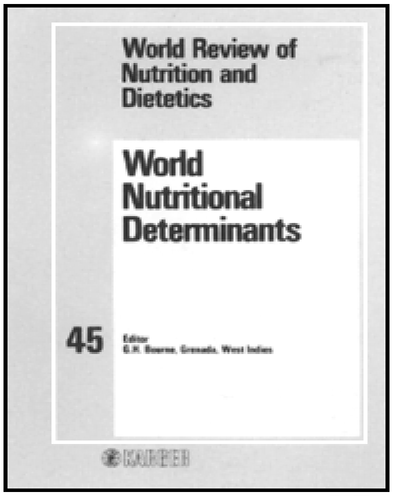
World Review of Nutrition and Dietetics (ISSN 0084-2230), **Vol.** 45
Series Editor: G.H, Bourne, Grenada, West Indies

World Nutritional Determinants

Volume Editor: G.H. Bourne, Grenada, West Indies



Contents

In seven expert reviews, this volume summarizes international knowledge on topics of current interest to nutrition researchers. General problems of world food supply are covered together with findings from the basic sciences.
The volume opens with a critical assessment of the many economic`` and political realities that cripple the capacity of nutrition research and technology to improve worldwide food production and food supply. Focused on agricultural planning, the review also examines problems which make it difficult for nutritionists to reach consensus on essential dietary guidelines. Poor childhood nutrition forms the focus for the second review, which uses data on Egyptian preschool children as a model for discussing the components of a preventive approach. The third review draws upon the anthropology literature to show how many cultures have beliefs and practices that operate to improve nutritional status. Findings from this review work to counter the general assumption that cultural taboos, superstitions, or habits promote poor nutrition. The second half of the book is devoted to advances from the biological sciences relevant to nutrition research. Topics include the roles of vitamins C, E, B group, and A in the mediation of human immune responses, the importance of vitamin E in human cellular metabolism, and the nutritional and hormonal requirements of mammalian cells in culture. The volume concludes with an evaluation of mechanisms involved in the biological transformation of B-carotene into vitamin A.

Fields of Interest

Nutrition, Metabolic Diseases; Biochemistry, Hematology, Immunology, Pediatrics

World Review of Nutrition and Dietetics, Vol. 45
World Nutritional Determinants
Volume Editor: G.H. Bourne, Grenada, West Indies
X + 226p., 11 fig., 34 tab., hardcover, 1985
SFr. 198.-/DM237.-/US$84.25
ISBN 3-8055-3948-7

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KI 84282

Annals of
Nutrition & Metabolism

European Journal of Nutrition, Metabolic Diseases and Dietetics Journal européen de nutrition, des maladies métaboliques et de diététique Europäische Zeitschrift für Ernährungswissenschaft, Stoffwechselstörungen und Diätetik
Official Journal of the Federation of European Nutrition Societies
Annals of Nutrition and Metabolism (formerly 'Annales de la Nutrition et de l'Alimentation' and 'Nutrition and Metabolism') is recognised by the 'Federation of European Nutrition Societies' (FENS) as its official journal
Founded 1959 as 'Nutritio et Dieta' by E. Azerad, H. Kapp and J. Trémolières
Former Main Editor: A. Wretlind (1961–1969)
Continued as 'Nutrition and Metabolism' (1970–1980)
Since 1980 integrating 'Annales de la Nutrition et de l'Alimentation'

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Ann, Nutr. Metab.
Printed in Switzerland

S. Karger AG,
Postfach, CH-4009
Basel(Schweiz)

Erscheint zweimonatlich;
pro Jahr 1 Band zu 6 Heften

Annals of
Nutrition &
Metabolism

Submission: Only original papers written in English, German or French are considered and should be sent to:

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General Information

Publication data: 'Annals of Nutrition and Metabolism' is published 6 times annually. Volume 29 with 6 issues appears in 1985.

Subscription rates: Subscriptions run for a full calendar year. Prices are given per volume, surface postage included.

