measurement of actual nutrient intake net of waste during consumption. Waste and losses occur at all intermediate stages, with the result that the raw data from these different surveys are not directly comparable.[2] Given consistency of methodology and comparability of the figures, the results from the supply balance sheets can be used to draw conclusions in comparisons over time.

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(1) see EUROSTAT Agrarstatistik 5/1974: Supply balance sheets 1972/73 or 1973, preface p. XIII, and Agrarstatistik 1976: Supply balance sheets, p. XI and 28.

(2) see for details: Helen C. Farnswortn, Defects, uses and abuses of national food supply and consumption data.
Food Research Institute studies, vol. II no. 3, November 1961, Stanford University, California, p. 193 et seq.

2.2.4.2. Food balance sheets and "nutrient content"

In the food balance sheets, the supply balance sheets entries under "human consumption" give gross quantities which are then converted to net quantities via certain factors ("extraction rates"), e.g. grains are shown in flour equivalent, honey in white sugar equivalent, cocoa beans in cocoa butter and powder, raw sugar in white sugar, raw oils and fats in pure fat. These figures are then used to derive consumption in terms of kg/head/year or day. The food balance sheets have become known as such because of their presentation of the quantities available for consumption per head and per day of nutrients in terms of their energy content (calories) or content of nutrients (animal and vegetable protein, fat, carbohydrate) and vitamins and minerals.

2.2.4.3. EUROSTAT notes on the per capita calculations and an assessment of these

EUROSTAT seems to regard this application of data from the supply balance sheets with some scepticism: in its latest (combined) publication of supply balance sheets for 1973/74 and 1974/75 (1974 and 1975) the per capita calculations on human consumption are the subject of a note;[1] this begins with the qualification that the item "human consumption" is a gross figure for quantities available at the wholesale level.

The figures used for calculating the per capita data are based on population as at the midpoint of the reference period (end-December for crop years, end-June for calendar years). The figure for the number of consumers does not take account of daily variations caused by movements in the

(1) EUROSTAT, Supply balance sheets, Agrarstatistik 1976, p. 28

border regions (workers and tourists) or of actual foreign travel numbers, including tourists. Even in cases where these short-term movements across borders offset each other in some degree, the number for the consuming population for some countries may be too large or too small. This can be further aggravated through foodstuffs bought by travellers during their stay in a country and carried out of the country without appearing in the figures for foreign trade. Furthermore the results are national averages for consumption which do not take into account the structure of the population. EUROSTAT accordingly recommends that the figures on per capita consumption should be used with caution, particularly in studies on consumption patterns or standards (qualitative comparisons based on calculations of energy and nutrient content).

This requires further comment. It is generally true that all appropriate scientific care and due caution should be taken in evaluating statistics of any kind.

The fact that the quantities shown as available for "human consumption" in the balance sheets are effectively the gross figures at the wholesale level, and do not exclude the waste and losses occurring on the way to the final consumer, is an important consideration and one that should not be forgotten. It is even more important to know the reliability and quality of the data (or of estimates more or less well founded) which are used for the national supply balance sheets and on which the figures are based for quantities available for human consumption. Attention should also be given to the problem of variation of statistical quality over time.

The population figures used in the pro capita calculations can well differ from the actual figure for the annual average number of consumers; this is certainly relevant for smaller

countries with an important degree of tourism, e.g. Austria and Switzerland. Even in these cases, however, estimates of the ratio between inhabitants and foreign visitors (as shown in the statistics on tourism) including workers indicate that the differences can be at the most a few per cent, but will be considerably smaller in most countries.

This process of monitoring the quality of the statistics is already necessary at the stage of determining the population figures, where the results of a census are updated from figures on current population movements and migration statistics; in this case the next census will certainly show a discrepancy from the updated estimate. In the Federal Republic of Germany, for example, the 1970 census showed a discrepancy of 0.86 million (1.4 per cent) from the higher estimate made for the same date on the basis of the census of 1961. It is most unlikely that this is an isolated case[1]. Population statisticians are faced with considerable difficulties when they are required to explain these differences and to supply revised figures on population for the past years to the "consumers" of statistics, even for the purposes of the production of supply balance sheets. The "consumers" often have to make their own estimates.[2]

The basic data available in the supply balance sheets for calculating per capita available resourves of foodstuffs necessarily have the result that these are averages over the population that ignore the structure of the population (varations in composition by age and sex). The same problem

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(1) Statistical Yearbook for the Fed. Rep. of Germany, 1975, Statistisches Bundesamt Wiesbaden, 1975, pp. 48, 49.

(2) see e.g. Statistical Yearbook for Food, Agriculture and Forestry 1976, pub. BML, Bonn, p. 7, tab. 6, footnotes.

arises in other contexts where economic aggregates are being related to population. The consumption of foodstuffs in specified socio-economic groups has to be established through other surveys (budget studies for specific household and income groups, or as part of a national sample survey on income and consumption).

Such surveys may be regular, or, for reasons of cost and resources, conducted at intervals of a number of years. The statistical problems of recording meals consumed outside the home and consumption in public institutions should not be overlooked if the frame at total national consumption should be filled by the results of such surveys.

The demographic structure of the population and changes in this over time create problems which can only be handled within the framework of very specific investigations. It is, for example, possibly appropriate to look at consumption of particular semi-luxuries (tobacco products, alcoholic beverages) in terms of the "potential consumers" defined by age (e.g. inhabitants over 15). Conversion factors are applied to male and female age groups - based on physiological requirements - to yield figures in terms of "standard consumers of foodstuffs"; these coefficients were devised and used in studies on the budgets of private households. This approach is, however, not adequate by itself, as many other factors beside age and sex are important for the extent and composition of consumption of food; examples of such factors are the strenuousness and duration of physical labour, degree of urbanisation and, of course, the level of income of the household. It would be difficult, if not impossible to find internationally acceptable conversion factors with which to produce weighted aggregates from population figures broken down according to different criteria. The problem raised by the use of the undifferentiated total population figure as the divisor must be recognised, and the

question of the relative significance of individual factors must be approached in other ways.

The calculations by EUROSTAT of consumption per head of population per year for products or product groups for which supply balance sheets are established do make it possible to make comparisons by products over time and between member states. It is, however, not possible at this stage to produce an aggregate and an assessment of the relative importance of the individual products within total consumption.

It is certainly quite legitimate to attempt to examine consumption patterns and the qualitative composition of foodstuffs available for consumption on a national average basis from the point of view of nutrition. One possibility is to calculate the energy content (in calories or joules) and the composition by nutrients (separated into protein of animal and vegetable origin, fat, carbohydrate). The result of this consists of a number of physical and physiological quantities; there is to date no sensible method of combining these different nutrients and units into one nutritional scalar measure. The calorie as a unit of energy is clearly unsuitable, as nutrients of animal and vegetable origin are not different in their calorific content but in their nutritive value. The data should not be taken at their face value, but rather be used as indicators of levels, magnitudes and trends and their changes.

Studies of the nutritional value of consumption of foodstuffs clearly do not exhaust all aspects of consumption; they cannot deal with goods without direct nutrient content, such as tea and coffee, nor yet alcoholic beverages, about whose nutritional value there are differing opinions. Nor do such studies shed any light on particular aspects of consumer preference, such as

accompanying ("built-in") services. A more appropriate approach would be a calculation of the "volume" of consumption, weighted with constant consumer prices of a base period; the aggregates constructed in this way show the quantitative and (in part) qualitative features of changes, so long as these are relative changes in the quantities of products (product groups) consumed. This volume index approach implicitly assumes that the quality of the individual quantities of products does not change over the course of time, for instance that the extent of "built-in services" within the individual quantitative components does not change. We shall pursue this further when considering the "common denominator" for aggregation.

As this type of aggregation of food consumption at constant prices is based on the same quantity figures as the presentation of nutrient content, EUROSTAT might have similar objections.

As was shown in the case of production, similar aggregates on a gross and net basis can be built on the consumption side of the food balance, and be related to the equivalent totals for human consumption. Such a procedure requires that the individual product balance sheets should show resources and uses broken down into domestic and foreign origin. Some examples:

1. a) Total human consumption
   b) of which human consumption of products of animal origin
2. Human consumption of domestic production
   a) "gross" - including consumption of animal products produced from imports of feed and going to domestic consumption
   b) "net" - excluding consumption of products of animal origin produced from imports of feed and going to domestic consumption.

These various aggregates will be discussed in the next section in the context of calculation of the degree of self-sufficiency.

Food balance sheets including calculations of calorie and nutrient content per head per day became politically important within international government organisations (FAO and OEEC/OECD), particularly at times of general or regional shortages of food supplies.[1]

At the same time, however, they brought to light the difficulties in international comparisons of national statistics, and provided a starting point for the FAO and OEEC/OECD for efforts to improve international comparability, to harmonise the basic concepts, and to develop statistical methods for agriculture and the food industries. The need to improve international comparability of national statistics is even greater for organisations of member states like the European Community than for associations of basically independent governments such as the UN, FAO or OECD, where to a large extent nothing more than recommendations are possible.

The supply-utilization balances and the Food balances do provide a good starting point for harmonisation and international agreement on methodological developments of statistics on agriculture and the food industry, because they include further a large number of quantity statistics. The possibility accordingly arises of examining the quantity figures for output of animal and vegetable products, stocks at various stages of marketing, industrial uses and processing and foreign trade for their consistency

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(1) cf OECD: Food consumption statistics, 1955 - 1973, Paris 1975.

and coherence, and to look for starting points here for required improvements.[1] Even though political and scientific interest may now have moved on to other statistics, such as national accounts and ectoral income, the problems posed by the quantity figures will remain important as long as it is necessary to work with the branch concept defined by a list of "products from agriculture, hunting and forestry" to construct a system of economic accounts for agriculture, deriving the figures for value as a separate stage from quantity and price data.

2.2.4.4. Other applications of food balance sheets

The recent forecasts and estimates of demand for agricultural products have led to greater interest in the aggregation of supply balances into food balance sheets, with the calculations of the calorie and nutrient content. Projections for individual products, for example for the member states of the EEC, can be checked for their plausibility by comparing the resulting figures for the calorie and nutrient content of the forecast consumption with the equivalent figures for the past, taking due account of past relationships and the variations in national dietary patterns. It seems less appropriate here to calculate a volume index of consumption on a constant price basis. An example of the many studies in this field is the work of B. Mönning with projections for the Community of the Six for demand for foodstuffs in 1980 and 1985.[2]

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(1) cf. Häfner, K. - Agrarstatistik in der EWG (Agricultural statistics in the EEC), op. cit.

(2) Mönning, B.: Nachfrage nach Nahrungsmitteln in der EG (6) - Analyse und Projektion (Demand for foodstuffs in the EEC (6) - analysis and forecasts), University of Giessen, 1975, pp. 288 et seq.

2.2.5. Calculating the degree of self-sufficiency

2.2.5.1. General remarks

The question is constantly arising in a wide variety of contexts as to the degree of self-sufficiency in the supply of foodstuffs (or agricultural products generally) from domestic production. A possible motive could be the desire for economic self-sufficiency or considerations of the security of national supplies. Countries which are to a considerable extent dependent on imports for their supplies of foodstuffs may be concerned to increase their domestic share of production in order to improve their balance of payments in the long term. The degree of self-sufficiency also can, especially in cases where it is well in excess of 100 per cent, be regarded as a measure of the productive strength of a country's or region's agriculture. It can also, over the course of time, be regarded as an indicator of the effects of agricultural policy, possibly aimed at affecting agricultural incomes via prices, which may result, in a setting of technological progress, in production growing faster than domestic demand. Changes in the degree of self-sufficiency are also of relevance in international negotiations (e.g. GATT, UNCTAD), where an increase can be used to show the protectionist nature of the agricultural policies followed by the other party, or conversely a constant or falling figure can be used to demonstrate the balanced nature and effective neutrality of one's own agricultural policies.

Political debate is not only concerned with changes in the degree of self-sufficiency in individual products or product groups, as calculated on a regular basis by EUROSTAT in the supply balance sheets, but also in general self-sufficiency

in foodstuffs or agricultural products, expressed if at all possible as a single number. Such an apparently simple result can only be produced after a number of preliminary statistical decisions have been taken, and the result of the calculations should be interpreted in the light of the underlying assumptions.

The most widely disparate bases have been used for calculating the degree of self-sufficiency. For the same nominal heading there are widely different results, depending on the zone of application (products covered) and the way in which the elements on the resources and uses sides of the supply balance sheets have been combined. Products covered can, for example, be restricted to agricultural products from the same climatic region, or may include "tropical products", fish etc. Entries in the balance sheets can be treated in different ways, for instance "usable production" can be related to "total domestic uses", or "final production for food" can be related to "human consumption". Another instance could be the question as to which part of total domestic uses of foodstuffs (and other agricultural products) derives from domestic production -also referred to as "domestic market share".

These calculations can also be carried out for "gross" and "net" totals, depending on whether the animal production from imported feed is included in domestic production or treated as indirect imports.

Given the definitions of products covered and the treatment of elements, it would also be possible to consider breaking down imports into products corresponding to domestically produced goods and others which, for climatic reasons, cannot be produced at all or (for seasonal reasons) can be produced for part of the year only. A criterion for defining a product

as "domestic type" here could be that the product be domestically produced under commercial conditions. If this is not the case, even where the product is a "temperate zone" product, it should not be treated as a "domestic type" product (e.g. durum wheat or maize in the northern member states of the Community), even where it is a direct competitor of other domestic products. Conversely, imported sugar is, by this criterion, a "domestic type product", as white sugar from cane-sugar and sugarbeet are interchangeable. Seasonal products (fruit and vegetables) could be treated as "domestic type products" during months where domestic output occupies a significant part (e.g. 10 per cent) of the total supply to the market.[1] If the total for available quantities is broken down in this way, the degree of self-sufficiency is automatically higher for the "domestic type product" group than for the total, as the degree of self-sufficiency for the other product group is either very low or zero.

A calculation on this basis may well be reasonable for an individual country, such as the United Kingdom. It would, however, be difficult to define "temperate zone" products which are not produced somewhere under commercial conditions in the European Community, where the climatic range extends from Sicily to the Orkneys. The remaining criterion remains largely valid, namely the significant share of production within the Community. The British authors cited here attempted to use these two criteria (production under commercial conditions and significant market share) to

(1) cf. Baines, A.H.J. and Angel, K.J., Ministry of Agriculture, Fisheries and Food, London: "The measurement of self-sufficiency in food and agricultural products", Economic Trends no. 190, August 1969; likewise Angel, L.J.: "Measuring self-sufficiency for food and drink in the United Kingdom", Economic Trends no 217, November 1971.

get round the difficult problem of assessing the degree of substitutability of related products.

The subsequent discussion refers to calculations based on the following elements in the balance sheets:
-usable production and domestic uses
-domestic use of production of domestic origin and total domestic uses.

2.2.5.2. Usable production and domestic uses

EUROSTAT gives this ratio as a derived calculation in supply balance sheets for individual products or product groups where it feels this is sensible.

Since supply balance sheets are, wherever possible, shown in terms of basic products, the determination of the degree of self-sufficiency is similarly carried out in these terms whenever possible. Usable production is defined:

- for balance sheets for unprocessed raw materials as domestic production of these products (e.g. usable production of harvest crops, animals for domestic slaughtering and export as live animals)
- for balance sheets for processed products as production from raw materials of domestic origin.

The separation of domestic production of processed products according to the origin of the raw materials used requires that it be in principle possible to produce entirely separate balance sheets for the individual products for resources and uses of domestic and imported quantities. There are - possibly for that reason - only a few examples published by EUROSTAT of balance sheets for processed products where the raw materials used are shown separately by origin.

Examples are the balance sheets for oil fruits and seeds, vegetable fats and oils and oilcakes; these include additional figures on processed raw materials by origin and the usable production of oils, fats and oilcakes separated by origin of raw materials.[1] This division is perfectly simple for oil fruits and seeds which are produced little if at all in the Community; it is obviously not possible for an outsider to know how far the separation by origin of the other oil seeds processed is based on returns from the mills or on estimates.

The balance sheet for meat differentiates between meat from slaughterings of domestic and imported animals ("net production" as defined by EUROSTAT). On the same basis the production of slaughtering fats in the balance sheets "fats and oils from land animals"[2] (whether already included in "carcase weight" or not) has been subdivided according to their derivation from imported or indigenous animals. The degree of self-sufficiency in meat is, however, calculated on the "gross domestic production" basis (slaughterings of indigenous animals and exports of live animals for slaughter). It would be more correct to go one stage further and make allowance for changes in the livestock population during the reference period. Where this fell, actual "production" figures would exaggerate output, and where population grew the figures would understate actual output (see for example summary table 11).

Separation of processed products according to the origin of the raw materials used requires in the case of balance

(1) see Supply balance sheets, EUROSTAT Agricultural statistics 1976, pp. 130 et seq.

(2) see Supply balance sheets, EUROSTAT, Agricultural statistics 1976, pp. 240 et seq.

sheets for the Community as a whole that the member states show the raw materials imported for processing under imports from other EEC member states and imports from outside the Community.

In the notes on the calculation of the degree of self-sufficiency, EUROSTAT points out that there are two possible ways of dealing with products from processing, depending on which of these two definitions of usable production is used:

- that part of production arising from basic products of domestic origin, and
- total usable production irrespective of the origin of processed basic products.[1]

EUROSTAT emphasises there that the first definition underlies its calculations. This appears to be contradicted by the presentation for the balance sheets for dairy products; here total usable production is shown opposite domestic uses, which would seem to imply that these refer solely to milk of domestic origin.[2] There is some foreign trade in whole and skimmed milk, but its significance is relatively small, with the possible exception of one member state where imports of whole milk are almost 6 per cent of total input to dairies. There are certainly no separate figures on uses of imported milk. This means that we are forced to assume that domestic raw materials are exclusively used.

EUROSTAT also points out that an element of distortion is involved in calculating total domestic uses arising from the so-called "global" balance sheets, i.e. balance sheets

(1) op. cit. p. 16

(2) op. cit. pp. 204 et seq.

covering the basic agricultural products and a number of derived products converted back into terms of the basic product (e.g. cereals, meat, sugar). In these balance sheets the external trade in processed products from the food industry is included, but although imports of processed products for industrial (non-food) use are ommitted, the production for exports of these products are included in domestic uses. This distortion should not arise in "simple" balance sheets for individual products (whether basic or processed), such as oil fruits and seeds, oilcakes, vegetable fats and oils.[1]

The reasoning here is not very clear.

The determination of the processed products and stages of processing to be included in these "global" or "total" balance sheets covering basic products and processed products expressed in terms of the basic products is a matter of convention and depends also on the degree of the breakdown of quantitative data in the statistics for foreign trade. The total balance sheets for cereals and cereal products include figures for foreign trade in grain products used partly or wholly for industrial (non-food) purposes, e.g. malt, starch. The resulting products (e.g. beer, dextrin) are not recorded in EUROSTAT supply balance sheets, certainly not in the cereal balance sheets. This is a case where EUROSTAT's contention that the heading "industrial uses" under domestic uses also includes quantities of industrial products which will finally be exported is borne out. This element in the balance sheets is a item for purposes of checking or completeness, and is not pursued further.

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(1) op. cit. p. 17

I consider that the same applies to the "simple" balance sheets, which deal with a single basic product or products at some stage of processing, contrary to EUROSTAT's contentions. Here too we could find a heading under domestic uses for "industrial use" which is not then followed up, even where the resulting industrial products are subsequently exported. It seems highly desirable that this point should be reconsidered, and if some misunderstanding is involved the notes (in themselves helpful) should be made more explicit.

In balance sheets for individual products or homogeneous product groups (cereals) it is desirable that the usable production should be set against the total (gross) domestic use. When establishing balance sheets for products of vegetable and animal origin at the aggregate level, care must be taken to exclude intermediate consumption of seed (hatching eggs) and feed, which would otherwise lead to double counting: the "results" from the feed, i.e. the resulting products of animal origin at the second stage of production, are already included in the figures. In the overall aggregates the totals for "output" and "final uses" should be used, where "final uses" is the sum for human consumption, industrial uses and losses in distribution (excluding figures for seed, hatching eggs and feed).

The significance of this intermediate consumption for the supply balance sheets is shown in e.g. the calculations by G. Thiede for the Community of the Six, using grain equivalents as a common unit.[1] The following figures emerge for the

(1) Thiede G.: "Die Versorgungslage der EWG mit landwirtschaftlichen Erzeugnissen. Versuche mit einem System von mengenmässigen Gesamtrechnungen" (The supply of agricultural products in the EEC. Experiments with a system of integrated accounts on a quantity basis.) "Berichte über Landwirtschaft" vol. 48 (1970) no. 2, pub. P. Parey, Hamburg and Berlin.