Personal subscription: SFr. 177.80, US$ 86.80. (Must be in the name of, billed to, and paid by an individual, Order must be marked 'personal subscription'.)

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Members of the Federation of European Nutrition Societies (FENS): SFr. 152.40, US$ 74,40.
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Microform subscription: SFr. 177.80, US$ 86.80. (Available exclusively to subscribers of the paper edition.)

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Bibliographic indices: This journal is regularly listed in bibliographic services, including *Current Contents®.*

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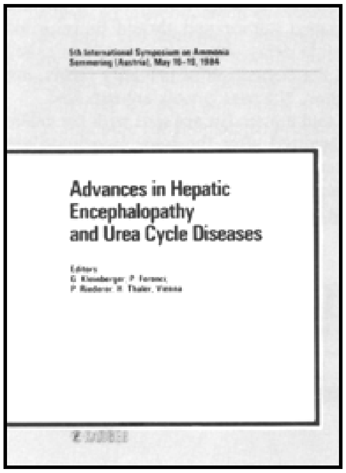
5th International Symposium on Ammonia, Semmering, Austria, May 1984

Advances in Hepatic Encephalopathy and Urea Cycle Diseases

Editors: G. Kleinberger; P. Ferenci; P. Riederer; H. Thaler, Vienna



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Opening Lecture · Panel Discussion: 'Future Clinical Trials in the Treatment of Acute Hepatic Encephalopathy' · Significance of Different Animal Models for the Study of Liver Insufficiency · Physiology and Pathophysiology of Ammonia Metabolism · Urea Cycle Diseases and Hyperammonemic Encephalopathy · Blood Brain Barrier Permeability · Neurotransmission ·Clinical Aspects of Hepatic Encephalopathy · Non-Hepatic Metabolic Encephalopathy · Amino Acid Metabolism · Hormones and Non-Protein-Metabolism · New Aspects of Nutrition in Liver Diseases · Special Aspects of Patients with Liver Disease

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Fields of Interest

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SFr:159.-/DM190.-/US$67.75
ISBN 3-8055-3995-9

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KI 85003

Eurofoods: Towards Compatibility of Nutrient Data Banks in Europe

Guest Editor:
C.E. West, Wageningen

1 figure and 5 tables, 1985

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Annals of Nutrition and Metabolism
Vol. 29, Supplement 1, 1985

S. Karger · Medical and Scientific Publishers
Basel · München · Paris · London · New York · New Delhi · Singapore · Tokyo · Sydney

Contents

Preface

Over the last couple of years, there has been increased interest in bringing about compatibility of food composition tables and nutrient data banks throughout the world. This publication describes the developments which have taken place in Europe since the establishment of Eurofoods in 1982. As the foundations of any activity related to food composition tables and nutrient data banks are those existing in individual countries, a review of these tables is included together with a number of background papers. In addition, a summary of recommendations made at the initial Eurofoods Workshop in Wageningen in May 1983 together with a review of subsequent progress are also presented.

Eurofoods has been fortunate in attracting funds from the Commission of the European Communities to carry out a project to investigate the feasibility and methodology of developing an easily accessible merged data base of European food composition tables. In addition, it has been possible to start a number of other projects. One of these concerns the collection of data related to nutrient losses and gains in the preparation of foods and data on missing values in food composition tables. Another is examining the comparability of analyses obtained by different laboratories. However, progress in reaching the aims of Eurofoods has been inhibited by the lack of funds for projects and the establishment of a secretariate to coordinate and serve the various activities. The Kellogg Company of Great Britain has been generous in providing funds towards this publication.

The second major meeting of Eurofoods will be held in Norwich (UK), August 25–28, 1985, immediately after the XIIIth International Congress of Nutrition. The meeting is intended to review progress since the workshop in Wageningen in May 1983 and to lay the foundations for the future of Eurofoods.

C.E. West

0250-6807/85/0297-0007 $ 2.75/0

1 Introduction: The Establishment of Eurofoods

Early in 1982 several members of the Department of Human Nutrition of the Agricultural University in Wageningen decided that the time had come to do something about the compatibility of food consumption tables and nutrient data banks in Europe. This idea was presented to and accepted by two groups of nutritionists and food scientists in Europe. These groups were the Working Group on Diet and Cancer of the European Organization for Cooperation in Cancer Prevention Studies (ECP) and Subgroup 4 of Cost 91 which is coordinated by the Commission of the European Communities.

In order to bring people in Europe interested in nutrient data banks together, it was decided to hold a workshop in Wageningen, May 29–31, 1983, immediately after the Fourth European Nutrition Conference held in Amsterdam. The workshop, entitled 'Towards Compatibility of Nutrient Data Banks in Europe', was designed as a first step towards: (1) increased and easier exchange of analytical data on food composition between the various countries in Europe; (2) increased opportunities for cooperation in international nutrition studies within Europe arising from increased compatibility of the nutrient data banks, and (3) increased exchange of information on the development of nutrient data banks in Europe.

An organizing committee was established with 6 representatives of various groups in The Netherlands together with 3 people from other countries in Europe. The members of this committee were: Dr. *C.E. West* (coordinator), Miss *W.A. van Staveren*, M.Sc., Ir. *B.C. Breedveld*, Dr. *A.B. Cramwinckel*, Miss *K.F.A.M. Hulshof*, Ir. *M.J. van Stigt Thans*, Dr. *L. Arab*, Dr. *D.A.T. Southgate*, and Mrs. *L. Bergström* (for list of affiliations and addresses see Appendix).

When the idea of holding the workshop in Wageningen was being considered, it was thought to be somewhat of a novel development. However, it soon became obvious that other people were having the same thoughts. Within Europe, a working group on food composition tables and data banks had already been established to facilitate cooperation within the Nordic countries (Denmark, Finland, Norway and Sweden, which were later joined by Iceland). Therefore, a member of the Nordic Working Group (Mrs. *L. Bergström*) was invited to join the Organizating Committee. On the other side of the Atlantic in the United States, Infoods was being planned (see below). Its initial aims as outlined in the paper by Dr. *Rand* were 'the creation of a comprehensive, internationally focused food data base covering the spectrum of biologic activity of food from essential nutrients to non-nutrients and contaminants'. As these aims and those of the workshop in Wageningen have very much in common, it was decided to call the organization being established to run the workshop and subsequent activities, Eurofoods. The name Eurofoods was decided upon as it was felt that it expressed the idea of being closely associated with Infoods while retaining the objective of European cooperation. (In a similar way, the Nordic working group on food composition tables and data banks has now adopted the name Norfoods.) Representatives of Infoods were invited to the Eurofoods workshop to strengthen the links between the two organizations. In fact much of the funding for the workshop came from Infoods. Funds were also made available by ECP, Cost 91, the University of Heidelberg, ZWO (the Dutch organization for supporting scientific research), and the Agricultural University in Wageningen. The Netherlands Nutrition Foundation acted as guarantor in case sufficient funds could not be raised from other sources.

As mentioned above, Eurofoods was being established at the same time as Infoods which held a planning meeting in Bellagio, Italy in 1983 attended by a number of people associated with Eurofoods. The basic aims of Infoods are to promote international participation and cooperation in the acquisition and exchange of data on the nutrient composition of foods in forms appropriate to the needs of a wide range of people and organizations. At the Eurofoods Workshop in Wageningen, it was firmly established that Eurofoods will work both independently and within the framework of Infoods. In following the recommendations made at the workshop, it can play an important part in reaching the goals established by Infoods. In order to achieve its aims, Infoods has established a number of task forces including the task force on the revision of the guidelines on the preparation of food composition tables. The earlier guidelines were prepared by Dr. *Southgate*, and he is revising them with the assistance of Dr. *Heather Greenfield* of the School of Food Technology of the University of New South Wales in Sydney, Australia.