Community of Six, as averages for the three crop years 1965/66 - 67/68 and calculated over all supply balance sheets regularly produced at that time (and therefore without oil fruits and seeds, oilcakes and fish), in millions of tons grain equivalent (using the conversion factors in use before the latest revision):

Table 2:

The significance of intermediate consumption in the EUR-6 for the average of 1965/66 - 67/68, in millions of tons grain equivalents (GE) (old conversion factors)

		vegetable products	animal products	total
I.	Production			
	gross	116.0	152.8	268.8
	of which seed, hatching eggs, feed	40.3	12.1	52.4
	"final output"	75.7	140.7	216.4
II.	Domestic uses			
	total (gross)	136.7	159.8	296.5
	of which seed, hatching eggs, feed and losses in distribution	54.1	12.9	67.0
	(of which feed)	47.0	12.2	59.2
	Industrial uses and human consumption	82.6	146.9	229.5

The gross production of products of animal origin, 152.8 m tons GE (= feed input = total for reproduction) in the balance sheets is offset by only 59.2 m tons GE of feed, mostly cereals (c. 42 m tons). The difference of 93.6 m tons FE is made up through animal feedstuffs not normally marketed, most of which are consumed directly on the farm where they are grown, and through marketed feedstuffs which are directly imported or produced in the course of industrial processing of agricultural (and fishery) raw materials of domestic origin or imported. The current figures for feedstuffs in the supply balance sheets are more comprehensive, as a result of the institution of regular reporting of balances for oilcakes and fish (incl. fish meal).

The same problem occurs here as in using production balance sheets as a quantity framework for calculating final production in the economic agricultural accounts, namely that agricultural products leave the "national farm" as sales and are then repurchased as feedstuffs. The market balance sheets (e.g. for cereals) include under "feed" not only imported quantities, but also quantities of domestic origin which return to the "national farm" in raw, processed, or mixed form. The extent to which this element can be isolated as marketed feed depends on availability of statistical data. In Thiede's figures this should have been practically entirely concentrated in cereals. EUROSTAT has produced figures for the crop years 1970/71 and 1971/72 as supplementary statistics on the "geographical origin" of cereals used in EUR-6 for feed.[1] According to these indigenous cereals used as feed in the two years amounted to 32.7 and 34.3 m tons respectively. The production balance sheets give figures for direct use as feed

(1) EUROSTAT Agrarstatistik vol. 1 1973 (Grain balances), pp. 109 et seq. and 54 et seq.

on farms of 23.0 and 25.3 m tons. This means that 9.7 and 9 m tons respectively of indigenous cereals were sold and subsequently repurchased in some form as feedstuffs. Regular publication of this sort of information in EUROSTAT supply balance sheets would make it easier to interpret the balance sheets.

The "adjusted" figure for output of products of animal origin (net of intermediate consumption), i.e. "output" and the figure for domestic use (excluding feed of animal origin and hatching eggs) still contain the part of production arising from imported feedstuffs. Where the degree of self-sufficiency is being calculated it is desirable to go a stage further and establish what fraction of domestic consumption of agricultural products ultimately derives from domestic "production of the soil". To put this more precisely, what is the quantitative relationship of domestic "production of the soil" to domestic use, remembering that not all domestic output need necessarily be used or consumed at home.

The feed balance sheets include figures on quantity in natural units of foreign products available for domestic use as feed. The natural units in which the imported feedstuffs are recorded require conversion via physical or price factors as a common basis for aggregation (for calculating inputs). As marketed feedstuffs are involved, there should theoretically be data on prices.

Calculation of "net self-sufficiency" exclusive of production from imported feed should be restricted to the total and the sub-total for products of animal origin. It is conceivable, when sufficient experience has been acquired with feed balance sheets, that it will be possible to allocate feed resources from imports to individual types of animal and animal products, and

hence derive "net self-sufficiency" for the individual products of animal origin.

Caution is required in interpreting the degree of "net self-sufficiency". To begin with, imported feedstuffs make it possible to extend animal production without being bound by limitations of domestic feed supplies. In addition the imported foodstuffs are particularly rich in protein (crude protein as well as digestible protein: see table 1) which makes it possible to improve the nutrient content of domestic feedstuffs deficient in protein, and hence to increase the intensity of production from animals via improved inputs. Both effects must be considered when assessing the net degree of self-sufficiency, especially as their importance differs in the individual member states in the Community.

It should again be remembered that the imported inputs only cover agricultural products (feedstuffs, seed, hatching eggs, cattle and breeding stock) in these figures. Other non-agricultural inputs (mineral fertilisers or raw materials, fuel, machinery etc) can be far more significant than agricultural imports for maintaining domestic agricultural production, particularly since animal traction has almost entirely been replaced by mechanical.

For a number of products "domestic use" (the divisor in calculating the degree of self-sufficiency) includes uses of surpluses subsidised by public funds. One example is state (Community) subsidies to "encourage" extra conversion of wine surpluses in distilleries, which is entered in the balance sheet for wine under industrial uses (distilleries). This amounted for the Community to 3.5 m hl. in 1970/71 and 1971/72, 6 m hl. in 1973/74, over 20 m hl. in 1974/75 and

1975/76 4 m hl. The European Communities Commission itself pointed out in its reports on the state of agriculture in the Community for 1975 and 1976 (par. 117 and 189) that different figures for self-sufficiency in wine were obtained depending on whether "extraordinary" (subsidised) distillation of wine was included in domestic uses or not:

	including extraordinary distillation	excluding extraordinary distillation
1970/71	103 %	105 %
1971/72	93 %	95 %
1972/73	89 %	89 %
1973/74	115 %	119 %
1974/75	95 %	108 %

For this reason we recommend that this subsidised extraordinary distillation should be shown in the balance sheets for wine under a separate heading, so that - if necessary - two figures for the degree of self-sufficiency can be calculated, including and excluding this part of consumption. If this is done in the case of surplus production, the difference between usable production and "normal" domestic use would comprise such subsidised domestic uses together with exports and increases in stocks.

A similar procedure is recommended for balance sheets for fruit, vegetables and citrus fruits, which should show separately quantities taken out of the market with publicly financed subsidies and partly used for subsidised processing. The same holds for other products where subsidies make domestic uses possible at prices below the market price (e.g. skimmed milk powder, denatured grain, subsidised distribution of butter to particular groups of consumers).

2.2.5.3. <u>Domestic uses from domestic production in relation to total domestic uses (domestic market share)</u>

For individual products the degree of self-sufficiency is the ratio of usable production to total domestic uses; for the aggregate of all products of animal and vegetable origin it is the ratio of output to adjusted final domestic uses (industrial uses and processing of foodstuffs, and direct human consumption). This does not enable us to tell what part of domestic uses is satisfied from domestic production and which from imports. The normal supply balance sheets combine imports and usable production to give "resources", which is then broken down into exports, stock changes and (gross) domestic uses, with its sub-headings. The origin of these resources is not apparent here. At one extreme, where the degree of self-sufficiency is x per cent we could find that domestic production was largely used for exports and stock increases, and that domestic consumption was largely satisfied from imports. In such a case the share of domestic production in uses in the domestic market would be considerably smaller than the ratio of production to domestic uses.

The problem is constantly arising in the context of marketing domestic agricultural production and the campaign of national marketing organisations with the (neutralised) slogan "home-grown products fresh from the farm" as to what proportion of domestic consumption is met from domestic production, i.e. how large is the domestic market share. In order to answer this question we must be able to produce a special balance sheet for usable production breaking down uses under stock changes, exports and domestic uses (with sub-headings for seed, hatching eggs, feedstuffs, industrial uses, processing and human consumption). While the degree of self-sufficiency in individual products is given by the ratio of usable production to total domestic uses, the share in domestic consumption of products of domestic origin

(the domestic market share) is given by the ratio of production going to domestic uses to total domestic uses. Stock changes have to be taken into account for domestic uses of production as well as for total domestic uses of domestic and foreign products. The use of the term "domestic market share" does not imply restricting the definition to total quantities from sales of production and exports, but covers total output and total uses including own consumption by producer households.

While usable production may exceed total domestic uses by any amount, the share of production going to domestic uses in total domestic uses cannot exceed 100 per cent. In a situation of a net deficit, balance sheets for simply structured cases (usable production mainly going to domestic uses, stock changes actually $\pm$ or unknown, imports mainly for domestic consumption) may show the self-sufficiency as equal to the share of domestic use of domestic output in total domestic uses. This is always true where usable production and imports both go directly into current total domestic uses. It was often the case in countries having to import food, where domestic agricultural production and industrial processing of foodstuffs were entirely oriented to the domestic market (already as a result of protectionist agricultural policies), that the domestic market share and the degree of self-sufficiency were identical.

If, in a net importer country, part of domestic production goes to stockbuilding and/or exports (raw or in processed form), the domestic market share will be lower than the degree of self-sufficiency. Conversely a fall in stocks of domestic origin will tend to produce the result that the domestic share of total consumption is greater than the degree of self-sufficiency.

The BML calculates and publishes both figures (degree of self-sufficiency and so-called domestic market share). The following summary table 3 shows as a methodological example both figures for selected products for the past two years.

Table 3

Federal Republic of Germany:

A comparison of the degree of self-sufficiency and the "domestic market share" (examples)[3]

	degree of self-sufficiency[1] %		domestic market share[2] %	
	1973/74	1974/75	1973/74	1974/75
Wheat	89	100	71	80
Wheat and rye tog.	90	101	77	83
Grains total	80	86	72	77
Dried pulses	51	54	51	54
Sugar	98	100	89	87
Fish (fillet weight) for human consumption	74	69	48	47
Skimmed milk powder	194	280	99	97
Cheese	80	89	57	58
Vegetable oils and fats, marine oils	7	10	7	10

[1] calculated from usable production and total domestic uses

[2] calculated from domestic uses of production and total domestic uses

[3] Statistisches Jahrbuch über Ernährung, Landwirtschaft und Forsten, 1976 Bundesministerium für Ernährung, Landwirtschaft und Forsten, pp. 162 et seq.

Both types of calculation give the same results for dried pulses and vegetable oils and fats. In the first product group the small quantities involved in stock changes and exports apparently do not arise from domestic output, and total usable production can hence be regarded as going entirely to domestic consumption. In the case of vegetable oils and fats the predominance of products of foreign origin (either manufactured from imported oil fruits and seeds or directly imported) has the result that exports are basically reexports (possibly in processed form) and that stock changes also involve basically goods of foreign origin.

Where the other products with self-suficiency of about 100 per cent are concerned, domestic production is exported (possibly after processing) and (grain) used for stockbuilding. A complex process of exchange of types and qualities of products may also be involved (as, for example, with cheese) in cases where the product groups cover very differing products. In the case of sugar, exports of domestic sugar led to a fall in domestic uses, but this process was offset by reductions in stocks of domestic sugar. Skimmed milk powder is a typical example of overproduction combined with very small imports. The domestic market is almost exclusively supplied from domestic production, a considerable part of which is exported depending on the degree of self-sufficiency and in "unbalanced" market conditions (i.e. at times of overproduction), surplus production also added to stocks even over years.

The degree of self-sufficiency and the share of production used at home in total domestic use need not always move in the same way when compared over a longer period; the domestic market share can either fall or rise when the degree of self-sufficiency is falling, depending on the relative movements of the individual elements in the balance sheets, and the same

holds for a rising degree of self-sufficiency.

Where net surpluses persist over a longer period (either for products or countries), imports and their domestic use should in the overwhelming majority of cases be minimal, compared to production and domestic consumption. A typical example is provided by the balance sheet for soft wheat for France. In recent years usable production represented roughly double total domestic uses; imports were minimal, at c. 1.5 per cent of domestic uses, with the result that the domestic market is supplied almost entirely from domestic produce.

It remains to be seen, however, if this low import share actually comprised the same products, or whether there was perhaps some trading in different varieties. "Soft wheat" in the EEC definitions also includes for example some overseas "hard wheats", although not durum wheat. It also remains to be seen if the imports were actually consumed on the domestic market, or were perhaps reexported after processing. Such considerations especially apply to cases where the imports are more significant.

These examples show that both calculations should be produced, if any importance is to be ascribed to them at all. The degree of self-sufficiency alone says nothing about the extent to which domestic products supply domestic consumption, and how far they go to exports and to increases of stocks. The domestic market share does not include exports (and stock increases) from domestic production: a rising, constant or falling market share can coincide with rising exports and stock increases from domestic production. To interpret the two indices we must virtually examine in some detail the development of supply and demand on the separate markets. An analysis in terms of quantities alone will not suffice to explain a rise in the

degree of self-sufficiency or a shift in the uses of domestic production (domestic uses, exports, stock increases).

The normal methods for calculating the degree of self-sufficiency and the domestic market share which we have described above apply both to the individual member states and to the Community as a whole. The question is, whether it is possible to apply these calculations to the Community as a whole and the member states on a common basis, and if so, to what extent this can be done.

The common factor in the calculations was the total domestic use; it would be possible to express the degree of self-sufficiency in terms not only of the total domestic production of the Community, but also of that of the individual member states, set against the total domestic uses of the Community. This would give figures for the total degree of self-sufficiency for the Community and the proportional shares in this of the member states, or for their contributions. Table 4 below shows an example of the balance sheet for total grain over three periods, giving the usual figures for the degree of self-sufficiency: these rose markedly in the Federal Republic of Germany and particularly so in France. As the share of both countries in total production rose at the same time, the degree of self-sufficiency for the Community as a whole also rose. The last part of the table shows the relationship of usable production in the various member states to total domestic uses in the Community. These ratios correspond to the shares of the member states in total production, weighted by the degree of self-sufficiency of the Community as a whole. (For example, France 1972-4: share in production of 51.4 per cent times the degree of self-sufficiency of EUR-6 of 0.982 gives 50.4 per cent). This ratio could give over a period an additional indicator of changes in the structure of production

in relationship to the total domestic uses of the Community, which can be calculated easily.

Here as with other presentations of the degree of self-sufficiency, we are dealing with a ratio between two largely independent quantities, which still tell us nothing about the uses of production (export, stockbuilding or domestic consumption).

With the help of appropriate calculations on the share of consumption from domestic production in total consumption, total domestic uses in the Community could be used as a reference figure, and the Community treated as a single uniform domestic market. Ignoring the question of stock changes for the moment, the Community consumption from usable production could then be treated as equal to total domestic uses excluding consumption of imports from outside the Community.

Table 4

Contributions of member states to the degree of self-sufficiency of EUR-6

Specimen calculations: total grain (excluding rice)

	F.R. Germany	France	Italy	Nether-lands	BLEU	EUR-6
I. Usable production in 000 t						
ø 1956 - 1960	13,509	20,451	13,037	1,725	1,916	50,638
ø 1966 - 1970	17,101	31,352	14,580	1,629	1,862	66,524
ø 1972 - 1974	20,717	41,495	15,063	1,331	2,193	80,799
II. Total domestic uses in 000 t						
ø 1956 - 1960	17,549	18,612	14,998	4,996	3,765	59,920
ø 1966 - 1970	22,518	22,317	21,085	4,631	4,334	74,886
ø 1972 - 1974	25,375	24,424	22,324	5,040	5,131	82,294
III. Degree of self-sufficiency in % [1]						
ø 1956 - 1960	77	110	87	35	51	85
ø 1966 - 1970	76	140	69	35	42	89
ø 1972 - 1974	82	170	67	26	43	98
IV. Share in usable production (EUR = 100)						
ø 1956 - 1960	26.7	40.4	25.7	3.4	3.8	100
ø 1966 - 1970	25.7	47.1	21.9	2.5	2.8	100
ø 1972 - 1974	25.6	51.4	18.6	1.7	2.7	100
V. Share of usable production in total EUR domestic uses [2]						
ø 1956 - 1960	22.5	34.1	21.8	2.9	3.2	84.5
ø 1966 - 1970	22.8	41.8	19.5	2.2	2.5	88.8
ø 1972 - 1974	25.2	50.4	18.3	1.6	2.7	98.2

[1] usable production as % of respective total domestic uses

[2] respective usable production as % of total EUR domestic uses; for EUR-6 this is the degree of self-sufficiency

Figures are based on EUROSTAT: Statistical yearbook for agriculture, various years, and EUROSTAT: Agricultural statistics - supply balance sheets 1973/1, 1974/5, 1976.

For the individual member states, intracommunity uses of their production would comprise their own domestic consumption and exports to other Community member states; their own consumption of Community production would comprise domestic consumption of domestic production and imports from other Community member states.

To explain this more fully, let us take as an example the supply balance sheet for total wheat for 1971/72 (Table 5). This year was chosen because it is the last year for which it is possible to establish exports to other Community states from import statistics of countries of destination, using the EUROSTAT published supplementary tables on intra-trade and using similar methods to those used by EUROSTAT to establish EEC exports by destination.

Lacking separate figures for resources and uses from production and imports, the following assumptions are made for the purposes of the example:

- imports from outside the Community are used entirely for domestic uses in the member states, i.e. they are not reexported either directly or in processed form;
- exports come entirely from usable production of the member state in question;
- stock changes affect domestic products only.

This gives us a figure for usable production available for consumption in the member states and the Community (domestic uses in member states and exports to other member states) based on usable production (for member states and the EEC) excluding exports to non-Community countries;
excluding stockbuilding
including stock reductions (lines 6-9 in the example).

If we go one step further and reduce this figure by "intra-exports" to the other member states and add in "intra-imports" we arrive at a figure for consumption of Community production for the individual member states and the Community as a whole (lines 10-13). This result is identical with total domestic uses excluding imports from non-Community countries (line 15 minus line 14). The result is shown in lines 16 and 17:

- the ratio of the member state's production available for use within the Community to total domestic uses (consumption) in the Community, and
- the ratio of consumption of the individual member states of Community production to total domestic uses in the Community.

These calculations cannot be carried out for the EEC as a whole, as the statistical data necessary (separate balance sheets for production and imports) is not usually available. The simplifying assumptions made for the purposes of this example are certainly not sufficiently realistic to permit their generalisation (see e.g. the negative consumption from domestic production for the Netherlands in line 11).

Studies are in progress in the Federal Ministry of Food, Agriculture and Forestry in Bonn (BML) along these lines, in order to make it possible to extend the calculations on the degree of self-sufficiency and "domestic market share" from the isolated national level to the Community level. The methods given here, as shown in two examples, are intended both as an approach to this problem and as a stimulus to further study.

Table 5

Share of member states' consumption from domestic production in total Community consumption

Specimen calculations: wheat (total) 1971/72

		F.R. Germany	France	Italy	Nether-lands	BLUE	EUR-6
1	Usable production	6,928	15,481	9,994	718	954	34,075
2	Total imports	2,423	279	1,521	1,494	1,294	7,011[1]
3	Stock changes	+ 926	+ 312	± 0	+ 98	+ 102	+ 1,438
4	Total exports	964	6,023	790	799	405	8,981[1]
5	Total domestic uses	7,461	9,425	10,725	1,315	1,741	30,667
6	Usable production	6,928	15,481	9,994	718	954	34,075
7	Exports ex-EUR[2]	923	2,866	714	480	196	5,179
8	Stock changes	+ 926	+ 312	± 0	+ 98	+ 102	+ 1,438
9	Production available for domestic uses in EUR	5,079	12,303	9,280	140	656	27,458
10	of which "exports to EUR countries"[2]	41	3,157	76	319	209	3,802
11	of which consumption in prod. land	5,038	9,146	9,204	-179	447	23,656
12	of which "imports from EUR countries"	1,637	91	524	593	957	3,802
13	consumption of EUR production in member states	6,675	9,237	9,728	414	1,404	27,458
14	Imports from non-EUR countries	786	188	997	901	337	3,209
15	Total domestic uses (line 5)	7,461	9,425	10,725	1,315	1,741	30,667

(1) incl. intratrade

(2) exports to other member states derived from import statistics of countries of destination; exports to non-EEC states, remainder from export statistics figures for exporting countries shown in table II, col. 6, p. 102 of source.

Source: EUROSTAT Agrarstatistik 1/1973: Grain balance sheets 1970/71 and 1971/72.

Table 5 (continued)

	F.R. Germany	France	Italy	Nether-lands	BLUE	EUR-6
Ratios: (%)						
16 Ratio of production used in EUR to total domestic uses of EUR (line 9: line 15 col. EUR-6)	17	40	30	1	2	90
17 Ratio of consumption from production by EUR to total uses in EUR (line 13: line 15, col. EUR-6)	22	30	32	1	5	90
18 Ratio of usable production to total domestic uses EUR (line 1: line 5, col. EUR-6)	23	50	33	2	3	111

2.2.6. Other applications of supply balance sheets as quantity framework - analysis of gross margins

A recurrent question during the political deliberations on using prices as a means to improve agricultural incomes was how producer prices could be raised without increasing the cost to the consumer. The gap between the price paid by the consumer and the price received by the producer of agricultural products, the "gross margin in distribution", was a constant object of criticism by producers and consumers, and continues to be the subject of empirical investigation.