Infoods gave assistance to Eurofoods in running the Wageningen workshop and has been instrumental in setting up Noafoods in North America, Latinfoods in Latin America, and Asiafoods in Asia. The coordinator of Eurofoods is on the Policy Committee of Infoods which met in Miami in August 1983 and in Madrid in July 1984. Other members of Eurofoods, in addition to *Dr. Southgate*, have been appointed to Infoods task forces. In this way duplication of work will be avoided.

In the same way that Eurofoods works with Infoods, a close relationship has been built up between Norfoods and Eurofoods. There is no conflict of interest between the Nordic Working Group and Eurofoods, and each can benefit from the existence of the other.

2 Purpose of Nutrient Data Banks and Options for Eurofoods

A.B. Cramwinckel

Over the last 10 years or so, work has begun in several places in Europe to make food composition tables suitable for use with computers. In England in 1978, the first computerized version of the McCance and Widdowson table was made; in 1972, a working group was set up in The Netherlands to develop a computerized system for analyzing data from nutrient surveys, in the Federal Republic of Germany in 1978, the Lindas data bank started; and in 1980, the French Nutrition Foundation began development of a national data bank. Most European countries now have at least one nutrient data bank. The reason for the development of these data banks is obvious. As outlined by *Bruce and Bergström* [1], there has been an increasing demand for good and reliable food composition tables because of the increase in research on the relationship between diet and cancer. In these epidemiological studies, it has been found that not only the traditionally studied nutrients, but also a number of other components in the diet have to be considered. In addition, many studies now examine interactions between nutrients and the effect of dietary components on bioavailability and metabolism of nutrients.

Because of the complexity and cost of these data systems, it is necessary that there is cooperation not only within, but also between countries. As outlined in the Introduction, the Wageningen workshop was designed as a first step towards such cooperation in Europe. Increased compatibility of the nutrient data banks will increase and make easier the exchange of analytical data between the various countries of Europe.

Eurofoods is not the only organization working towards cooperation between countries on nutrient data banks. Within Europe, the Nordic countries, Denmark, Finland, Norway, and Sweden established Norfoods, a project group on food composition tables and nutrient data banks which was later joined by Iceland. Several months prior to the Wageningen Workshop, the first planning meeting of the International Network of Food Data Systems (Infoods) was held [2]. At this meeting, *Young* [3] referred to the importance of nutrient and food component data in understanding the role played by the nutritional environment in human health and welfare. On this basis alone, according to *Young*, it is obvious that these data are an essential resource for those concerned with food supply and its implications for the well-being of individuals and populations at large.

People have an interest in food composition tables and nutrient data banks for a variety of reasons. From a survey carried out prior to the Wageningen Workshop and reported in the paper by *Arab*, people were identified as carrying out three separate functions: using the data itself, food composition table and data base construction, and food analysis. Thus Eurofoods will make most progress if people with these three separate functions work together.

It is necessary to identify the requirements of the users, table/data base constructors, and analysts. Users are a heterogeneous group of people. They comprise public authorities, epidemiologists, medical practitioners, food scientists, and those involved in home economics, the food industry, and information transfer. It is necessary to know what type of products and which nutrients and other constituents they would like included, what information they require about the data itself, and the type of software required to satisfy their needs. Constructors of food composition tables and nutrient data bases have their own wishes. They like to see a system which is complete, one which can be easily updated and which provides data on the updates made, and a system which gives information on the source and accuracy of the data. They also require a system which provides an adequate description of foods including mixed dishes and a good method for coding the foods. Analysts want agreement on suitable methods of analysis, on methods of sampling, on rounding figures, and on the description of mixed dishes.

In summary, Eurofoods is important because it will help to bring about cooperation between countries in Europe and between users, food composition table/nutrient data base constructors, and analysts. Cooperation is necessary, because among other reasons, there is not enough money to meet all the wishes of those involved with food composition tables and nutrient data bases.