These investigations started from the view that foodstuffs at the consumer level are a joint product combining agricultural raw materials with services and inputs from the transport, processing and distribution sectors. The composition varies from one foodstuff to the next, and also alters in the course of time. "A thorough analysis of the demand for foodstuffs and semi-luxuries must accordingly cover not only the demand for foodstuffs at the final consumer stage, but also the demand for the associated inputs of material and services and for agricultural raw materials."[1]

The study quoted here will serve as an example of the use of supply balance sheets as a quantity framework for investigating demand. The authors perform a macroeconomic analysis at three stages of the market: the producer stage, the consumer stage, and the intermediate stage of inputs of material and services. Of the three possible approaches to establishing total consumption of foodstuffs:

at the point of production (agricultural production)
at the point of use (household) and
in the stages of processing and marketing

the authors feel that the supply balance sheets are the proper point of departure, because of the statistical information they provide, particularly for the purposes of comparisons between the stages of production and consumption; this although the balance sheets are basically starting from the furthest

(1) Hanau, A. in the preface to Koester, U. and Bittermann, E. - "Theoretische und empirische Analyse der Nachfrage nach Nahrungs- und Genussmitteln auf der Verbraucher- und Erzeugerstufe. Bundesrepublik Deutschland 1950/51 - 1965/66." (A theoretical and empirical analysis of the demand for foodstuffs and semi-luxuries at the consumer and producer levels. West Germany 1950/51 - 1965/66) Vols. I and II, Agrarwirtschaft, special nos. 27 and 28, Hannover 1968, 1969.

possible remove from consumption, the production of the raw material. The human consumption time series shown in the supply balance sheets for the Federal Republic of Germany are used as a quantity framework. In order to calculate the demand in money terms for foodstuffs at the consumer level these quantities are multiplied by average expenditure per unit (derived from continuous budget studies on specific types of households). "Demand for foodstuffs at the producer level is defined here as the value of quantities of agricultural products equivalent to human consumption. These quantities are calculated using average conversion factors and allowance is made for possible losses in marketing".[1] The resulting quantities are multiplied by average producer prices of domestic products, irrespective of the actual origin of the goods. This approach was adopted on the justifiable assumption that, under the system of regulated markets and other agricultural protective measures, comparable agricultural products of foreign and domestic origin have the same prices on the domestic market. Only where the products are either not indigenously produced or are produced in relatively small quantities or different qualities to imported goods are average import unit values used, including tariffs etc where applicable.

On this basis, total figures for the value of demand for human food consumption are built up by products, product groups and for the overall total, the figures being calculated both for producer and consumer levels. The difference between the value aggregates for the two levels is allocated to "complementary services and inputs". Volume indexes are also calculated, using constant average unit values, as demand studies require value figures both at current price and

(1) Koester, U. and Bittermann, E. op. cit. vol. II, p. 106

constant price (volume) figures, together with their relationship to total consumer income.

These value aggregates for demand can be further broken down and used for many other purposes in cases where the quantity figures for consumption of foodstuffs can be split into domestic and foreign origin. Once again, this requires that the supply balance sheets show uses of domestic production and imports separately. In the quoted study for the Federal Republic of Germany the authors were able to use such disaggregated data. This made it possible inter alia to calculate the relationship of total demand for foodstuffs at the producer and consumer levels, and to extend this to market demand for foodstuffs of domestic origin at these two levels (yielding the share of sales by the agricultural sector in total consumer expenditure on foodstuffs of domestic origin). The authors make it quite clear that the resulting figures for expenditure by consumers calculated for the consumer and producer levels do not necessarily correspond to actual expenditure, but should give a good indication of the order of magnitude and changes involved.[1]

In the course of converting quantities of foodstuffs going to human consumption back into equivalent quantities at the producer stage via technical conversion factors, an element of double-counting arises with agricultural basic materials which appear as by-products in the food-processing industry (e.g. bran from cereals, beetpulp from sugarbeets, oilcake from oilseeds, hides from cattle); the value of these products has to be subtracted from the figure for consumption of foodstuffs at the producer level, or else added to the figure at the consumer level in order to give a correct picture of the gross

(1) cf. also Agrarbericht 1977 der Bundesregierung (Federal Government Report on Agriculture 1977), publication 8/81 of the Deutsche Bundestag, p. 181

margin. Both methods are in fact used. This problem is mentioned here as it occurs in all calculations involving equivalent units (or "weights") at different stages in the market.

We have already mentioned the description of the methods used for calculating the degree of self-sufficiency in foodstuffs for the United Kingdom given by L.J. Angel ; this work has been continued by I.A. Beaumont [1] to cover the question of costs in processing and distributing foodstuffs. These costs are calculated as the difference between the total expenditure on foodstuffs at the consumer level (by consumers, institutions, government and exporters) and the value of foodstuffs at the stage of agricultural production and of imports. Even though only over all aggregates in value terms at current and constant prices are shown for 1962/63 to 1969/70, the explanatory notes to the tables in these studies indicate that figures were available for quantity balance sheets separately for uses of domestic production and for resources from imports; in addition, estimates of stock changes must also have been available in order to produce value figures for domestic uses for foodstuffs. Beaumont also made allowances for own-consumption by producer households and for non-commercial production on small holdings and allotments to arrive at total values in the market.

In the interests of completeness on other use of "equivalent" quantity data in the comparative analysis of time series for different market levels should be mentioned, i.e. the "vertical" comparison of price indices. The official Laspeyres indices for

(1) Beaumont, J.A., "The cost of processing and distributing food in the United Kingdom" in Economic Trends no 217, November 1971, London , CSO

producer and consumer prices cannot be directly compared as they are based on a different "basket" of goods by selecting from the two sets of commodities the corresponding positions, which must either be directly present in both "baskets" or else be derivable from some element in each. Where the corresponding index of consumer prices of foodstuffs is a subindex of the cost-of-living index and uses the given weighting scheme, the index of producer prices weighting scheme is so calculated to contain the quantities of agricultural products required to produce the quantities of foodstuffs forming the basis of the consumer prices index weighting scheme. For this purpose foodstuffs are converted via technical conversion factors into the required inputs of grain, live animals etc. The price indices so calculated give a comparable picture of price movements at both levels. Further, similar indices of the price differences between the levels (margin per unit of product) can be calculated from the difference between the total values entering the calculations (gross and net, i.e. including or excluding the index of by-product prices). This technique has been set out in detail by D. Manegold.[1]

The US Department of Agriculture (USDA) also used two fixed equivalent baskets of goods for the base period in calculating the share of agriculture in consumer expenditure for food, taking for the baskets at both market levels the current prices of their elements, and showing the absolute and relative evolution of both price indices and the price margin.

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(1) Manegold, D. - On methods of vertical comparison of price indices: the example of the indices of producer and consumer prices for agricultural products and foodstuffs respectively in the Federal Republic of Germany. In "Agrarwirtschaft", special issue 26, Hanover 1968.

Historically the development was the other way round. USDA was concerned to be able to compare exactly the price changes at the two market levels and their difference, on the basis of fixed "baskets" of commodities. The method given by Manegold also can be applied to improving vertical comparisons of price indices and to developing a corresponding index of the margin for trade and distribution. This concept of equivalence has then been applied to macroeconomic analysis of the growth of the turnover (value of consumption of foodstuffs at the producer and consumer levels where the equivalent quantities change over time) and the gross margins.

A first step towards a comparison of corresponding prices at the producer and consumer levels was made in a table published by the EC Commission in its last two reports on "The state of agriculture in the Community"[1]. This showed price changes for 7 comparable pairs of products (e.g. bread and soft wheat) over a longer period (1968-1974 or 1975) at the producer and consumer levels in the nine member countries, and the comparisons were used to show that the consumer prices for these products in a raw or processed state had generally risen faster than the producer prices (i.e. the margin for associated inputs and services had increased). When work is completed on harmonisation for an index of agricultural producer prices which will be comparable within the Community, it might be possible to take the next step and draw up corresponding price indices for foodstuffs at the producer and consumer levels for the Community.

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(1) EC Commission, "The state of agriculture in the Community", Report for 1975, tab. e I/7.9, pp. 196-7, and Report for 1976, table 1/7.12, pp. 220-221.

3. The choice of a common denominator for converting heterogeneous quantities

The mass of quantitative data of agricultural statistics gives rise to the need to summarise them in some clear, intelligible and significant form. For most purposes a common denominator is required for summarising figures representing heterogeneous dimensions. There is also the need for the Community to aggregate national totals. Various common denominators are available for the different purposes involved.

A number of methods of aggregation have evolved in the different countries and international organisations, used according to the problem in question; these can be grouped as follows (Besch and Wöhlken);

"(1) aggregation using physical units as common denominator (or using weighting factors representing natural quantitative relatives)

(2) aggregation using monetary units as common denominator (or weighting factors related to the prices of the goods)"[1]

3.1. Aggregation in using physical units

3.1.1. Calories

As agricultural products and foodstuffs are almost entirely products used for their nutrient content as animal or human food, it is natural to consider the principal nutrients,

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(1) Besch, M. and Wöhlken, E., "Zielsetzung, Aussagemöglichkeiten und Aussagegrenzen von mengen- und wertmässigen Gesamtrechnungen" (Purposes, significance and limitations of aggregation in terms of quantity and value), EUROSTAT, Agrarstatistische Studien 16, 1974, p. 3.

carbohydrates, protein and fats, and their aggregation in terms of their physiological thermal content (calories). This yields figures for the thermal value of nutrients in the human body of: 1 g carbohydrate = 4.1.cal; 1 g protein = 4.1 kcal; and 1 g pure fat = 9.3 kcal; this in turn gives a ratio of 1:1:c. 2.3. The calorific content as a common measure for the various nutrients contained in the products is, admittedly, only one particular aspect. A summary of food consumption (regionally and average per capita and daily consumption) should not just show the content in calories, but also show the individual main nutrients, and also the content of minerals, vitamins etc. These various characteristics cannot be brought together in one figure.

It must also be noted that, while the supply balance sheets give figures for quantities available for human consumption virtually at the wholesale level, the tables on nutrient content of foodstuffs and calories per unit of quantity (food composition tables) further take account of losses and inedible quantities on the way to the household. The calculated values show calories and principal nutrients in the foodstuffs available for human consumption at the "kitchen-level", i.e. including food wasted and scraps given to pets.[1]

For the purposes of analysing the amount and structure ("dietary pattern") of food consumption over time, the lack of some scientific or economic basis for a method of

(1) FAO, Monethly Bulletin of Agricultural Economy, vol. 24, no 4 and 7/8 (April and July/August 1976), pp. 1 and 37 (Special feature "Food supply: calories, proteins, fat per cap. per day, 1961-5 and 1970-5).

evaluating the special role of the protein content vis-a-vis the energy content can only be met by separate sub-totals (products of vegetable and of animal origin, product groups of economic or nutritional importance - sources of carbohydrate, of protein, of fats, of vitamins and other nutrients - etc). Proteins from vegetable and animal sources, for example, do have the same calorific content, but their bioavailability and the physical input involved in obtaining them are different, to say nothing of their cost.

In order to take account of the different physical inputs required to produce foodstuffs of animal origin, consumption of such products is often not shown in calories consumed or in secondary calories, but in calories equivalent to the input of fodder required for the production of these products, the "primary calorific value". Each secondary calory in foodstuffs of animal origin requires roughly five primary calories. The rising proportion of foodstuffs of animal origin in total consumption involves an increase in the primary calory requirement (the output of the soil) and serves simultaneously as an indicator of the standard of living.

An example of a summary balance sheet in terms of secondary and primary calories is a publication of the Dutch Ministry of Agriculture and Fisheries for the Netherlands 1970/71.[1] This is in the form of a flow diagram, and shows on the

(1) "Herkomst en bestemming van in Nederland geproduceerde en geimporteerde landbouwprodukten in 1970/71, gemeten in biljoenen Kcalorieen" (Sources and uses of agricultural products of domestic and foreign origin in the Netherlands in 1970/71, measured in billion kilocalories), Statistische Informatie van het Directoraat-Generaal voor de Landbouw en de Voedselvoorziening (no date of publication).

left-hand side the sources (domestic output of the soil and imports). Animal farming is shown apart in the diagram, as a secondary flow. Uses distinguishes, from left to right, the input from domestic crops and imports for animal farming and the output of products of animal origin, with end-uses of soil production, food imports, and animal products as food, non-food industrial uses (incl. beer and alcohol) and exports. The figures on which the diagram is based are shown in the table below:

Netherlands:
Sources and uses of agricultural products, domestic and imported, 1970/71 (in billion kcals, 1 billion = 10^{12})

Uses	soil production	imports	total	animal production	grand total
Seed, eggs for hatching	0.44	.-	0.44		0.44
fodder	27.15	26.14	53.29	1.33	54.62
exports	4.79	14.29	19.08	4.45	23.53
industry	2.99	0.70	3.69	0.44	4.13
food	4.60	7.74	12.34	4.18	16.52
total	39.97	48.87	88.84	10.40	99.24
of wh. total final use	12.38	22.73	35.11	9.07	44.18

According to these figures, an output of 10.40 billion kilocalories of animal products required 54.62 billion kilocalories of fodder, i.e. ca. 5.25 primary calories for each secondary calory; conversely, the "yield" of secondary calories was ca 19 per cent of the primary calory input.

The figures show uses of separate sources (domestic production and imports), and also the great importance (in calories) of domestic and imported fodder, and the importance of reexports of imported products after processing or in their original state.

3.1.2. Starch units and feed units as common denominators

These units were originally conceived in the context of the fodder economy on the individual farm, and are still used in this context. The extension of their use to the national agricultural accounts makes it possible to derive figures for agricultural products in terms of net energy content (e.g. in starch units) or to find ratios of feedstuffs' nutrient value in terms of some cereal (e.g. barley). The feed unit used in Scandinavia and the one under discussion within the EEC have the same basic principle.

This evaluation (weighting) of products in terms of their net energy content still, however, takes no account of the economic costs (extent and combination of labour and capital inputs for the various products) - a point already referred to in the section on evaluation in terms of calories.

The calorific content method allows unifications of the previously separated calculations for human and animal nutrition, as one starch unit corresponds to approximately 4.1 kcals. Such calculations have a certain validity for international comparisons of countries in differing stages of development, if used carefully, as a considerable part of agricultural production is, after all, usable either as fodder or for human consumption. Change in the emphasis on agricultural products and uses between vegetable and animal products leading to a change in diet is not only important at times of short supply, but also where consumer income is growing

only slowly. In spite of all the objections, this sort of "natural basis for calculation" can still have more meaning than imputed monetary values in countries where production and uses fall largely outside the organised markets, and where no assessment in terms of prices is therefore possible (subsistence agriculture).

3.1.3. Grain equivalents as common denominator

The grain equivalent used in the Federal Republic of Germany, now known as the grain unit (Getreideeinheit) is also based on the physiological energy content of the main nutrients. The unit is also based on a ratio of the form protein: carbohydrate: fats, with values of roughly 1:1:2.4.

The original conversion table, developed by Professor Woermann in 1944, was used until the mid-Sixties with some alterations and supplementation: it sought to take account of the particular significance of protein by multiplying its energy content by a factor of 2.5. The resulting value for individual products was then expressed as a ratio to the value of an average unit of grain (set at 1).

The decisive feature was the inclusion of animal as well as vegetable products, where the animal products were shown in terms of their particular feedstuff requirements (replacement value), in grain units.

The revision of the conversion table in 1970 had become badly necessary.[1] To begin with, the feed requirements per unit of

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(1) cf details in "Bericht über die Ueberarbeitung des Getreideeinheitenschlüssels in der BR Deutschland (Report on revisions to the conversion tables for grain equivalent values in FR Germany) by Prof. Woermann and Dr Padberg, EUROSTAT (Committee on Agricultural Statistics, Working Party "Supply balance sheets") doc. F/V/266, Luxembourg, November 1972.

output of animal products were established at a particular point in the development of animal husbandry and feeding on the one hand and the relative importance of the individual lines of animal production nationally on the other. Technological advances (including more intensive use of manufactured mixed feeds which have been specially produced for specific purposes), and also shifts in lines of production (e.g. towards pigs with less fat, to improved methods of fattening young bulls and broilers, battery farming for egg production) have led to reductions in the quantity of feed needed per unit of output of animal products. This has all been taken account of in the revised conversion tables.

In the course of revision the multiplier applied to proteins has also been dropped, so that vegetable products and feedstuffs of animal origin are assessed in terms of their net energy content, expressed in starch units, related to the net energy content of average grain.

It is important to remember that certain assumptions have to be made when aggregating products of vegetable and animal origin on the basis of the feed requirements of the latter (replacement value) in cases where different products are simultaneously produced (meat and milk; meat, milk and wool; meat and eggs); the assumptions are working hypotheses needed for allocating the total input of feed among the products (cf the report mentioned above, also Lange, op. cit.).

The report bears out this author's experience that the presentation in terms of grain equivalent has proved a suitable and useful tool in aggregating agricultural final output (gross and net, i.e. after deducting production of animal products from imported feedstuffs) and in the feed

balance sheets.

The objections against the use of grain equivalent - especially after the special multiplier for proteins was dropped - are basically the same as against the use of calories, starch units or feed units: all these are only concerned with physiological transformations and show only the technical physical relationships involved, which do not necessarily reflect the economic price and cost relationships involved. The grain equivalent can, however, still be used to illuminate the relationships in the physiological, physical and production dimensions between the output and uses of vegetable products, and to demonstrate the role of animal husbandry and the relative magnitude of the factors involved in producing "final output".

The use of grain equivalent, or another feed unit based on the same principles, which links animal and vegetable products by the feed requirements of the former and hence makes it possible to add the totals, gives rise to special problems in aggregating the quantity figures in the supply balance sheets for individual products and product groups. These balance sheets are either drawn up in terms of agricultural basic products, such as grain, rice, pulses, potatoes, vegetables, fruit, eggs, or in terms of products at the first or second stage of processing, such as sugar, vegetable oils and fats, meat shown as carcase weight, and milk products with varying solids content and varying milk fat and milk protein content. While application of the grains equivalent conversion tables involves no technical problems in the case of the balance sheets for agricultural basic products, appropriate conversion factors have to be calculated for products at later stages of processing. By using technological coefficients, the basic products are dissolved into the various components (e.g. grain are divided between

flour and bran, sugarbeet between white sugar, molasses and beetpulp), the amount going to fodder is converted with the help of the grain equivalent tables and finally subtracted from the total value for the basic product. In this way, grain equivalent values are derived for, e.g. flour, white sugar, vegetable oils and fats. For meat in carcass weight, including edible offal and fats from offal, the total grain equivalent for the live weight was assigned to this meat. This is because it is assumed that other carcass products (hides, bones, non-edible offal etc.) have a grain equivalent of zero. A similar method is adopted for milk products. The derivation of the grain equivalents for processed products is given in EUROSTAT publications: G. Bantzer[1] provides a detailed explanation of the earlier conversion tables, and H. Besch and E. Wöhlken[2] refer briefly to the post-1970 revised tables.

The "derived" grain equivalents for processed products are, like the "original" conversion factors for agricultural basic products, based on physiological relationships, transformation and technical production factors, and are quite independent of economic costs or supply and demand conditions. The same applies for joint products (meat and slaughter fats, fat and protein of milk etc.) where the conversion factors for these elements are parts of the physiological and technical relationships, and not on an economic basis (in price terms).

The aim of the grain unit approach is to cover the whole range of agricultural production and uses. The products can be grouped as follows:

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(1) Bantzer, G. Studie der methodischen Probleme bei der Aufstellung von Gesamtrechnungen über die Versorgungslage in der EWG mit landwirtschaftlichen Erzeugnissen (A study of the methodological problems of aggregation in determining the supply of agricultural products to the EEC), EUROSTAT, Luxembourg 1970 (duplicated), pp 6 et seq. and supplementary tables 55-76.

(2) Besch, H. and Wöhlken, E., op. cit. pp 25 et seq.

1. vegetable products which are converted on the basis of their net energy content (marketed crops which can be used either for food or as fodder, marketed processing products for fodder, and non-marketed fodder);
2. feedstuffs of animal origin, which are converted on the basis of their net energy content rather than the replacement value[1];
3. products of animal origin, converted on the basis of the feedstuffs required for their production, expressed in net energy content (starch units) (replacement value);
4. vegetable products which are not measurable in terms of their net energy content, such as wine, tobacco, hops, fibres, seeds, flowers, ornamental plants and nursery products. These are covered via comparable crops (crops in the same region having similar requirements) and the working hypothesis used was that these crops have the same yield per hectare in grain units.

This last group is the principle ground for criticism of the use of the grain unit. Although it only takes up a small fraction of the agricultural land under cultivation, it nevertheless has a far greater significance in agricultural production as a whole in value terms, expecially if wine is included. An attempt to assess the importance in approximate terms of this group's final output in the final agricultural output of the member countries for 1973 yields figures between 4 and 16 per cent, and for the EC-8 (excluding the Irish Republic) of just 12 per cent, assuming that the heading "other vegetable products" in the national agricultural accounts is largely accounted for (apart from seed) by products such as flowers and ornamental shrubs. These "non-edible garden products" must also be a

(1) For example whole milk from cows has a feed value of ca 0.24 (net energy content), but a replacement value of 0.8 grain units.

particular area of uncertainty in the value accounts. The element of uncertainty in the quantity figures affects the "physical" and "monetary" accounts here equally, but the difficulties of aggregation in terms of price are particularly severe with this very heterogenous product group, and the total figures for value used are not very dependable, where they have been estimated by other means.

The author has gone into methods of aggregation based on physical units in some detail because of his impression that Besch and Wöhlken were unduly harsh in their criticisms of these methods in their study (op. cit.) while regarding the problems of monetary aggregation (especially in inter-regional comparisons) as relatively less important[1]).

The advantages and disadvantages of using the grain equivalents or similar "feed units" which enable us to add animal and vegetable products on some common basis will be discussed after an examination of the use of monetary units.

3.2. Aggregation in using monetary units

3.2.1. Volume figures at constant prices

The use of prices (or prices relatives) as an economic common denominator is so widely accepted for monetary and market economies that it apparently requires no further justification,

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(1) in this context see also

Hix, H. and Lohmann, B. "Produktion und Wertschöpfung der Landwirtschaft in der Bundesrepublik" (Abschnitt: Zur Anwendbarkeit des Getreideeinheitenschlüssels) (Production and value added in agriculture in the Federal Republic of Germany - section on the applicability of the grain equivalents), in "Agrarwirtschaft", Zeitschrift für Betriebswirtschaft, Marktforschung und Agrarpolitik, Hannover, vol 3, 1975, p. 61.

and seems indeed proof against all criticism. Precisely for this reason some remarks seem called for.

The advantage of this procedure is supposed to be that the value of goods and services is determined by the mechanism of supply and demand in a market, in the course of which all the relevant aspects for demand are simultaneously taken account of. This is contrasted to the other measures based on physiological considerations (calories, starch units, grain units etc) which are determined by technical relationships of production, and not by demand.

This is certainly true in theory. The argument is, however, restricted in its validity to products and services which are subject to this market mechanism for price determination, which have a market price. A significant proportion of agricultural production, above all vegetable products, consists of products which do not generally pass through a market, which are used directly on the farm where grown or as fodder within the agricultural sector. Valuation in terms of prices here would be difficult, to say the least, as this is not merely a case of setting an imputed price for one product but rather of an entire system of such imputed prices. In this case a system of aggregation based on nutritional standards is certainly more satisfactory for the purposes of showing the relationships between the output of the soil, feed, agricultural final output and net production (excluding imported feed).

Price determination for goods and services by a market mechanism is, particularly in the case of agricultural products, not simply a free market operation, but is widely influenced by restrictions of competition and official market regulation and pricing policies. In com-

parisons between countries and regions, the various national foreign exchange policies will further distort the relations of prices and total values. These government (or Community) interventions are aimed at changing price relationships for political ends, or even at changing prices of ingredients (as, for example, milk fats and milk protein prices, which then yield the desired relationships between prices of milk and milk products). Admittedly these effects of the Community policy on agricultural prices affect all member countries to roughly the same extent; they should, however, not be ignored or underestimated in assessing the advantages and disadvantages of monetary and physical aggregation systems.

Undisputed is the use of monetary measures for aggregates which are intended to show economic relationships with other sectors or to determine e.g. amounts of incomes. Such uses naturally also include sector accounts drawn up within the framework of integrated economic accounts.

To a great extent, time series of monetary values for agriculture and the food industry are not primary statistics directly collected as such, as is the case in other economic sectors, but must be derived by combining data on quantities and prices. The wide range of quantity data makes this largely possible, where price data are available and match the quantity figures. An important example of this is the calculation of the value of production for the national agricultural accounts in current prices (and at current exchange rates). In a similar way, calculation of volume figures at constant price relatives for some base period can be performed directly in many cases, and not - as in the case of statistics directly collected in value terms -

through the (not entirely problem-free) process of deflating by (Paasche) price index. Estimates are required for major gaps, both at current and constant prices (volume figures), where no figures are available for quantities and/or prices (unit values).

The supply balance sheets for agricultural and food industry products show quantity figures. "Global" balance sheets involve conversion of processed products via technical production coefficients to a joint basis with the basic products to give a common unit for these balance sheets. The balance sheets show the uses in some common unit, although the actual goods pass through various stages of processing and marketing before reaching the consumer. The character of products covered by a balance sheet changes differently according to the differing inputs of materials and services. Aggregation of the heterogenous quantities of the individual balance sheets into a total balance (regional, and for the Community as a whole) should in principle be carried out on a quantity basis, even where prices or price relatives are used to build up the volume figures. Given the nature of the supply balance sheets, only a presentation in volume terms is possible.

Aggregation of quantities of non-homogeneous products and product groups on a monetary basis (using constant prices or price-relations of some base period) yields "volume" figures which should be regarded as "surrogate of quantities".[1] Changes in "volume" and quantity terms need not necessarily be identical: they diverge "where the groups in the aggregate are subject to diverging changes prices".[2] The

(1) cf. Koester, op. cit. p. 24

(2) op. cit., p. 73

different changes in quantities represent a structural effect. The changes in volume similarly include an element of quality, which gains in importance as more groups are added into the final total. Thus, the volume changes vary in the subtotals for e.g. grain, meat, or milk and milk products, according as a) the quantities involved are weighted by the average base weights for the group as a whole, or

b) the separate products (wheat, barley, types of meat or milk product) are weighted by their respective average base weights.

Structural changes and changes in the quality of components within the selected smallest unit of the individual product or product group, are not shown by volume figures with monetary weighting. These assume that the quality composition does not change over time, and that it is adequately reflected in the price weightings of the base period.

Volume figures are subject to the same restrictions as price indices. A price index of the Laspeyres form involves using a fixed "basket of goods", or quantitative ratios of the base period, for the entire period covered, and this although not only the prices but also the quantities (quantitative ratios) involved alter through time. Volume figures and indices of the Laspeyres type hold the prices (price relatives) constant throughout, although these alter just like the quantities and ratios of quantities concerned through time.

In the course of time both volume and price indices of this type are subject to distortions which increase as the base period recedes in time. Both indices must be rebased from time to time. With longer time series, this leads to problems of linking. When series with different bases are linked, it often proves the case that Laspeyres indices with more recent

weighting systems (prices or quantities) give smaller rates of change than those based on the old weights. Weinreich[1] for example shows in his introduction to the new agricultural price indices for the Federal Republic of Germany how the indices for producer prices on the price basis 1970 rose between 5 and 6 per cent less than the indices on the old bases (1961/2 - 62/3 and 1962/3 respectively) over the period 1968-1975. This fact seems to cause the price statistician no surprise at all.

Basically similar conclusions arise from the following comparisons of volume indices (see table 6) of agricultural "final output" at 1963 and 1970 prices and exchange rates for 5 and (partly) 6 of the members of the original EEC.

Table 6

Agricultural final output: volume indices
(1963 and 1970 prices and exchange rates, calculated for the EEC)

	at prices and exch. rates				at prices and exch. rates			
	1963		1970		1963		1970	
	1963 = 100				1963 = 100			
	1970	1972	1970	1972	1970	1972	1970	1972
FR Ger.	121.2	126.5	119.0	122.3	82.5	104.3	84.0	102.7
France	123.3	129.4	119.9	126.4	81.1	105.0	83.4	105.1
Italy	125.4	121.7	123.5	119.6	79.8	97.0	81.0	96.9
N'lands	142.5	154.0	141.5	152.2	70.2	108.1	70.7	107.6
Lux.	103.8	103.8	104.8	104.8	96.4	100.0	95.4	100.0
Total (5)	124.7	128.2	123.9	126.8	80.2	102.8	80.7	102.4
Belgium	133.4	143.1	.[1]	.[1]	75.0	107.3	.[1]	106.6
EUR-6	125.1	128.9	.	.	80.0	103.0	.	102.6

1) not available back to 1963
Sources: calculations from EUROSTAT, Agricultural Statistics series "Agricultural economic accounts", 1974, vol. 4 and 1973, vol. 5

(1) Weinreich, op. cit., p. 92 and p. 95

In this example too the series with the more recent base period show lower growth rates. It is not possible to extend the comparison past 1972 as the old figures based on 1963 were only published up to provisional figures for 1972, when the new series based on 1970 was produced, with backdated figures. The table hides the great difficulties involved in comparisons over a longer period within the EEC, caused by the constant revisions and methodological changes in national figures.

The brief comments above show clearly the extent to which the aggregation of quantities into "volume" data by monetary methods leads to "surrogates of quantities", and how the results depend on the degree of disaggregation of the product data, the relative changes in the quantities, the choice of the base period, and differences in the price weights of individual quantity series. All this applies already to figures at the national level. International figures covering different currencies involve further problems which will be dealt with below.

The quantity data in the balance sheets are either shown in terms of agricultural basic products (e.g. cereals, husked rice, fruit, vegetables, potatoes, eggs, animals for slaughter in live weight) or of products at the first stages of processing; the prices used should therefore correspond as far as possible to the producer stage or the processing stage concerned. The available price data include:
- prices as such, as defined in the statistics of prices, and
- unit values (average values of sales per unit quantity).

3.2.2. Prices as such

Official price statistics are largely produced with a view to the requirements of preparing price indices; these are aimed at showing movements in prices alone in terms of relative changes. This is only possible where the element of price can be isolated from all other conditions of sale, which must then be held constant. Such conditions include specifications of quality, the marketing stage, place of transaction (parity), and other conditions. Price changes caused by alterations in these conditions are "false" price changes. Since price indices are intended to show relative changes over time, it is sufficient to have a carefully selected sample of price series for products of precisely determined quality and other conditions of trade. The inclusion of a price series depends on:

- the size of turnover
- its suitability as a representative price for the development of prices of other products not covered, and
- its suitability as a representative price which is expected to provide comparable information on prices over a longer period.[1]

In practical terms this involves the assumption that the prices of other qualities of the same product, and of the same quality of product in other places will show similar changes, because of the interrelationships in the national markets to begin with.

Merely to show relative changes in price aggregates through price indices is not enough for many purposes which require

(1) Weinreich, op. cit.

information on the absolute prices. A part of the constantly increasing demands on official price data is contributed by the need for reliable information to compare absolute price levels on a regional basis. The Federal Statistical Office has expressed the opinion that this would require other methods of collecting data, massive increases in the number of individual prices reported by each collection point, and a considerable increase in the number of collection points themselves; all this, it is felt, is not likely (on cost grounds) to be realised in the foreseeable future.[1,2]

As the Community work involves not only comparisons of national time series, but also interregional comparisons, much depends on the results of efforts to harmonise the price statistics in the Community, particularly since price policies are the main method of market regulation.

The appropriate price data for linking quantity data from the supply balance sheets or data in quantity terms on agricultural final output with prices are unit values.

3.2.3. Unit values

As has been frequently emphasised, time series in value terms of agricultural statistics very often involve derivation from other data. The extensive and detailed quantity data is a good basis for this. As this quantity data cover all qualities

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(1) cf EUROSTAT, "Einkaufspreise der Landwirtschaft" (Agricultural purchase prices), Agricultural statistics 3/1976, p. VI, for the quote.

(2) "Gegenwarts- und Zukunftsaufgaben der amtlichen Statistik" (Present and future tasks of the official statistics), Statistisches Bundesamt, Wiesbaden, pp. 27 et seq., p. 48.

of product and varying conditions of trade, mostly with no information on changes over time in composition (tel quel), it is not possible to use a price for a standard quality and assign this to the quantity data; instead a system of average prices per unit quantity (unit values) is used. These would, for example, correspond to the division of the value of sales (proceeds) by the quantities sold, but also to unit values in foreign trade statistics or in expenditure data on private households etc. The unit values express price movements as well as changes in the mix of qualities and varieties. EUROSTAT notes: "changes in unit values show not only the pure price movements (as shown in the price statistics), but also all other possible variations in the factors determining price (with the exception of quantity)" and goes on, "the term unit value should always be used where there are changes in the composition of the goods (changes in quality or variety) between two reference points and/or in the factors determining price (with the exception of quantity). As the unit values reflect all these changes, they are much more closely linked with reality than a simple price series."[1]

Unit values are particularly suitable for monetary aggregation procedures in the Community which must take account of possible differences of quality and composition between products and product groups in different member states. Examples here are the individual varieties of cereals, animals for slaughter (weighted average of different types and commercial classifications or qualities and markets), sub-categories of vegetables, fruits, and non-edible garden products.

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(1) "Durchschnittserlöse" - valeurs unitaires (unit values) 1963 - 1970. Special issue 12 of "Agrarstatistischen Hausmitteilungen", December 1971, EUROSTAT - Agricultural statistics - pp. 7 et seq.

Agricultural unit values (ex farm) for agricultural products are required for the purposes of the agricultural economic accounts (or should be used there) and are published with these by EUROSTAT. In the first issue referred to above EUROSTAT pointed out that problems with comparability (i.a. differences in treatment of taxes on production, indirect taxes and subsidies) meant that comparisons should be restricted to intertemporal ones. Although some gaps may well have been filled since the first publication in 1971 covering the years 1963-1970, others have arisen and data for the new member states is not available; the problems of comparability seem accordingly as great as ever.

Unit values should be included in the work on harmonising price statistics. It would be useful to have a comparative exposition of the methods used in the member states to derive these unit values: EUROSTAT (op. cit.) merely says, "unit values are mostly derived by dividing value of sales by quantities sold" (p. 8, sections 2 and 4), which tells us nothing about the derivation of the national figures on sales value and quantities themselves, the very things we are seeking to evaluate. From the point of view of the users of the statistics, it would also be helpful to have available consolidated longer time series for unit values.

The coordinated and largely harmonised quantity data in the supply balance sheets would have to be supplemented by equivalent price data (preferably unit values) comparable for all member states, with which interregional comparisons and calculations could be drawn up.

In their study Besch and Wöhlken cite "Indadequacies in EEC producer price statistics" (p. 35) as a complicating factor for the use of monetary weighting systems, and go on to say,

"an essential prerequisite is the existence of detailed and reliable price data at the producer level in agriculture" (p. 44).

3.2.4. Conversion to a common currency

It is generally necessary when summarising value figures expressed in different currencies to convert these to a common currency or unit of account. This is the principal source of statistical difficulties for the Community where aggregation of monetary figures is involved. By comparison the methodological problems involved in aggregation at a national level are relatively simple.

EUROSTAT originally used for conversion into units of account the parities given by the IMF; from 21.12.71 (Washington agreement) the nominal rates laid down, and from 1975 retroactive average exchange rates for the individually floating currencies (£ from 23.6.72, Lira from 14.2.73, US $ from 19.3.73, FF from 21.1.70-9.7.75 and from 15.3.76) have been used. The EUROSTAT publications on national agricultural accounts (e.g. "Agricultural statistics", 3/1975, p. XIII, footnote NB, and in recent issues of the "Yearbook of agricultural statistics, p. 43) have pointed out, "The well-known fact should be borne in mind here that conversion into a common currency basis using exchange rates is known to be very problematic, as these rates do not necessarily (indeed, very rarely) reflect the relative domestic purchasing powers of the currencies. The presentation in a common currency of data for different countries does not provide a precise (sometimes a very rough) measure of the real difference of levels between countries. A better basis for comparison would be possible, if purchasing power parities were available."

Exchange rates become relevant first for trade across frontiers in goods, services and capital. The supply and demand conditions at home and abroad, and the relative importance of foreign trade with individual products will determine the effects on the prevailing domestic and foreign price level and relative price changes occurring in the course of the adjustment process. Costs and prices of individual products will be influenced differently by changes in exchange rates. The general economic conditions which produce such changes in rates of exchange need not affect all sectors of the economy in the same way. Also domestic dimensions (value figures at current prices, or volume figures at constant prices for agricultural production or for domestic uses of agricultural products) do not immediately respond in a simple proportional fashion to exchange rate alterations, even in interregional comparisons.

The use of the unit of account in implementing Community agricultural pricing policies was intended to produce certain effects which differ from the "normal" adjustment mechanisms involved in exchange rate alterations in that these were to affect only the country changing its exchange rate. The automatic, instant adjustment of common fixed prices expressed in the national currency concerned which was intended to follow currency changes was never realised in its pure form. The adjustment in terms of the national currency was always delayed. In the event of devaluation, the automatic increase of prices in terms of the national currency was stretched over time and only approached in stages; this was done to avoid the undesirable economic consequences of increases in consumer prices. In the event of revaluation, the automatic fall in prices and hence proceeds in terms of the national currency would have had the effect of unjustly penalising agricultural incomes in

a situation where the general price and cost level was only slowly adjusting to the new rate.

The delay in the price adjustment process in terms of the national currency or its effects on agricultural incomes was first of all met by the introduction of equalisation payments, then by currency conversion or "marginal adjustment" schemes. These involve use of special "representative conversion rates" for the individual member states in translating the regulated market prices expressed in units of account into prices in terms of the national currencies (the so-called "green parities").

This produces not only a sectoral splitting of exchange rates, but also on occasion a further splitting within the agricultural sector, depending on whether "positive" adjustments are made for agricultural products (in countries revaluing) or "negative" adjustments (in devaluing countries) or whether agricultural products are unaffected by these special provisions. The effect of the adjustments varies for the individual products, and depends on the current relationship of market price and intervention price in the importing and exporting countries, and their mutual relationship.[1] The system of nationally uniform management of the size of the adjustment leads to distortions in the terms of trade for individual products.

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(1) see here: Schöpe, M. - "Auswirkung von Wechselkursänderungen, Währungsausgleich und unterschiedlichen Preissteigerungsraten auf die Wettbewerbsposition einzelner EG-Länder im Agrarbereich" (The effects of exchange rate alterations, currency equalisation methods and differing rates of price increase on the competitive position of individual EEC countries in agriculture) Ifo-Studien zur Agrarwirtschaft Nr. 15, Ifo-Institut für Wirtschaftsforschung, Munich, 1976.

This gives rise to the question whether EUROSTAT is right to continue with its methods for producing price statistics on agricultural products, where national prices in the different currencies are converted into units of account. For those products whose regulated price is fixed in units of account (or whose prices are affected by cereal prices - eggs, poultry meat), the conversion into national currencies is at the "green parities" and these diverge from the normal exchange rates. The "positive" equalisation system in areas whose currency tends to drift upwards produces a price level for products subject to regulated prices which is above the level given by application of the normal exchange parities. Conversely, in areas where the currency tends to fall in value, the "negative" adjustments tend to produce a domestic price level which is below that given by the normal exchange rate. Conversion of these prices in national currencies back into units of account by normal exchange rates rather than the "green parity" rates would therefore tend to produce an overestimate of prices in revaluation countries and an underestimate in devaluation countries. The question is accordingly whether this conversion of regulated products' prices into units of account reflects correctly the relative price levels. Where equalisation charges vary in different ways over the course of time, it is also open to query whether the relative changes in prices over time are "correctly" shown by this method.

The above comments on the problem posed by floating currencies through their effect on the special conditions for agricultural products arising from the Community system of administered prices are only a brief summary of the subject, and make no claim to completeness in respect of the theoretical considerations underlying these effects or of the empirical description of these. The remarks should serve to make clear that the relationship

between rates of inflation, exchange rates and purchasing power parities is, at least in the short run in periods of rapidly changing exchange rates, not close enough for aggregation of quantities in a given sector using monetary weights for different currency areas to be an obvious solution, free of problems. Even though the statisticians have no better method for comparing and aggregating sectoral totals expressed in different currencies than the method of converting into a common currency using official exchange rates, we should remain aware of the problems in such comparisons and not take these value figures and their relationships to be the absolute truth.