References

1 Bruce, A.; Bergström, L.: User requirements for data bases and applications: nutrition research. Background paper prepared for the Planning Conference Concerning an International Network of Food Data Base Systems (Infoods), Bellagio, Italy 1983.

2 Rand, W.M.; Young, V.R.: Report of a Planning Conference Concerning an International Network of Food Data Base Systems (Infoods). Am J. clin. Nutr. *39*: 144–151 (1984).

3 Young, V.R.: Infoods: an introductory statement of purpose and goals of the Planning Conference. Background paper prepared for the Planning Conference Concerning an International Network of Food Data Base Systems (Infoods), Bellagio, Italy 1983.

3 Review of Food Composition Tables and Nutrient Data Banks in Europe

3.1 Introduction

There has been no comprehensive review of food composition tables in Europe since the updated bibliography of the world's food composition tables was published in 1975 by the FAO [1]. Thus, prior to the workshop, representatives from each of the 17 countries participating were asked to prepare a paper on the state of food composition tables/nutrient data banks in their respective countries. Those preparing the papers were asked to include: (1) an overview on the establishment and development of food composition tables/nutrient data banks and plans for the future; (2) the role of the various food composition tables/ nutrient data banks within the country, for example, is there a national data bank serving a variety of needs, or are there purpose-specific data banks? (3) the manner in which coordination is achieved at the national and international level, and (4) information on the attitude of government to food composition tables and nutrient data banks.

In addition, a paper on the Nordic working group on food composition tables and nutrient data banks was prepared by Mrs. *Bergström* (3.2). Thus the four papers for the Nordic countries are grouped together (3.3–3.6) followed by the papers for the other countries in Europe represented at the meeting (3.7–3.19). In 3.20, a summary is presented of the questionnaire on food composition tables/nutrient data banks in Europe which was complied, circulated, and analyzed by Dr. *Arab.*

Thus, a picture has been built up of the situation at the time of the Wageningen Workshop with respect to food composition tables and nutrient data banks in Europe. The intention is to revise and extend this investory at regular intervals in order to avoid duplication of effort and to help to bring about cooperation not only between countries but also within countries.

Reference

1 FAO : Food composition tables: updated annotated bibliography (FAO, Rome 1975).

3.2 Activities of Norfoods: the Nordic Project on Food Composition Tables and Nutrient Data Banks

L. Bergström

Norfoods is a project group on food composition tables and nutrient data banks under the Nordic working group on food and nutrition within the official Nordic cooperation concerning foods (see fig. 1).