This applies not only to conversion at current prices and exchange rates, but also to volume calculations where the quantities are weighted at constant prices and exchange rates of a base period. The aim of converting value totals from member states (in terms of the national currency at current prices or constant prices) with current exchange rates or rates at some base period to give a total for the EEC is not simple to obtain this total for its own sake, but also to establish the share of the member countries in the EEC total concerned. These shares will naturally be affected by the prevailing currency cross-rates. In the case of volume figures at constant prices it is the relative exchange parities prevailing in the base period which influence the relative shares of the member countries in the total, even though this effect remains constant over time. There may well be good reason to assume that, at the time of the selected base period (currently 1970 for volume figures and price indices) the relative parities and prices were more or less "normal"; this does not affect the fundamental difficulties and reservations. The problems will become obvious when a new base period has to be chosen, for

example 1976.

M. Besch and E. Wöhlken express a different opinion in their study (EUROSTAT: Studies in agricultural statistics 16/1974) p. 44). For them the changes in EEC countries' exchange rates should be seen in the context of differing rates of inflation, and are to a large extent a reflection of changes in purchasing power parities. Thus they regard incorporation of these in aggregation of quantity figures from different currency areas as entirely legitimate: the country share would be revised following an exchange rate alteration to correspond largely with the change in purchasing power. This argument may well hold for a one-off change in exchange rates, seen over the long term when the adjustment processes have reached a new equilibrium; in the shorter run, and where currencies have been shifting constantly as they have in recent years, it is not possible to assume simply that (as we have already said above) changes in sectoral purchasing power will relate directly to shortterm shifts in exchange rates.

There is no question of the theoretical advantages of monetary weighting systems (prices or price relatives) in aggregating incommensurable quantities for economic study; this is true at any rate for aggregation within a currency zone. Inter-regional aggregation of incommensurable quantities from different currency zones (the statistical problem current in the EEC) is subject even in times of quiet on the currency front to the warning by EUROSTAT quoted above in connection with the interpretation of figures derived from conversion by exchange rates. The practical difficulties arising from the still limited comparability and the various gaps in figures for "unit values", the limited prospect for generalization of price statistics (in the sense of the term as used for price-indices) and the continuing uncertainty in exchange rates, all these

indicate the need to use care when interpreting figures arrived at on a basis of monetary weighting systems - even despite the "relative advantages" of this method by comparison with figures based on physical weighting.

3.3. Comparison of aggregations of quantity figures using physical and monetary weighting systems

The advantages and disadvantages of physical and monetary weighting systems have already been discussed above. Here we propose to go into some more technical points using the specimen calculations from the EUROSTAT study by M. Besch and E. Wöhlken previously cited.

Two physical weighting systems (grain equivalents in the old and 1970 revised forms) and two monetary weighting systems (constant producer prices, as averages of the two periods covered) are used to aggregate the following quantity figures, which are also averages for the two periods:

1. production of foodstuffs (final output) using the Federal Republic of Germany as an example, as a step towards an index of agricultural production;

2. "usable production" and "domestic uses" (again in the Federal Republic of Germany), used to show:
   a) the movements of both series
   b) the aggregate degree of self-sufficiency;

3. "final output" in four member states (F.R. Germany, France, Italy, Belgium) used to construct indices of production.

Besch and Wöhlken have very carefully traced the growing disparity between figures based on producer prices and those

in grain equivalents. With rising income levels and wages and salaries, there is a widening gap between the producer prices of products which are labour-intensive and less amenable to technological progress and of products which are less labour-intensive and more suitable for technical innovations (e.g. potatoes, vegetables, beef, milk on one hand and cereals, poultry and eggs on the other). The grain equivalent basis (now solely related to the nutrients and feed equivalents for products of animal origin) takes no account of the supplementary services and material. As a result of the application of technical advances and of changes in emphasis in production the feedstuffs requirement per unit of output has fallen for many products of animal origin, while at the same time the relative prices have continued to increase or have only fallen relatively little (poultry, eggs).

Given this considerable disparity in the conversion methods used, it is astounding how slight the differences are in the figures in (1), (2a) and (3) (cf tables 8, 15 and 23 in Besch and Wöhlken, op. cit.). In the aggregation of a large number of individual items the divergence of the weighting systems and differences in quantity changes are largely offset by compensating effects. "As there is no strict relationship between physical and monetary values assigned to individual products and growth in production of these, we might expect a more or less random distribution of these characteristics over the individual agricultural products. Higher values for physical or monetary equivalents for specified products are offset by contrary movements in quantity, with the result that the volume indices based on physical or monetary methods of aggregation do not show significant differences" (Besch and Wöhlken, op. dit., p. 21).

One result of these random and largely compensatory effects in

aggregation of a large number of quantity data has been that, in the Federal Republic of Germany for example, calculation of indices of agricultural production or of the degree of self-sufficiency for all agricultural products has been carried out using physical weighting systems. This method allows the comparison of the overall relationships between "production of the soil" and its uses, feed balances, usable production and domestic uses in the supply balance sheets and final output of agriculture to be computed, so important for many considerations. The broad agreement between the results of the physical and monetary weighting systems, for the Federal Republic of Germany at least, was certainly not an adequate scientific argument, but it was sufficient for the needs of the practical work by the Federal Ministry for Food and Agriculture on overall evaluation of statistics. Even if the index of agricultural production or the degree of self-sufficiency were calculated using monetary weights, a procedure which (subject to the qualifications already mentioned) would be entirely proper, a parallel calculation in terms of physical units would be useful and relevant for consideration of the relationships mentioned.

Aggregation of non-homogeneous quantity figures using monetary weights also does not yield some unique "truth" or absolutely exact result: such is in any case not possible in economic and social statistics.[1] As with every index the result is dependent on choice of the base period, which is evident at every revision of the base period.

Unfortunately the calculations under (3) for agricultural final output for the four EC-countries (F.R. Germany, Italy, France and Belgium) were only done by Besch and Wöhlken for the countries

(1) Wagenführ, R. -Wirtschafts- und Sozialstatistik (Economic and social statistics) R. Haufe Verlag, Freiburg, 1970 and 1973, vol. 2, p. 63.

separately, without going into the problem of forming an aggregate for the whole Community. The grain equivalent was used throughout as a physical measure, and the monetary weights were national constant producer prices (unit values) converted into Eur (UA) for the two periods studied (1963 to 1966 and 1968 to 1970).

The fact that the calculations were only possible for four member states is yet another example of the constantly arising difficulties in obtaining all the quantity and price data required for all countries and periods in adequately comparable form.

Aggregation of non-homogeneous quantities at the national and interregional level (e.g. the Community) is aimed at keeping a quantity form for the calculations. In the method used, where quantity series are "weighted" using constant prices, the resulting volume figures are treated as quantity figures. Totals for the Community for a given product are obtained by adding national totals. The addition of national totals which are volume figures from quantities and constant national prices converted via exchange rates into UA (Eur) will only yield the same ratios as national and total quantity figures in cases where the national prices in UA are the same in the Community. This will never be the case. The different prices in UA (Eur) in the present state of integration of the agricultural market and of the harmonisation of the statistical systems not only reflects the regional differences in a completely integrated internal market and the prevailing composition in quality terms (tel quel); they are also affected to an unknown extent by other factors which have nothing to do with pure quantitative calculations.

One example of the recurrent methodological differences is in

agricultural national accounts and the derived unit values of the producer tel quel: in some cases the "producer price" contains VAT, in other not, to quote just one factor.

It therefore seems appropriate to use uniform (physical or monetary) weighting systems for member countries and the Community in volume calculations at the Community level.

International organisations such as the FAO or OECD try to avoid the difficulties of monetary weighting systems resulting from different currencies and changes in exchange rates by working with price relatives. The FAO, in its calculation for the index of agricultural production, uses regional weightings (e.g. for Europe) based on price relatives in terms of wheat ("wheat based price relatives"). The first stage is to calculate national price relatives (average producer prices or unit values) in relation to the national price of wheat; these national price relatives are then "weighted" by the current national production and then added up for the region as a whole. Division by the regional production then gives the regional weighted price relatives. The revised weights published in 1971 by the FAO are generally based on producer prices in 1961-65.[1] Agricultural products are therefore shown as multiples of the equivalent quantity of wheat. The resultant quantity figures for the products are accordingly volume figures in terms of "wheat equivalent". Such procedures are possible using

- national price relatives for a base period, based on wheat, and aggregation of "national wheat equivalents" for the individual countries to give regional figures, or

(1) cf FAO Production Yearbook 1975, vol. 29, pp 469 et seq.

- average regional price relatives for a base period, based on wheat, and applied uniformly to the individual countries and the region.

An objection which is constantly raised to this method of relating prices to one particular product (here wheat) is that distortions of pure market prices can be caused by differing national agricultural and price policies, with the complication that the reference product chosen (in this case wheat) is an important object for these policies.[1] The uniform use of regional coefficients weighted by national production, reduces the force of this objection, which would be further weakened in the case of the Community by the fact that relative agricultural prices are largely affected in the same way by a common agricultural and price policy.

In the case of the quantity figures in the supply balance sheets, quantities showed in one balance are treated as equivalent and additive, even between member countries. Where the differences in quality are too great (e.g. soft and hard wheat, new potatoes and ordinary potatoes, adult beef cattle and calves) the qualitatively different goods should be shown as separate products in their own balance sheet, as actually is done. Separate relatives of prices or unit values should accordingly be derived and used for these products. It would, for example, be relevant for the purposes of using unit values as price relatives to make a division in the agricultural national accounts e.g. of unit values in Italy for soft and hard wheat and for beef cattle and calves. In the case of aggregation of quantities within a balance sheet for an individual product or a product group or for the member countries and the Community as a whole, uniform

(1) cf e.g. Wagenführ, R. op. cit. vol. 1, p. 263

coefficients (physical units, prices, price relatives) should be used. Otherwise effects other than pure quantity effects will affect the totals.

The three following tables attempt to illustrate the effect of using different weighting systems. For the sake of comparability the data used by Besch and Wöhlken for the four EC member countries for quantities and prices are used in cases 1 and 2 described below; these are supplemented by our own calculations on the same basis (cases 3 to 6). These summarise the results of these authors for the four countries, which provide a proxy for the Community as a whole for the purposes of this methodological study. The following aggregates are compared for 1968-1970:

1. Grain equivalent (uniformly applied to all countries using the revised 1970 conversion coefficients);

2. national producer prices 1968-1970, converted at current rates to Eur/t;

3. weighted producer prices 1968-70 converted to Eur/t at current rates as an average of the four countries;

4. national price relatives 1968-70, based on wheat;

5. weighted price relatives 1968-70, based on wheat, as an average for the four countries;

6. FAO weighting coefficients for West Europe as used in the index of production ("wheat based price relatives", base period for prices 1961-65).

Table 7 shows the national price relatives based on 1968-70 (from Besch and Wöhlken, wheat = 100), the averages for the four countries using national production weights, and, for comparison, the FAO weights for West Europe (base period for prices 1961 - 65), and the grain equivalents. This shows again that the cereal equivalent gives higher values for cereal and sugarbeet than the price relatives, and lower values for all other products covered, particularly animals for slaughter and products of animal origin.

Table 8 shows figures for agricultural final output for 1968 - 70 as index numbers based on 1963-66. The differences of the indices for the different weightings are surprisingly small, with only the volume figures for vegetable products in grain equivalents showing rather faster growth.

Table 7

Price relatives for average producer prices (unit values) 1963/66 and 1968/70, based on wheat = 100

	F.R. Germany		France		Italy[1]		Belgium		Total of 4 countries[3]	FAO wheat price relatives		grain equivalents	
	1963-1966	1968-1970	1963-1966	1968-1970	1963-1966	1968-1970	1963-1966	1968-1970	1968-1970	1952-1956	1961-1965	Old coefficients	New
Wheat	100	100	100	100	100	100	100	100	100	100	100	1.00	1.00
Rye	91	93	87	91	85	86	80	87	93	90	89	1.00	1.00
Barley	97	93	81	87	72	87	84	88	89	85	87	1.00	1.00
Oats	91	97	78	84	70	83	78	84	89	75	80	1.00	1.00
Maize	.	95	101	94	70	85	-	-	92	80	79	1.00	1.00
Grain average	96	97	95	95	96	97	97	97	97	.	.	1.00	1.00
Husked rice	-	-	166	150	112	126	-	-	129	100	98	1.00	1.00
Potatoes	37	43	46	48	53	67	35	36	49	33	45[2]	0.25	0.20
Sugarbeet	18	18	16	18	25	16	17	17	17	.	12[2]	0.25	0.25
Tobacco	1145	1596	1435	1502	829	942	618	778	1172	.	996	2.50	2.00
Wine	241	277	167	203	105	139	-	-	175	85	106	1.50	1.00
Beef and veal animals	603	667	665	724	568	673	572	676	694	415	552	6.00	5.20
Pigs	602	649	841	757	561	652	628	667	678	585	609	5.00	4.20
Milk	93	103	105	104	93	108	99	100	104	80	93	0.70	0.80
Eggs	776	726	733	630	651	648	571	532	662	815	778	5.00	4.20

(1) For wheat average price of soft and hard wheat. The price for soft wheat alone would be c. 95 per cent of the average price. Relative prices in terms of soft wheat would be about 5 per cent higher.

(2) estimate

(3) National price relatives weighted by national output and totals divided by total output of 4 countries.

Sources compiled from Besch and Wöhlken, op. cit., FAO Production yearbook 1975, pp. 470 et seq. and author's calculations.

Table 8

Index-numbers of agricultural final output for different weighting systems for 4 EC-countries, 1968-70 on 1963-66 (= 100).

	Aggregation by					
	Grain equivalents	Producer prices 1968-70 (unit values)				FAO price relatives
		national prices in UA/t	weighted average 4 countries	national wheat equivalents	wheat equivalent wghtd.	
	(1)	(2)	(3)	(4)	(5)	(6)
			F.R. Germany			
All products	112.8	112.7	112.8	113.1	112.8	113.1
vegetable	111.2	109.3	108.1	109.8	108.6	108.1
animal	113.2	113.5	113.8	113.8	113.7	114.1
			France			
All products	118.8	114.7	115.2	114.8	115.5	116.2
vegetable	129.6	121.4	121.8	120.7	122.4	124.7
animal	111.8	111.0	111.6	111.4	111.6	111.8
			Italy			
All products	114.4	114.2	114.4	114.3	114.1	114.2
vegetable	109.2	108.4	108.6	108.3	108.6	108.4
animal	121.2	121.2	121.6	121.1	121.4	120.7
			Belgium			
All products	120.1	121.5	121.1	121.2	121.0	121.1
vegetable	116.7	110.4	109.4	110.0	108.9	105.9
animal	121.1	123.8	123.6	123.5	123.7	124.6
			All four countries			
All products	116.0	114.3	114.3	114.4	114.6	115.0
vegetable	118.5	113.7	113.7	114.1	114.3	115.0
animal	114.5	114.6	114.6	114.6	114.8	115.0

Sources: Besch and Wöhlken op. cit. tables 17-23: figures for the individual countries in columns (1) and (2) above from table 23, column (3) from tables 19-22, column (4) from quantity data in tables 17 and 18, and "wheat based price relatives" of the FAO for the regional index of production for West Europe.

Table 9

Changes in ratios of aggregates with different weighting systems

	Aggregation by					
	Grain equivalent	Producer prices 1968-70				FAO price relatives
		national prices in UA/t	weighted average 4 countries	national wheat equivalents	wheat equivalent wghtd. ø	
	(1)	(2)	(3)	(4)	(5)	(6)
	1. Share of countries in agricultural final output of four EC countries 1968-70, percentage					
F.R. Germany	31.0	32.2	31.6	31.3	31.5	32.4
France	40.8	37.2	39.1	40.7	39.2	39.1
Italy	22.6	25.2	23.6	22.6	23.6	22.6
Belgium	5.6	5.4	5.7	5.4	5.7	5.9
Total	100.0	100.0	100.0	100.0	100.0	100.0
	2. Share of animal products in "all products", percentage					
F.R. Germany	78.3	82.5	83.2	81.9	82.9	83.1
France	57.1	62.6	62.6	61.2	61.7	63.2
Italy	46.2	48.7	47.1	48.1	46.4	50.2
Belgium	78.6	84.3	83.8	84.4	83.6	84.0
Total	62.4	66.7	66.7	66.1	66.0	67.9
	3. Share of cereals in "all products", percentage					
F.R. Germany	12.7	9.3	8.8	9.2	9.0	9.9
France	27.7	19.3	20.2	20.0	20.8	23.2
Italy	25.2	18.8	17.8	19.4	18.8	21.3
Belgium	9.5	6.4	6.0	6.4	6.2	6.9
Total	21.4	15.3	15.1	15.8	15.8	17.5
	4. Share of cereals in vegetable products, percentage					
F.R. Germany	58.7	52.9	52.3	50.9	52.6	58.5
France	64.5	51.6	54.2	51.6	54.4	63.1
Italy	46.8	36.6	33.7	37.6	35.0	42.7
Belgium	39.6	41.1	37.4	41.0	37.5	42.8
Total	57.0	45.8	45.8	46.4	46.4	54.6

Calculated from sources to table 8

Table 9 shows specimen calculations for the shares of national overall aggregates in the total for the four countries (agricultural final output) and for subtotals in the totals of the individual countries. In the first section of the table (share in agricultural final output) the share of France for example is highest in terms of grain equivalents (similar ratios result from calculations on the basis of "national wheat equivalents", col. 4). The shares of France and Belgium are lower when calculated in terms of national producer prices in UA/t (col. 2) than in terms of average prices for the four countries (col. 3).

In contrast the shares of F.R. Germany and Italy are lower in column 3 than in column 2. In column 3 the effects of differing price levels might be cancelled out by those of column 2. In the second section of the table, the figures for shares of animal products are somewhat lower in terms of grain equivalents than in the columns based on prices. This will be due to the lower value given to all products of animal origin in this system.

One must be clear in such calculations that these are not dealing with "absolute truth" and make no claim to absolute precision, but that they are meant to display the order of magnitude and relative changes over time. It is easy to over-estimate the effects of differences in the weighting systems. As has been shown, these cancel each other out to a large extent.The remaining differences persist as a constant error term or limit, and have relatively little effect on relative changes (index-number) and relative shares. As the same weighting system is used over a longer period, the results of these aggregations should be comparable between countries and for main sub-aggregates.

This has been born out by the methodological investigations of G. Thiede, who has carried out an aggregation in quantity terms (using the old grain equivalent conversion system) of the disposable production (or final output) and domestic uses from the supply balance sheets for the old EEC (EC-6) for the annual averages 1956/7-1960/1 and 1965/6-1967/8.[1]

4. Problems related to the time reference in supply balances: calendar and crop years.

4.1. Use of the calendar year in agricultural statistics

The usual reporting period in economic statistics is the calendar year. Statistics of industrial production, of foreign trade, national accounts, financial statistics, price statistics generally to give but a few examples are produced on the basis of the calendar year. The same requirement is made of statistics in agriculture and food production at both national and international level, as these are an integral part of economic statistics. This is not simply a question of general statistical method and neatness of presentation, but also of saving work.

Some individual elements in the supply balance sheets on both sides are taken from general statistical sources. In producing the sheets a large part is played for example by foreign trade figures. This particularly applies to the balance sheets described by EUROSTAT as "global" or "total" balance sheets, which contain information on the basic products as well as on derived processing products which are converted back into terms of the basic product using technical coefficients. Here imports

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(1) Thiede, G.: "Die Versorgungslage der EWG mit landwirtschaftlichen Erzeugnissen. Versuch mit einem System von mengenmässigen Gesamtrechnungen", op. cit.

and exports are not only shown in total, but also split on a regional basis in order to separate trade for EUR-6 and EUR-9 into internal trade and trade with outside countries. The different start of crop years (which begin on 1 April, 1 July, 1 August, 1 September for individual vegetable products or groups of products) have the effect that these figures have generally to be extracted laboriously "by hand" from monthly and half-yearly data in the foreign trade statistics. A particularly extreme example here is the balance sheet for meat, where foreign trade has to be regionally separated on the one hand for trade in live animals and on the other for trade in meat and meat products. A common reporting period for all these figures based on the calendar year should be well worth while for the purposes of producing balance sheets using EDP produced figures for foreign trade.

A large part of the wide range of individual data used to compile figures for domestic uses comes from data on industrial production or the quantity figures in statistics on excise duties. These figures are more usually available for calendar years than for shorter reporting periods which would be needed to compute staggered crop-years.

The supply balance sheets for products which, unlike vegetable products, are not harvested once a year but are produced throughout the reporting period, are already produced on a calendar year basis (in the EEC and the OECD). These are the balance sheets for animals and products of animal origin (meat, butchery fats, milk and milk products, eggs and fish). In terms of final production, animals and products of animal origin (excluding fish) account for almost 60 per cent in the EUR-9, with individual countries varying between 40 per cent and 84 per cent. As the fats heading includes fats and oils of animal, marine and vegetable origin, the balance sheets for fats are

also produced on a calendar year basis. Because of the connection with balance sheets on the supply of oilcakes, and, recently, because of the feed balance sheets, the balance sheets for oil-seeds and oleaginous fruits and for vegetable oils and fats are also produced on a calendar year basis.

The "Agricultural Economic Accounts", according to the national accounts concept for agriculture (as defined by a list of agricultural products), also is produced for the Community on a calendar year basis. The questionnaires for determing the value of final production include questions on quantity data yielding the individual elements in the balance sheets for supply and uses on the producer level including stock changes.[1] This (in theory) means to compile balances on the producer level even for vegetable products on a calendar year basis, independently of the crop-year/based supply balance sheets. It is impossible for an outsider to assess to what extent the (unpublished) quantitative data are based on actual returns, informed estimates or a consistent set of assumed figures. An answer to this question would help in assessing to what extent the statistics permit production of balance sheets on a calendar year basis also for vegetable products.

It should also be noted that the Community statistics on prices and unit values of agricultural products are based on the calendar year, as with other price statistics, and that the Community index of producer prices for agricultural products (base year 1970) has also recently been compiled on a calendar year basis.

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(1) see EUROSTAT, Agrarstatistik: Handbook on economic accounts for agriculture. Provisional version, Doc. D/LG/50, Dec. 1976, app. 3.

For an index of prices of means of agricultural production on a calendar year basis it should also be possible in future to use price data and price indices compiled for other industrial sectors (e.g. sub-indexes for maintenance of buildings and machinery, for cost of new buildings or for larger machinery (cf Weinreich, op. cit., p. 93).

This should indicate sufficiently the extent to which the calendar year is already being used as a uniform reference period in Community statistics on agriculture and the food industry.

International organisations such as the FAO[1] have for some time followed the policy of encouraging member countries to go over to the calendar year as a common reference period; this is meant to further an integrated and coordinated system of product balance sheets, and also to improve international comparability. It is also to meet technical requirements of EDP systems which alone are capable of handling the enormous mass of data involved at regional and global level. The Community will be confronted with this problem in the course of work on international coordination and harmonisation of agricultural statistics.

4.2. Use of crop years for individual supply balances

Annual production cycles for the various vegetable products vary within countries, and a fortiori within a region such as the Community, with its range of climates. Here the harvest dates vary more or less widely even for the same product. The

(1) For part of the membership of the FAO (Southern hemisphere countries) the calendar and "agricultural year" are largely identical: the remaining members will be the ones ceeding to change.

argument has obvious force on a global level. As the FAO has established, it is impossible to find any common reference period, whether calendar or crop year, which will fit the different regional and product harvest cycles (cf. FAO, Preparation of supply/utilization balances ... , op. cit. paras. 21-24). The determining element in the choice of the calendar year for balance sheets for vegetable products is the availability of information on stocks at the end of the year (see below).

The Community has agreed that the supply balance sheets for various vegetable products will have the following crop year bases:

1.4 - 31.3 for individual types of fruit and vegetables (for market balance sheets only);
1.7 - 30.6 for total vegetables, total fruit, pulses, potatoes, cocoa, sugar, oilseeds and oleaginous fruits, vegetable oils and fats, oilcakes, feed balance sheets;
1.8 - 31.7 for grain, rice, flax and hemp;
1.9 - 31.8 for wine;[1]
1.10 - 30.9 for sugar (compiled separately by the General Directorate for Agriculture of the EC Commission).

These dates are conventions: the point at which the new crop is available (the actual basis for the "crop year") varies throughout the Community for a given product. The extension of the Community beyond the EUR-9 will exacerbate this problem and may perhaps lead to the need to consider the problem anew.

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(1) with the exception of Italy, for which the balance sheet is drawn up for the period July to June (information supplied by the General Directorate for Agriculture)

Various good reasons have been advanced for the retention of the crop year as the reference period for supply balances for products of vegetable origin.

A purely statistical reason is the availability or lack of information on stocks at the beginning and end of the period, or on stock changes. It is argued that, in the case of products which are difficult to store or easily spoiled, there will be virtually no stocks at the end of the harvest year. Even with products which can be stored for longer periods (such as cereals) the stocks from the old harvest should be lowest at the beginning of the crop year, and estimates of stock changes made at this point should be less liable to error than estimates for stocks at the end of the calendar year.

This argument has only limited validity. It is undoubtedly true that the level in absolute terms of stocks of harvested products will be higher at the end of the calendar year than at the end of the crop year, as quantities are required for domestic consumption and net export until the new harvest, or for domestic consumption which cannot be met from net imports. The stock changes between the beginning and end of a reference year over the course of a crop year for storable vegetable products (such as cereals and sugar) need not, however, be smaller in a crop year than in a calendar year, particularly in the case of surplus products which are subject to Community intervention or other measures. As an example of this table 10 shows the changes of stocks and their relationships to the total for domestic use in the Federal Republic of Germany for total cereals, total wheat and "other grains"; supply balance sheets have been published here on a calendar and crop year basis since years.

Variations in stock changes can be greater for individual products (wheat) than for product groups (total cereals and

"other grains"), where offsetting movements can occur. The table also shows how much domestic use would be altered if stock changes could not be determined and domestic use had to be calculated solely from disposable production and the balance of foreign trade.

For products which are less storable, where stock changes might be neglected for the crop year, there can still be stock changes, for example in the case of fruit and vegetables in the consolidated balance sheets which cover (besides fresh products) processed products (conserves, juice) converted into terms of the fresh product; there will certainly be stock changes, whether recorded or not, in the processed products (particularly stocks resulting from public intervention in the market).

The two examples of storable and more perishable products show clearly the importance of knowing stocks at the beginning and end of the reference period chosen. Purely from the statistical viewpoint, the inclusion also of vegetable products into balancing on a calandar year basis would only be justified where reasonably complete figures on stocks were available for the end of the calendar year.

A survey of the actual possibilities for recording stock levels at the end of the calendar year would provide the opportunity for a critical review of the situation in statistics on stocks generally, and at the same time of the state of statistics on stocks for crop years.

In the current balance sheets for vegetable products on a crop year basis, stocks at the beginning and end of the period or stock changes on agricultural holdings (for balance sheets at the producer level) are only shown for grain, and even here for only three member countries, if we ignore the figures for

Table 10

Stock changes in grain and wheat on a calendar and crop year basis for F.R. Germany

Calendar year (CY) or following crop year (from 1.8) (HY)	all grain		of which			
			total wheat		other grain	
	CY	HY	CY	HY	CY	HY
	1. stock changes in 000 t					
1968	+ 2,186	+ 1,971	+ 1,011	+ 1,189	+ 1,175	+ 782
1969	- 484	- 2,818	- 120	- 2,248	- 364	- 570
1970	- 2,137	+ 103	- 1,636	+ 415	- 501	- 312
1971	+ 2,701	+ 1,182	+ 1,564	+ 926	+ 1,137	+ 202
1972	+ 44	- 563	+ 64	- 466	- 20	- 97
1973	- 220	+ 451	- 305	+ 186	+ 85	+ 265
1974	+ 1,501	+ 744	+ 965	+ 533	+ 536	+ 211
1975	- 711	- 1,172	- 269	- 255	- 442	- 917
	2. stock changes as percentage of domestic use					
1968	+ 10.0	+ 8.8	+ 16.5	+ 17.9	+ 7.5	+ 5.0
1969	- 2.1	- 11.8	- 1.7	- 30.2	- 2.2	- 3.5
1970	- 9.0	+ 0.4	- 21.8	+ 5.9	- 3.1	- 1.9
1971	+ 11.1	+ 4.6	+ 22.1	+ 12.4	+ 6.6	+ 1.2
1972	+ 0.2	- 2.3	+ 0.8	- 5.8	- 0.1	- 0.6
1973	- 0.9	+ 1.8	- 3.8	+ 2.4	+ 0.5	+ 1.5
1974	+ 5.9	+ 2.9	+ 12.9	+ 7.1	+ 3.0	+ 1.2
1975	- 2.8	- 4.6	- 3.6	- 3.5	- 2.4	- 5.0

Sources: "Statistisches Jahrbuch für Ernährung, Landwirtschaft und Forsten" op. cit., various years, and "Statistischer Monatsbericht", Federal Ministry for Food, Agriculture and Forestry, 1977, vol. 1, p. 23

France which have remained constant for years. Otherwise stocks on agricultural holdings are only available for potatoes for F.R. Germany. A check should be made to see if commercial stocks held in the trade, the cooperatives and the processing industries are fully covered on a comparable basis, and whether publicly held stocks from national interventions comprise throughout national reserves as well as those from market interventions (including stocks financed from public funds but held by private bodies). Absolute levels of stocks at the beginning and end of the period give rise to doubts (for example in the case of the balance sheets for grain) as to whether stock figures are calculated in a consistant manner. "Actual" stock changes and hence "actual" domestic uses in the reference period would then differ from the calculated figures. At the same time a check should be made to see whether, for example, the stocks of grain at 1st August already include supplies from the new crop. As the total harvest is shown as usable production and the (unpublished) market balance sheet includes all sales from the new crop, including sales before 1st August, the figures for stocks carried over from the previous year must only include figures for the old crop in order to avoid double counting. A critical survey of the data on stocks in the balance sheets for animal products and their separation into intervention stocks and other stocks would also be useful.

Another argument for retaining the crop year as a reporting period for vegetable products is the conclusion of market observers and researchers that the size of the harvest, prices, direction of uses and possible public intervention are interdependent. Balance sheets on a calendar year basis would blur this interrelation, as such sheets contain the effects of two harvests, which cannot then be isolated.

It could be asked if this argument is not more relevant to

observation of individual national markets and loses its force at the level of a large "internal market" such as the Community. It is already difficult enough to establish one crop year for a product throughout the Community which is suitable for conditions everywhere. Conversely, the regionally differing harvests of a particular product, together with internal trade in this product, have the effect of extending the period of availability of the new crop, with resulting equalising influences on prices and uses.

The crop years for vegetable products used in the supply balance sheets are largely identical with the "market year for price fixing". This is not the case with animals and products of animal origin, which does not seem to cause problems for decisions on pricing policy.

Irrespective of the significance of the compilation of supply balance sheets for vegetable products on different crop year bases for market analysis and research, administration of market regulation policy, and for decisions of agricultural policy, a general conversion to the calendar year basis would require extensive cooperation within the Community on sufficiently comprehensive and reliable determination of stocks at the end of the calendar year.

4.3. Problems of aggregation for integrated accounts

Previous discussion has been concerned with balance sheets for individual products or product groups. Here it has been a question of comparisons over time of the individual balance sheets for uniform and comparable reference periods (e.g. grain 1 August to 31 July, cauliflowers 1 April to 31 March). In the case of aggregations of all available supply balance sheets, or of particular elements on the resources and uses sides of the

balance sheets to give general totals, it should in principle be expected that the data relate to the same period.

In the Community system of integrated agricultural accounts "final output" of the production sector "agricultural and hunting products" (as defined by a list of products) is calculated on a calendar year basis. We have already noted the need for balance sheets at the producer level on a calendar year basis (including for vegetable products) and for information on stocks in agriculture at the end of the calendar year.

Aggregation of data from the various supply balance sheets to yield integrated accounts involves combination of data from different reference periods. If we start with the balance sheets for animals and animal products on a calendar year basis and add in balance sheets for vegetable products on a crop year basis, having harvest dates somewhere in the same year, then the reference period is extended up to 21 months. An equally long period arises if the balances for animal products are taken for the year following the crop year based balances for vegetable products, possibly because harvest contribution to animal production arises largely in the following calendar year. As long as the balance sheets for animal products also referred to a crop year the distortion in time produced by the individual balance sheets played a minor role in aggregation into integrated accounts, and gave rise to no problems in repeated applications of the method. Now that the balance sheets for animal products have been placed on a calendar year basis it can only be a question of time before the vegetable products are treated in the same way.

The length of the reference period resulting from the different reporting periods must be borne in mind when aggregating figures from the supply balance sheets.

What importance do these time variations have for the calculation of the possible and current aggregate totals from supply balance sheets described in section 2.2 above?

They are unimportant for the calculation of the "gross product of the soil", as here all harvest results for the year are simply added on some common basis. The results could be applied to calendar years or crop years equally. Aggregation of "utilization balances" for vegetable products at the producer level presents no particular difficulties due to different reference periods.

There are good reasons for choosing the crop year for calculating resources of feed in feed balance sheets (basically July to June); this is to avoid the problems caused by the lack of information on stock data for the greater proportion of non-marketed feedstuffs, and also to follow through the utilization of the grown feedstuffs crop. The time variations can be ignored for the residual item for feed taken from the supply balance sheets for vegetable products and inserted in the feed balance sheets. This is also true for feedstuffs arising as by-products of processing of vegetable products. It is not possible to derive availability of feedstuffs of animal origin on a crop year basis from the balance sheets for animal products (including fish and fishmeal) compiled on a calendar year basis; this has to be separately derived where balance sheets for animal products are not available also on a crop year basis. We have already noted in the treatment of feed balance sheets that data on animal production are required also on a crop year basis for the compilation of the uses side of the feed balance sheets.

Other uses of supply balance sheets to yield aggregate figures (final output, food consumption by products and shown as nutrients, degree of self-sufficiency, and as a framework for calculating gross market margins) should naturally be based on the priciple

that the aggregate annual data cover a roughly equivalent period. This ultimately implies that it is not possible simply to add balance sheets based on crop and calendar years. For the purposes of aggregation the balance sheets for animals and animal products would have to be available on a crop year basis as well. The great importance of animal products in final production, agricultural income, and generally in the agricultural markets means that these balance sheets - even if not in the form of quarterly balance sheets, moving totals for 12 month periods etc - are an essential tool for market analysis and research.

4.4. Conclusions

Production of supply balance sheets for vegetable products on a calendar year basis is only possible where the necessary information on stocks at the end of the calendar year is available, and data for the individual headings under domestic uses relate to the same period. Even if this were the case it is arguable that supply balance sheets for vegetable and animal products should be produced currently on a crop year basis as well as a calendar year basis to meet the various needs of users of statistics. Supply balance sheets are only one form of presenting the data which the continuous process of market analysis and research uses, or should be using to improve understanding of the processes of the market and management of market policy. A simultaneous production of supply balance sheets on calendar and crop year bases for the major products would provide information on the most up-to-date basis, and would at the same time be an important aid to continuous monitoring of short-term projections, and also for checking the assumptions made in medium and long-term forecasts.

5. Proposals for improvements

5.1. Suggestions for publication and extension of the information contained in the supply balance sheets

Quantitative supply balance sheets for agricultural and food industry products already have a history going back over many decades. Experts in scientific institutes, government departments, secretariats of international agencies, and finally the Community have worked on developing, harmonising and reaching agreement on the concepts and methodology used. It is therefore unlikely that suggestions for further improvements would include any surprises or sensations as long as the "special nature" of agricultural statistics described in the introductory passages does not basically change at the international level. At best proposals could be expected for small changes arising from changes in conditions and new demands made on the balance sheets.

Supply balance sheets are one particular way of aggregating data on agriculture, the food industry and foreign trade. The quality of the data depends on the completeness, reliability and comparability of the underlying statistical information. Filling gaps in the statistics made evident in the course of producing these balance sheets and improving the quality of the basic statistics are continuing tasks. This holds for production and stock statistics and for the individual elements on the uses side of the balance sheets.

For the users of agricultural statistics it seems a matter of urgency to have a "period of consolidation" for examining achievements and agreements to date, in order to be able to arrive at comparable data for some years for all member countries as well as for the Community as a whole. This is as applicable

to the published supply balance sheets as to the economic accounts for agriculture. This should be done before new membership applications lead to a further period of uncertainty and lack of information. Supply balance sheets represent a distillation of a mass of individual data: for their interpretation in the course of market analysis and for the purposes of research in agricultural economics, it is necessary to be aware of the information going into the sheets which is not published (in some cases no longer published) by EUROSTAT. An example is the balance sheets for grain: these were published for 1970/1 and 1971/2 with a mass of "supplementary statistics" which were important for their understanding. These additional figures are absent in the present collected form of the supply balance sheets, which are otherwise to be welcomed.

A particularly relevant need is for a balance for flour (as a sub-heading, in order not to disrupt the present form of the grain balance sheet).

The principal objection is undoubtedly the additional cost in labour and expense involved in the publication of such additional information. The question then arises whether it might not be possible to condense the supply balance sheets without serious loss of information and thereby make savings; such condensation could, for example, be carried out in the balance sheets for oleaginous seeds and fruits, oilcakes and vegetable oils and fats, which are presently published by type. These balance sheets take op one fifth of the volume of supply balance sheets published by EUROSTAT in 1976.

In the last section on the use of supply balance sheets as an aid to decision-making, it will be shown that the application of various means of market regulation can produce statistical

information which could be incorporated in the supply balance sheets for the appropriate products, and which would considerably increase the information content of these. Such would be the separation of stocks at the beginning and end of period in the stocks arising from intervention, and other stocks, the extent of intervention, and particular presentation of subsidised uses for export and various domestic purposes.

5.2. Supply balances on milk and milk products

The statistics on milk and milk products come in three stages (overlooking for the moment the censuses on the structure of the dairy industry which are held at intervals of a number of years):

- milk production (from milk cows, and other animals including buffaloes, goats and sheep);
- supply and uses of the basic products whole milk, skimmed milk and buttermilk (and whey), as well as production of milk products in agricultural holdings and in milk processing enterprises (dairies etc.);
- supply balance sheets for milk products grouped under seven products or product groups (fresh milk products excl. cream, cream, concentrated milk, whole milk powder, skimmed milk powder, butter (in product weight and fat content), and cheese (including unfermented cheese).

The milk products cover products with differing content of solids and differing composition in terms of the two major components of milk, milk fats and milk protein. The relative significance and direction of the balance of trade and stock changes are in general different from product to product. This means that in a summary presentation the average composition in terms of these components will vary between the different

uses and total domestic use. This is the starting point for efforts to reduce the mass of partial information in the individual balance sheets for milk and milk products (broken down by product, nature of resource and use, and country) to a few informative summaries.

The milk products are - or were - frequently converted back into terms of the quantities of whole milk required for their production (whole milk equivalent). This method assumed basically that the relative composition of milk products in terms of milk fats and milk protein is constant, and corresponds to the composition of the primary product whole milk. Imports of butter were converted by this method, and the appropriate quantity of skimmed and butter milk (milk protein) was shown also as "imported" and (for exports) "exported". In foreign trade figures for skimmed milk powder, fictitious quantities of milk fats were"subtracted" from domestic consumption or "added". Under the individual uses the quantities of whole milk equivalents will differ, depending on whether the calculation was in terms of milk fats or milk protein.

A logically impeccable way of summarising the mass of data in the balance sheets for supply of milk products would be the production of two balance sheets showing the total supply of milk fats and of milk protein.

In the EUROSTAT publications on statistics of milk and milk products (Agrarstatistik, 2/1975) only the first of these has been done. In a harmonised framework the member countries gave the average fats content (in percent) for the milk delivered to dairies. If we assume that the fat content of the milk produced is equal to that of the delivered milk, it is possible to compute the "total production of milk fats by milk cows" (cf Agrarstatistik 2/1975, pp. 8-9). From use of

whole and skimmed milk in dairies it is further possible to calculate the content of milk fats of the milk products produced (Agrarstatistik 1/1975, pp. 22-23). The next stage, the supply balance sheet in terms of milk fats, has not yet been published. This would require the use of technical conversion factors for the milk fats content of the milk products currently shown in the supply balance sheets in order to cover foreign trade and stock changes. Such factors could be derived from statistics on production and input of raw materials. It would be useful at the same time if the Community experts could use the experience gained to determine whether the allocation of milk fats under the individual products should be on the basis of the actual fats content of the whole and skimmed milk used in the processing, or whether the assumption should be used that skimmed milk has a fat content of zero, and the milk fats should be allocated to products on the basis of the use of whole milk alone as a raw material.

EUROSTAT has not so far published any corresponding figures on supply of milk protein. The Federal Ministry for Food, Agriculture and Forestry has, for example, published some calculations on supply and uses of milk protein in agricultural holdings and dairies in the Federal Republic of Germany for the years 1971 to 1976.[1] There the raw materials (whole and skimmed milk combined) were given a constant milk protein content of 3.5 per cent. It is a matter for the experts to decide on the conversion factor for the milk protein content or to decide if it would be relevant to use not milk protein content but total non-fat-solids as a basis. If empirical tests on the content of milk fats and milk protein should produce different results due to different technical procedures or definitions, these should be adjusted by "correction factors" as far as possible.

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(1) Milch- und Molkereiwirtschaft, Statistischer Bericht (Milk and dairy industry, statistical report), 1976, p. 39

In this method of summarising the balance sheets for milk and milk products in terms of milk fats and milk protein, uses of important products should be shown separately, unlike the present practice. For example, the balance sheet for milk fats could show under "human consumption" milk fats in the form of butter, or the balance sheet for milk protein could show under "animal feed" the use of skimmed milk powder for feed.

5.3. Supply balances for meat

Two questions are examined here:

- the different definitions of the term "production" and especially in relation to the balance sheets for live animals
- the appropriate treatment in the balance sheets of slaughter fats.

5.3.1. Various definitons of production for live animals and meat

The starting point for the balance sheets for meat is, on the resources side, "production" of meat defined as supply from slaughter of live animals of domestic and foreign origin. The separation according to origin is done either on the basis of reports by the veterinary services (e.g. at special border slaughterhouses) or from figures for foreign trade in live animals. From these figures the proportion of animals is taken which national expert opinion regards as appropriate for representing imports of live animals for immediate slaughter. A similar approach is used for exports. The foreign trade statistics give trade in live animals by numbers and live weight, the slaughter statistics the number of slaughterings, average carcass

weight and (derived) the total carcass weight. By using technical conversion factors the live weight figures from the foreign trade statistics can be converted into carcass weight.

The yield from total slaughterings (of domestic and imported animals) is described by EUROSTAT as "net production" in its publications. The proportion of meat coming from slaughterings of animals of domestic origin is correspondingly described as "net indigenous production". In order to arrive at the total available quantity of meat in a given reference period coming from domestic production in the reporting area, the exports of live animals must be added in, assuming that these exports are of domestic animals. Total slaughterings including exports and excluding imports of live animals for slaughter (or the corresponding carcass weight) yields indigenous production (or else figures for slaughterings of indigenous animals plus exports of live animals for slaughter can be taken). These production figures are described by EUROSTAT as "gross indigenous production of meat" and is given as such at the beginning of the supply balance sheets for meat. This is the quantity which was used up to now as "usable indigenous production" in calculating the degree of self-sufficiency.

In the course of time some doubt has arisen whether the gross indigenous production of meat defined in this way (total slaughterings ± foreign trade in live animals for slaughter) actually corresponds to total production of meat in a given reporting area. Foreign trade in live animals includes animals for immediate slaughter, cattle (including animals for further fattening prior to slaughter - store cattle[1]) and animals for

(1) This particularly important e.g. for the Republic of Ireland, as traditionally large numbers of store cattle are supplied to the United Kingdom. Italy also imports large numbers of young and store cattle from its neighbours.

breeding. The composition and relative importance of foreign trade in live animals is naturally different from one member country to another and the manner of their statistical classification under the national foreign trade classification and the Community classification (NIMEXE) apparently varies.

The proper starting point should be to establish the total indigenous production of livestock (number, live weight, carcass weight). This is defined by EUROSTAT either as: slaughterings of animals of domestic origin plus exports of all sorts of live animals (for slaughter, cattle and breeding) and with an allowance for changes in the livestock population in terms of numbers and weight in the course of the reporting period; an alternative definition is total slaughterings minus imports plus exports of live animals of all types and changes in the livestock population.

Up to the end of 1975 EUROSTAT and the reporting countries continued to use the narrower definition of "gross indigenous production of meat" in the supply balance sheets (total slaughterings ± foreign trade in live animals for slaughter). In 1976 they went one step further by using in addition another, broader definition of "gross indigenous production of livestock" in the monthly reports on the supply of meat; this used an expanded definition of foreign trade including imports and exports of all types of live animal, but still excluding "thoroughbred breeding stock".[1] The result of

(1) EUROSTAT has apparently fallen foul of its own complex scheme of definitons. On one hand the definition given above is used for "total indigenous production of livestock"; the supplementary statistics given in no. 9/1976 of monthly meat statistics is also given as "total production of livestock" but here what is clearly meant is "gross production of livestock" (total slaughterings minus imports plus exports of live animals excluding breeding stock), a definition developed meticulously in a working paper (Doc. D/V/290 of 4.10.76) of the Working Party on "Supply balance sheets" of the committee on agricultural statistics.

including foreign trade in livestock other than animals for slaughter (excluding breeding stock) is shown below. Here gross production of cattle and calf animals combined is shown for 1975 on the previous definition (total slaughterings minus imports plus exports of live animals for slaughter) and also on the extended definition (total slaughterings minus imports plus exports of live animals excluding breeding stock) (table 11).

The second definition (concept A) which includes foreign trade in cattle gives a smaller gross indigenous production figure for countries with a net import requirement for such cattle (the UK and Italy) than the previous definition (concept B), and conversely a higher gross indigenous production figure for countries with net exports also of animals other than for slaughter (West Germany, France, the Netherlands, the Republic of Ireland). In the case of Denmark the figures are the same on both definitions, as there is apparently no difference resulting from foreign trade in animals for slaughter and other uses. For the Community as a whole the differences are small, as the overwhelming proportion of trade in live animals is carried out within the Community. Whether the gross indigenous production figures using the second definition (concept A) are more "correct" than the others at the national level (even if logic would suggest this is so) would be shown by a calculation of indigenous production including changes in livestock population as used for the forecast of livestock production. Table 12 below shows such an attempt for a first approximation (in 1000 heads) it shows the stock of cattle and cows at December 1974, changes of total cattle numbers for December 1975 on the previous year, gross indigenous production of beef and veal cattle combined for 1975 on both definitons, including and excluding changes

Table 11

Gross indigenous production of beef and veal cattle combined in 1975 according to definitions A and B[1]

	000 t carcass weight		number in 000 heads	
	A[1]	B[1]	A[1]	B[1]
EUR-9	6,601	6,577	29,308	29,077
EUR-6	4,683	4,691	20,673	20,649
F.R. Germany	1,365	1,341	5,500	5,255
France	1,868	1,786	9,256	8,131
Italy	745	875	2,591	4,123
Holland	413	396	2,215	2,043
Belgium	282	283	1,074	1,059
Luxembourg	10	10	37	37
United Kingdom	1,131	1,239	5,053	5,555
Republic of Ireland	546	405	2,431	1,723
Denmark[2]	242	242	1,150	1,150

(1) definition A Total slaughterings minus imports plus exports of live animals (excluding breeding stock)

definition B Total slaughterings minus imports plus exports of live animals for slaughter

(2) The same for both definitions as there is no differentiation of foreign trade in live animals according to whether for slaughter or not.

Sources: compiled from EUROSTAT Agrarstatistik: Monatliche Statistik von Fleisch (Monthly meat statistics) 9/1976

Table 12

Gross indigenous production of cattle and caloes combined for 1975 in relation to the cattle population, according to definitions A and B[1] (000s)

	Beef cattle population Dec. 1974		Popn. changes 1974-5	Gross indigenous production of cattle and calves combined in 1975				Gross indigenous production of cattle and calves combined as percentage of cow popn. 1974			
				excl. changes in cattle popn.		incl. changes in cattle popn.		excl. changes Changes in cattle popn.		incl.	
	total	of wh. cows		A[1]	B[1]	A[1]	B[1]	A[1]	B[1]	A[1]	B[1]
EUR-9	79246	31355	- 1743	29308	29077	27565	27334	93,5	92,7	87,9	87,2
F.R. Germany	14420	5546	+ 92	5500	5255	5592	5347	99,1	94,8	100,8	96,4
France	24300	10207	- 465	9256	8131	8791	7666	90,7	79,7	86,1	75,1
Italy	8153	3642	+ 376	2591	4123	2967	4499	71,1	113,2	81,5	123,5
Holland	4714	2215	- 108	2215	2043	2107	1935	100,0	92,2	95,1	87,4
BLEU	3103	1143	- 92	1111	1096	1019	1004	97,2	95,9	89,2	87,8
United Kingdom	14914	5342	- 923	5053	5555	4130	4632	94,6	104,0	77,3	86,7
Republic of Ireland	6497	2034	- 533	2431	1723	1898	1190	119,5	84,7	93,3	58,5
Denmark[2]	3145	1226	- 90	1150	1150	1060	1060	93,8	93,8	86,5	86,5

(1) Gross indigenous production A = total slaughterings minus imports plus exports of live animals (excl. breeding stock)

Gross indigenous production B = total slaughterings minus imports plus exports of live animals for slaughter only

(2) See footnote 2 to table 11

Sources: Cattle numbers from EUROSTAT Yearbook of agricultural statistics 1976 and previous issues Gross indigenous production from Eurostat Agrarstatistik, Monthly meat statistics, vol. 9/1976, and author's calculations.

in cattle population, and the ratio of these to the initial stock of cows (table 12). As gross indigenous production according to the second definition (including stock changes) should be very near to the usable addition to or the disappearance from the livestock population (only foreign trade in "thoroughbred breeding stock" is omitted), the ratio of this "total indigenous production" shows a better relationship to total initial cow population (penultimate column in the table). The reference basis used in calculating the births of calves going to production (total number of cows at beginning of year) must certainly be improved, and allowance made for the differing uses of cows, useful life, incidence of accession of heifers and disappearance (sales) of cows, possible differences in fertility of pure milk cows and other cows, and other factors, in order to arrive at a realistic basis for calculations which corresponds to the varying conditions in the individual member countries.

Livestock numbers of the most important types of animals for the supply balance sheets for meat (beef cattle and pigs) are counted in a Community census during December. This "animal census year" does not quite correspond to the calendar year as a reporting period for the balance sheets for meat. A close examination of this problem should show if this difference in the reporting period is of significance for determining changes in livestock population for the balance sheet year (calendar year), or whether this lies within the margin of normal errors.

It is therefore suggested that we should go a step further and, instead of gross indigenous production, use total indigenous production of livestock as a measure of indigenous production. This would mean starting as before from total slaughterings and then including total foreign

trade in live animals (for slaughter, rearing and breeding) and changes in the livestock population. The first entry in the balance sheets for meat would then read:

proposed:	previous:
total indigenous production of livestock	gross indigenous production (of meat)
± changes in livestock population	(or gross indigenous production of livestock)
= gross indigenous production of livestock	
- exports of live animals (total)	- exports of life animals for slaughter
+ imports of live animals (total)	+ imports of live animals (for slaughter)
= net production	= net production
+ imports (of meat and meat products)	+ imports (of meat and meat products)
etc. (other headings as before)	etc. (other headings as before)

For the purposes of monthly reports on production (including foreign trade in live animals (total)) it is naturally not possible to include changes in the livestock population. This can only be determined after the end of the reporting period. In this case the monthly gross indigenous production of livestock has to serve as a preliminary monthly indicator (total slaughterings minus imports plus exports of total live animals).

The term "total indigenous production of livestock" - production indigène total - or "pit" (total slaughterings minus imports

plus exports of total live animals). The latter does not make any allowance for the changes in livestock population in the course of the reporting period; the figure is accordingly larger than actual total indigenous production of livestock where the population falls and smaller where the population rises. Despite this EUROSTAT states in the abovementioned working paper (Doc. D/V/290 of 4.10.76) on p. 7 of the German version:

"EUROSTAT currently works with two basic definitions, np and gip of livestock

Net production (np) comprises all slaughterings of a given type of animal within the country.

Gross indigenous production of livestock (gip livestock) comprises all production between two consecutive livestock censuses. Experience shows that these two definitions of meat and animal production completely characterise the subject and can for example be found in the basic data for production of supply balance sheets or agricultural economic accounts."

These definitions should be carefully reexamined to avoid possible misunderstanding. In the agricultural economic accounts changes in the livestock population are naturally covered in the calculation of final output - or at least should be covered. In the case of the supply balance sheets so far neither changes in the livestock population nor a considerable part of foreign trade in live animals (intra-trade and external trade) is taken into account (for whatever justified reasons this may be) when calculating indigenous production of meat (or livestock). Even if the supply balance sheet definitions are altered to allow for foreign trade in all live animals, moving thus to "gross indigenous production of livestock", the question of changes in the

livestock population remains unresolved. Total indigenous production should be set against domestic uses for the calculation of the degree of self-sufficiency, rather than gross indigenous production (either of meat or livestock).

Total indigenous production of livestock in terms of number, live and carcass weight, provides a starting point for a number of statistical purposes: for agricultural economic accounts, according to national accounting definitions and principles; for feed balance sheets; for forecasts of livestock production (in terms of number, live and carcass weight); and also as a basis for forecasts in supply balance sheet form for the supply of meat and livestock. How far domestic slaughterings of indigenous live animals and exports of live animals do lay behind projected and actual total livestock production due to increases in the livestock population over the reporting period can only be determined at the end of the period. The same applies for the converse case due to a reduction in livestock population over the period. If these changes in livestock population are ignored this will give a false picture of actual indigenous production in each period. Such is the case where the so-called "gross indigenous production of livestock" (ignoring population changes) is taken as indigenous production. Naturally the positive and negative changes largely cancel out when averaged over a number of years, but supply balance sheets are meant to give a short-term picture of actual or projected changes over a single reporting period.

The problem only arises, however, because total indigenous production of livestock cannot be determined directly as gross production or usable production (which is the starting point for balance sheets for other products), but must be derived instead from another figure (total slaughterings).

This presupposes that total slaughterings can be determined reliably for all countries.

The three statistical elements in arriving at total indigenous production of livestock are figures for slaughterings, foreign trade in live animals, and livestock population. The calculations at the same time provide a check on the consistency of the partial statistics for numbers (plausible results for additions or disappearances in subtotals for livestock production, ratios between specific parts of populations and parts of production etc). This consistency check could be a suitable starting point for harmonising and improving the reliability of present statistics.

5.3.2. Treatment of slaughter fats in the supply balances

Presentation in balance sheet form of figures for carcass products has always posed problems, as has international comparability of these. Harmonisation of definitions has been accordingly difficult.

In the OECD (and its predecessor OEEC) the food balance sheets[1] (produced also for the FAO) have, from the end of the Forties to date, distinguished

- dressed carcass weight,
- slaughter fats (fats removed from carcass and offal),
- edible offal (additional to carcass weight).

This division was introduced at a time when, because of the scarcity of supplies of foodstuffs, the supply of edible fats

(1) see OECD Food consumption statistics 1955-73, Paris, 1975, op. cit.

was the subject of special concern.

A uniform treatment - to improve international comparability - was not possible because of differing national consumption patterns and differing emphasis in production (e.g. bacon pigs - fat pigs). The different uses of fats are industrialised and commercially organized to a widely different extent, making statistical coverage difficult. Experience gave different estimated coefficients for individual OECD countries for the yield of butchery and offal fats per unit carcass weight.

The interrelated consumption patterns and direction of production have altered in the course of time. The rearing and production of low-fat animals for slaughter have on the one hand lead to a drop in the relative proportion of extractable slaughter fats, on the other hand the increase in consumption of meat (carcass weight) is counteracting a decrease in the availability of slaughter fats.

The balance sheets for meat are drawn up within the Community on the basis of agreed definitions of carcass weight including so-called extractable fats. Up to 1972/73 they were published on a crop year basis, and from 1971 on a calendar year basis. Until 1972/73 balance sheets were also produced for meat excluding extractable fats. The current state of published balance sheets for meat and fats[1] is thoroughly unsatisfactory. On one hand the meat balance sheets are drawn up on the basis of carcass weight (hence including so-called extractable fat); on the other, the balance sheets for fats include these under "fats and oils from land animals". The result would be that aggregation

(1) as in EUROSTAT Agrarstatistik, Supply balance sheets 1976 (for 1973/74 and 1974/75 or 1974 and 1975, and for fats for 1973 and 1974).

of the balance sheets would lead to double counting of the extractable fats already included in the meat balance sheets.

A uniform treatment of slaughter fats in the balance sheets is made more difficult by

- the differing patterns of consumption and emphasis of production already mentioned, and
- the differing national methods of compiling balance sheets for meat and fats, on the argument of the desirability of not disrupting comparability at the national level.

Within the Community the role of consumption of extractable slaughter fats varies; it is also true that the figures are based on more or less reliable estimates rather than on statistics on industrial production and uses. The decision to treat slaughter fats uniformly as meat (as part of the uniformly defined carcass weight) is not entirely adequate. Extracted (melted) fats from carcass and offal fat are involved in industrial processing and foreign trade as different qualities of tallow and pork fat. These are not only used for foodstuffs (directly or via industrial processing), but for other purposes as well.

In this situation the only compromise probably left is to compile the meat balance sheets on the basis of carcass weight; the member states can then show separately used slaughter fats under the heading "processing" as crude fats, as national requirements dictate. The figures for human consumption of meat (in carcass weight) would then be correspondingly reduced. The crude fats shown under "processing" would then be transferred to the separate balance sheet for slaughter fats as production from indigenous production or imported raw materials. This would then avoid

the double counting mentioned above of meat and slaughter fats.

6. Supply balance sheets as an aid to agricultural policy decisions

6.1. The aims of agricultural policy and policy measures, and the need for supply balances

The question of the possibility of using supply balance sheets to help with decisions relating to agricultural policy might be particularly related to the following aims stipulated in the Rome Treaty:

- market stabilisation (Article 39, para. 1c)
- ensuring security of supplies (Article 39, para. 1d)
- appropriate consumer prices (Article 39, para. 1e)
- harmonious development of world trade (Article 110).

The most important of these goals is market stabilisation. In the short term the aim is to bring about a balanced state of the market while supporting agricultural incomes, by the use of the instruments of market regulations within the framework of policies on markets and prices. In the longer term such a balance requires structural adjustment of supply to demand.

Ensuring security of supplies is largely achieved by attaining a balanced state of the market. A delay in structural adjustment of supply has the result that production rises faster than domestic uses, the degree of self-sufficiency rising above the level which is justified for ensuring supply and freedom of foreign trade. In addition ensuring security of supplies involves appropriate stockpiles and a flexible market structure able to react quickly to imbalances of supply and demand within the Community market. This aim, like market stabilisation, can

easily conflict with the goal of a harmonious development of world trade, which is desirable from general economic and foreign policy considerations.

The Treaty does not define the vague term "appropriate consumer prices" more closely. The level of consumer prices for foodstuffs is not determined simply by the level of market regulation prices set at the wholesale level for agricultural raw materials and products at the first stage of processing, but also by additional inputs of services and materials up to the consumer stage, by the structure of the market, its ability of adjustment and by the extent of competition. The calculations of the effect of common decisions on prices for goods subject to market regulation on the level of producer prices for agricultural goods and of consumer prices for foodstuffs (and generally) which have become so natural would not have been possible without the supply balance sheets and the structure of aggregate totals based on these.

Supply balance sheets as a particular grouping of aggregate figures for quantities can be of considerable assistance in analysing the situation and in making decisions of agricultural and trade policy for the purposes of meeting the aims set out in the Treaty.

The question of the possibility of using supply balance sheets as an aid to decision-making in agricultural policy might be related primarily to the price and market policy within the broad range of agricultural policy activities according to the goals and plans at the national and Community level.

Price and market policy are still regarded (as before) as the main ways of implementing agricultural income policy. Public opinion is only now becoming aware of the fact that the effects

of price policies on agricultural incomes are limited by market forces (need for structural equilibrium of the market) as well as by major structural differences in agriculture in the individual member countries and the Community as a whole. Price policy (price level and relation of prices) and the application of technological innovations can lead via the availability (structurally determined) of factors of production to production which rises faster than the demand, which alters more slowly in quantity terms.[1] A balanced growth of the markets as a whole requires major structural adjustments on the supply side in inputs of factors of production and in the structure of agricultural holdings. As a result other strands of agricultural policy become more important which aim to facilitate volume adjustment and optimal combination of factors of production within socially acceptable conditions.

Market and price policy for supporting agricultural incomes and stabilising the markets use different approaches to correspond with the differing structure of market regulation. The results in terms of quantity appear largely as elements in the supply balance sheets. Community protection ("principle of Community preference") uses equalisation tariffs and customs duties to raise import prices to the Community level. The unlimited guaranty involved in intervention is manifested in the stocks held by the intervention agencies (as part of the total initial and final stocks). Market relief by subsidised exports or subsidised inferior

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(1) cf. e.g. Thiede, G.: Standorte der EWG-Agrarerzeugung (The location of EEC agricultural production), Parey Verlag, Hamburg and Berlin 1971, p. 94, and
Thiede, G.: Europas grüne Zukunft (Europe's green future), Econ Verlag, Düsseldorf, Vienna, 1975, pp. 347 et seq.

internal uses (denaturing) or distribution at reduced prices to specific groups of consumers are also elements or sub-headings on the uses side of the balance sheets. The correlate to the unlimited commitment to purchase surplusses is the "principle of financial solidarity", or in less demanding terms the unlimited commitment of member countries to contribute to the common budget. Price determination, manipulation of supply and demand through measures of market regulation policy, and financial outlay of the Guaranty Department of the EAGFL represent an interconnected system. Including stock changes it is theoretically always possible to achieve a state of market equilibrium, as long as the costs remain the equalising variable factor. In this way, short-term decisions can be acclaimed as political compromises which, seen in the longer term, are attempts to avoid otherwise necessary adjustments and delay longer-term structures adjustments which a rational policy requires. An example of this is the currency equalisation payments resulting from the delay in adjustment of the national levels of producer prices to changes in currency rates. The more restricted the financial possibilities are, the less room there is for political compromises which are attractive in the short term without considering their middle and long-term effects, and the more urgent the decisions become, to facilitate the adjustment of supply factors to possible demand.

The annual determination of market regulation prices provided for in the market regulation scheme (intervention prices, target prices etc) should make it possible to take swift account of the actual and projected state of supply and demand on the individual product markets. As public intervention in these markets through the various market regulation measures requires public financial support, the pricing decisions involve in practice a decision on the budget resources available. This

requires conceptions on probable developments of supply and demand in quantity terms (on the Community and world markets) at the time of drawing up proposals on prices and drafts budgets. In order for market equilibrium to be possible at the foreseen prices, the future development of the market and the necessary extent of market regulation operations and budget expenditure must be thought out well in advance as accurate as possible. It is assumed that a condition is that the goal must be reached with the lowest possible cost to the guaranty fund.

Those responsible for the political decisions should thus be in a position to predict the effects and costs of the selected policies. This also applies to variations which occur in the form of compromises during the formation of policy.

The probable volume of market regulation operations (increasing or reducing intervention stockpiles, export subsidies, costs of denaturing etc) yield the projected expenditure under major headings in the guaranty section of the budget.

For the purposes of preparing price and budget recommendations in the shorter term (current and following year), supply balance sheets as a form of summaries of the short-term forecasts provide an important aid to decision-making. Forecasts of future developments in individual product markets (possibly in the Commission's submissions to the Council) provide the underlying reasoning and background to the proposals on prices and the budget, and for longer-term policies for reestablishing market equilibria (e.g. milk or wine).

The same applies to management of market regulation by Community and national administrations (the Commission, management committees,

national ministries and market regulation offices). At this level there is a need for much more detail in the statistical information. Annual forecasts are broken down into shorter periods in order to obtain preliminary and final data on actual developments for earlier checks of forecasts. Also involved here is a mass of operational data (e.g. volume and costs of intervention operations, denaturing, export subsidies).

Collection and evaluation of this continuous stream of data enables their incorporation into supply balances to show clearly the extent of market regulation operations (which differ by type of market regulation). One possibility here would be e.g. to show initial and final stocks separated into stocks in official intervention stockpiles (including officially subsidised stocks in private hands) and "others". In order to show the volume of movements through stocks the uptake and release could and should be shown at least for official stockpiles. The balance of these would correspond to the balance of initial and final stocks (on official stockpiles). The headings on the uses side could be broken down according to need in order to show, for instance, domestic uses at "market prices" and subsidised prices (after denaturing) for feed, distilleries, industrial use or distribution at reduced prices of foodstuffs to specific groups of consumers; similarly exports could be shown according to exports at "world market prices" (i.e. with "normal" export subsidies), as aid in the form of foodstuffs, and other measures. An example of this is the balance sheet for butter and skimmed milk powder in the 1976 Report of the Commission on "The state of agriculture in the Community", January 1977, pp. 332-3.

Regular publication of this kind of data would improve the understanding of the markets, make it easier to reach the "correct" decisions for private firms, and supply economic

researchers with the necessary information they require.

Economic intervention by "the State" and by Community institutions involve i.a. a growing need for statistical information. Reliable statistical information is required for empirical analysis of the initial position, to assist in making the most rational policy decisions, for implementing the measures embodying the chosen policy, for monitoring the effectiveness of these, and for establishing and evaluating the experience gained with a view to possible modification of decisions.

Supply balance sheets for individual products or product groups cover specific produce markets, and provide quantity statistics for only part of the required statistical information; moreover they are themselves already in the form of an aggregated summary of a range of quantity data. We are concerned here with the observation and influencing of markets, and this requires to take into account in quantitative analyses quantity and price data, i.e. also figures for value totals, the determining factors of supply and demand and the interdependence between individual markets.

Supply balance sheets are, to the extent that they are based on statistical data, concerned with the past, like all statistics. They provide inter alia the basis for empirical analyses in agricultural economics, in order to gain experience on the quantitative and causal relationships between various parameters which can then be used for forecasting purposes. These analyses can also be used to clarify the extent to which economic policy measures (e.g. price fixing) have been effective in terms of the target or otherwise, and to attempt to discover the reasons for the succes or failure. These results from analysis of past situations can then be taken into account in future policies.

Economic policy decisions are concerned with the near and more distant future. They should not be made "in isolation", but rather in the context of an optimal orientation of policy towards the targets given forecast developments. In order to estimate the course of future supply in the short and middle term, forecasts or projections are made on the basis of past experience.

Forecasts for the current year, or for even shorter periods (quarterly, monthly), for the following crop (calendar) year, or middle-term projections (5 or 10 years) involve working assumptions (conditioned forecasts). These assumptions must be continuously checked for validity and likelihood, or in the light of changes in their relative importance and the forecasts or projections have to be revised as new knowledge becomes available. Continuous monitoring of forecasts is also part of the process of following the economic developments.

As it is impossible to make firm forecasts of future developments of the dimensions incorporated in the assumptions, no absolute answers are possible. It is, however, possible by varying a few central assumptions (e.g. future path of per capita real income or rate of growth of production) to indicate limits within which the probable development is likely to fall.[1]

The more complete and reliable the underlying statistical data are, the better the conditions for differentiated empirical

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(1) cf. i.a. Wöhlken, E.: Grundfragen zu Vorausschauen in der landwirtschaftlichen Marktforschung (Fundamental problems of forecasting in agricultural market research) in Landwirtschaftliche Marktforschung in Deutschland. Festschrift für Arthur Hanau (Agricultural research in Germany, In honour of Arthur Hanau), pub. G. Schmitt, Munich, 1967, pp. 223-240; Mönnig, B.: Nachfrage nach Nahrungsmitteln in der EG (6) - Analyse und Projektion (Demand for foodstuffs in EUR-6 - analysis and projection), dissertation, Giessen, 1975.

analyses, and hence the better the chance of obtaining reliable forecasts. These statistics provide at the same time a major part of the information required for proper understanding of the market conditions.

6.2. Short-term forecasts

In research in agricultural economics work on quantitative analyses of factors affecting demand has been more advanced than of factors affecting supply.[1] One result of this is that forecasts and middle-term projections of supply are subject to a greater margin of uncertainty. Previous developments in statistics have, however, shown that this uncertainty can be reduced at least for short-term forecasts of supply (production).

To form ideas on prospective crops, there are numerous surveys available on intentions on the extent of cultivation for winter and summer crops on arable land and for vegetable cultivation; these are available before the results of censuses on land use. The first figures for the forthcoming harvest yield are trend-extrapolations, followed by reports on growing conditions, and then the first estimates from field stations, before the final results become available. Recently developed methods involving extensive use of meteorological data are capable of giving reliable forecasts of yields per hectare by early Spring (these were developed originally for cerceals forecasts). All these figures make a steady refinement possible over several months from the first extrapolated forecasts up to the final returns. A special drive by EUROSTAT to develop statistics on permanent crops of fruits has made considerable improvement possible in longer-term forecasts of production capacity.

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(1) Plate, R.: Agrarmarktpolitik, Grundlagen (Fundamentals of agricultural market policy), vol. 1, Munich, Basel, Vienna, 1968, pp. 116 et seq.

There are similar statistical aids to short and medium-term projections of production of livestock and animal products. The livestock censuses, giving data on age and weight, use and sex, are combined with slaughtering statistics and foreign trade figures for live animals to give projections of domestic production of pigs and beef cattle. Numbers for pregnant sows and the calving ratio make it possible to extend the forecasts beyond the "life expectancy" of the animals covered within the census period. The four-monthly Community pig census should be largely adequate to the needs of the forecasts. The introduction of a second beef cattle census (in June) would considerably improve the reliability of forecasts of the supply of beef.

Forecasts on supply of poultry meat and eggs have been considerably improved as a result of the statistics on eggs for hatching and hatchings in the larger hatcheries and on poultry slaughterings in larger enterprises.

The period of the forecasts could be further extended by questions on future intentions (the subject of controversy for some years); these could cover the state of orders at hatcheries or intended covering of sows.

The difficulties with consumption forecasts (at least for human consumption) are relatively smaller for short-term forecasts using macroeconomic forecasts (growth rates for real and nominal consumer income).

An important condition for reliable short to long-term forecasts is continuous and detailed analysis of product markets by interpretation and evaluation of an adequate system of statistics by agricultural researchers and the national, Community and international agencies. On the basis of the experience gained from this, gaps in statistical data and deficiencies in their quality can be determined and suitable points for improvement

discovered, research directed towards gaps in our knowledge and methods of forecasting improved.

6.3. Medium and longer-term projections

For decisions relating to creation (or reestablishment) of a structural equilibrium in a market by adjusting factor inputs and the agricultural structure, with consequential effects on agricultural incomes, longer-term projections are a major aid to rational decision-making. These projections are not of the nature of quantitative targets embodying the policy aims or involving recognition of the feasibility of these, where merely the extent and degree of policy measures for reaching the aims within the envisaged period are calculated. We are concerned below with projections of a more indicative nature designed to illustrate possible developments in the context of the basic assumptions made.

These are no forecasts, but projections under given conditions or assumptions. Subsequent reality will differ more or less from these projections as a result of deviations from these conditons, or because of unpredictable and frequently unusual events. Such longer-term projections must accordingly also be subject to the constant monitoring in the light of actual developments and to appropriate revision. The actual purpose of these scenarios is not to produce numerical forecasts for future values, but to "illustrate the underlying forces and the economic processes resulting from these. This at the same time points to suitable areas for effective application of agricultural policy ... Used like this (the model) can serve as a map of development in agriculture within the framework of general economic growth, and as a basis for assessing the trends operating in agriculture and the effects of agricultural policy

on these.[1]

During the last two decades there has been a flood of medium and long-term forecasts and projections over 5, 10 and 15 years from researchers, governments, secretariats of international organisations such as the OECD and FAO, and from the EC Commission either directly or as a result of commissions. These have dealt with future developments in production and consumption and foreign trade balances for the major agricultural products and foodstuffs at the national and regional levels and for developed and developing countries. Methodology and forecasting methods have been developed an refined. The importance of reliable and sufficiently detailed statistical information has been generally recognised, and the modes of operation and limitations of policy instruments for agricultural policy have been studied.

A distinction should be drawn here between projections for individual products or product groups (production, consumption, balance of trade) where the elements correspond to entries in the supply balance sheets (or food balance sheets) and the data for the base period are taken from or derived from individual supply balance sheets. This first group are intended to provide information on possible developments in individual agricultural markets within the basic assumptions. Most projections are of this type.

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(1) EC Commission: "Wirkung einer Senkung der Agrarpreise im Rahmen einer gemeinsamen Agrarpolitik der EWG auf die Einkommensverhältnisse der Landwirtschaft in der Bundesrepublik Deutschland." (The effects of a decline of agricultural prices within the framework of Community agricultural policy on relative incomes in agriculture in the Federal Republic of Germany) expert's report of members of the scientific advisory board of the Federal Ministry of Agriculture and of economic advisers to the EC Commission. Agricultural studies no. 11, Brussels, 1962, par. 55 (so-called "report by professors").

Other questions require use of forecasts for global aggregates of a higher order in agricultural integrated accounts: value and volume figures for final output, inputs, gross and net value added at market price and factor cost. If it is assumed that incomes from agricultural activities should grow relatively with disposable real income per person employed (or per head) in the economy as a whole (or in the rest of the economy), it is possible to calculate the number of fully employed persons for which these expectations of income from value added from agriculture can be satisfied. It is then possible in consideration of the "income capacity" of types of farms (including differing sizes) to produce alternatives for factor inputs and structural developments and agricultural policy measures.

This type of projection of global agricultural aggregates are either built up "from below" or "synthetically"[1] by combining elements from projected supply balance sheets and supplementary calculations of the value of final output, material inputs and value added ("farm income"), or else are directly established from global aggregates in agricultural economic accounts for a base period, using assumptions for rates of change in the individual aggregates (final output, inputs, gross and net value added etc.)[2]. The growth rates should be derived from

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(1) see "Der Mansholt-Plan - Kritik und Alternativen" (The Mansholt Plan -criticisms and alternatives) pub. by the Federal Ministry for Agriculture, Food and Forestry, in the series "Landwirtschaft - Angewandte Wissenschaft", vol. 141, 1969, p. 37.

(2) Examples are
- for derivation from individual product markets:
  Plate, R., Woermann, E., Grupe, D.: Landwirtschaft im Strukturwandel der Volkswirtschaft (Agriculture in the structural change of the economy), "Agrarwirtschaft", special issue 14, Hannover 1962 (the basic model for the "report by professors" cited above) and its continuation in Plate, R. and Neidlinger, G.: Agrarmärkte und Landwirtschaft im Strukturwandel der 70er Jahre. Analyse und Projektion für die Bundesrepublik Deutschland (Agricultural markets and agriculture in the structural changes of the Seventies, analyses and forecasts for F.R. Germany), Hiltrup, 1971.
- for direct derivation from global figures:
  "Agrarbericht 1971" (Report on agriculture for 1971) by the Federal Government, Deutschen Bundestag publication VI/1800, pp. 58 et seq. (for F.R. Germany and the EUR-6 up to 1980).

"synthesised" projections or based on these. The effect of all these forecasts and projections on agricultural policy is difficult to determine, as these aids to decision are only one of a number of factors affecting the decision-making process, and their effect cannot be isolated in any quantitative way.

Short-term forecasts of developments in individual markets in the form of supply balance sheets are natural, daily working material for the Commission, management committees, governments and national offices. They should therefore also regularly affect the development of opinion within the Commission during preparation of submissions to the Council on market and pricing policy.

Regular publication of forecasts and annual reviews by the Commission, governments and research institutes make it possible for the interested public to form informed opinions.

Medium and long-term projections for individual markets can also serve to indicate areas for implementing policies aimed at establishing structural equilibrium in these markets, by making it possible to quantify the effects of different policy actions (e.g. changes in relative prices of cereals in order to avoid structural surpluses of individual types of cereal). Medium and long-term projections for agriculture as a whole using global figures from the agricultural economic accounts are used to indicate the direction of adjustment processes required in factor inputs and farm structure as a result of technical progress and rising expectations for income on the part of those engaged in agriculture in the context of general economic growth combined with a slow rate of increase in demand for agricultural products. Required reductions of production capacity would not only have consequences for employment, but also for the area under cultivation and specific lines of production (milk cows).

The "Report by professors" quoted above is the best-known example of an expert assessment of agricultural pricing policy in the EC based on model-projections with alternative assumptions. This showed that the reduction in German real agricultural prices required to attain a uniform Community price level was merely an acceleration of an adjustment process which would have been inevitable even without the formation of the Community as a result of general economic developments and technological innovations. In order to control and soften the adjustment in factor inputs and the size of agricultural holdings in a setting of rapid economic growth, special policies and direct and limited income supplements were proposed, which are now regarded as a natural component of national and Community agricultural policy. The implementation of these proposals in current policies was achieved after a long period of opinion formation. The recommendations were finally embodied in the agricultural programme of 1968 of the Federal Government and in subsequent programmes.[1]

The developments around the EC Commission memorandum on "Agricultural reform" of December 1968 have shown that general agreement on the past and future developments of agriculture does not necessarily imply general agreement on interpreting the targets and on a Community structural and social policy system.

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(1) Working programme for the Federal Government agricultural policy (Agricultural programme), Federal Ministry for Agriculture, Food and Forestry, series "Landwirtschaft - Angewandte Wissenschaft", vol. 134, Münster, 1968, and

Structure of targets and programmes for agricultural and food policy in the Federal Republic of Germany, in "Agrarbericht 1973" (Report on agriculture for 1973) and later annual reports of the Federal Government, published by the Deutscher Bundestag.

6.4. Conclusions

In times of low general economic growth, widely differing rates of inflation and currency problems adversely influencing progress towards integration, it is difficult to point to concrete contributions of projections of production and demand in the form of supply balance sheets. Decisions on market adjustments at minimum cost to the budget are deferred wherever it is possible to find a compromise through an extensive interpretation and application of the principle of financial solidarity. Quantitative forecasts enter the decision-making process to the extent that they help to clarify the costs in budget and general economic terms of these compromises.

If quantitative forecasts are to assist rational consideration and to contribute to forming opinion among those concerned in the decision-making and of general political opinion, these forecasts must be "constantly checked and up-dated, constantly brought to public notice, and - where necessary - effectively defended".[1]

An attempt to use forecasts to contribute to forming public and expert opinion on probable developments in agriculture and to affect policy formation in the context of a programme for agriculture was made by the German Federal Government in the "report on agriculture for 1971" quoted above.[2]

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(1) cf. Hanau, A.: Der Mechanismus der agrarpolitischen Willensbildung, dargestellt am Beispiel der Getreidepreisangleichung in der EWG. (The mechanics of opinion formation in agricultural policy, as exemplified in the EC cereals price adjustment) in Die Willensbildung in der Agrarpolitik" (Formation of opinion in agricultural policy). Schriften der Gesellschaft für Wirtschafts- und Sozialwissenschaften des Landbaes, vol. 8, Munich, Vienna, 1971, pp. 332 et seq.

(2) Scholz, H.: "Agrarprojektionen in der EWG - Grundlagen der agrarpolitischen Planung" (Agricultural forecasting in the EEC - the basis for planning of agricultural policy) in "Mobilität der landwirtschaftlichen Produktionsfaktoren und regionale Wirtschaftspolitik" (Mobility of agricultural factors of production and regional economic policy), same publication vol. 9, Munich 1972, pp. 247 et seq.

The EC Commission itself feels no doubts about the usefulness and necessity of projections in the form of supply balance sheets for the individual products and in the form of aggregated agricultural economic accounts. In the "Appraisal of the common agricultural policy"[1] paras 100 and 101 stated:

"100 Improved understanding of the market on the national, regional and Community and international levels, together with more detailed and more current figures are valuable tools in short-term management of markets.

101 The problems involved in establishing market equilibrium and security of supplies and in budget forecasts can only be overcome with the help of projections and forecasts of developments in the major agricultural product markets. The Commission therefore considers it is essential to extend work in this area so that the Community can at all times turn to up-to-date short-term (up to 18 months ahead) forecasts and medium and long-term projections (1985). The Commission will take the necessary measures to reach this goal."

The same document (par. 61) points out in connection with the problems of world trade that the need for precise means for analysis and research of future conditions is pressing in the case where a medium-range policy on world trade is being carried out. A well-based price policy and improved forecasts of market developments should make it possible to avoid extraordinary measures such as import bans (par. 98). In the context of the agricultural budget and budget management by the EAGFL the

(1) EC Commission: "Bilanz der gemeinsamen Agrarpolitik" (Appraisal of common agricultural policy) (Commission report to the Council and Parliament), KOM (75) 100, February 1975.

importance is once again pointed out of a comprehensive and up-to-date picture of the situation in the market (improvement of the system of statistics and speeding up availability of information) and improvement of short and medium-term forecasts (par. 132).

Putting these requirements into practice implies the need for empirical research in agricultural economics, analysis and forecasting of the Community agricultural product markets by close collaboration between experts in the member countries, in order to take advantage of national experience of influential factors for which insufficient quantitative information is available; it also implies continuous work on forecasting and projection to keep these abreast of the latest information.[1] Continuous observation and expert evaluation of the markets could be strengthened if, as proposed, the data arising in the course of the implementation of agricultural market regulation (from Commission market regulation departments and national departments) are made available to departments concerned directly with production of statistics and supply balance sheets. In this way the analysis of the agricultural markets could be improved and forecasts and projections made more certain and reliable, as the supply balance sheets could then better reflect the activities of market intervention. A first step in this would be (as already discussed above) division of stocks into intervention stockpiles and other stocks, display of the volume of intervention and releases from stocks under various conditions, and separation of utilisation within the Community and for export according to uses at "normal" market prices and (subsidised) special conditions.

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(1) cf. Plate, R. and Neidlinger, D., op. cit., p. 3

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