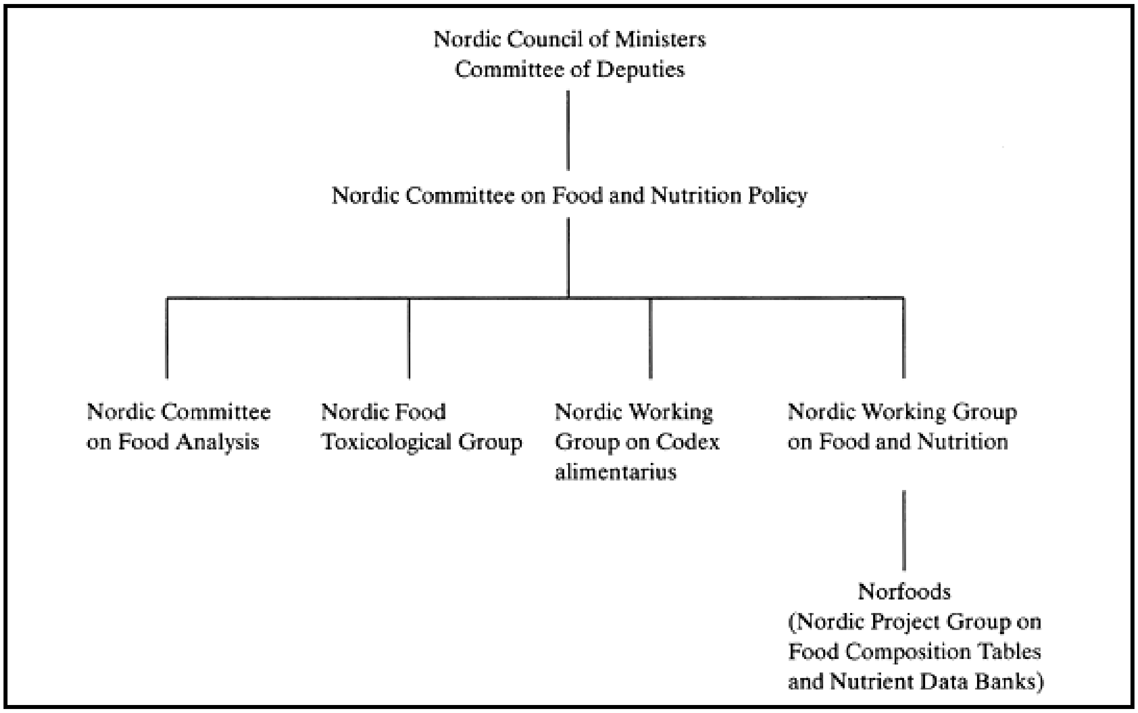

Figure 1. Administrative framework for Norfoods

The goals of the project group are to coordinate and to stimulate work on food composition tables, nutrient data base systems, and on food analysis in the Nordic countries. The group comprises one representative each from Denmark, Finland, Iceland, Norway, and Sweden and a representative from the Committee of Deputies. Norfoods started its activities in 1982 and has met two or three times each year. During these meetings, information has been exchanged on a number of issues including data contained in food composition tables and nutrient data banks (see the reports from individual countries), on the definition of various foods and dishes, on food enrichment and food standards, on current food analysis projects, and on nutrition surveys and other research projects being carried out in the Nordic countries.

This inventory period has been vital for the continuing work of Norfoods. It has facilitated cooperation in identifying, at an early stage, the similarities and differences between the various Nordic countries with respect to data available on the composition of foods. This background information has allowed the members of Norfoods to outline the tasks which need to be tackled.

The major projects of Norfoods are: (1) the preparation of a dictionary of foods and dishes including English, Nordic, and, where appropriate, scientific names: the first part of the dictionary, which will be on foods, is due for publication in 1985; (2) a comparison of data on the nutrient content and the source of such data in food composition tables and nutrient data banks in the Nordic countries; (3) the preparation of a directory of nutrient data banks in the Nordic countries; (4) a register of references on food composition tables and nutrient data banks from all over the world of special significance to the Nordic countries, and (5) a register of references with respect to nutrient losses and gains during the preparation of foods.

In addition to the first part of the food dictionary, it is planned to publish the results of the other studies mentioned above before the end of 1985. Other projects which have been started include: (1) a review of the capabilities of nutrient data base systems established in Nordic countries; (2) preliminary work on the establishment of a computer network of nutrient data banks in the Nordic countries; (3) a survey of enriched foods and of standards for foods in Nordic countries; (4) a comparision of recipes and dishes eaten in Nordic countries, and (5) a register of current projects in Nordic countries carrying out analyses to determine the nutrient content of foods.

As far as Nordic nutrient data bank are concerned, a proposal has been presented to divide foods into 13 main food groups. Discussions have also been held on methods of calculating the energy content of foods and on procedures to be adopted for the rounding off of values in the tables.

It is expected that the work of Norfoods will result in the harmonization of the food composition tables and nutrient data base systems in the Nordic countries. For information on the activities being carried out in the individual Nordic countries, the reader is referred to the summaries on the following pages.

3.3 Denmark

A. Møller, J. Højmark Jensen

Food composition tables have been published in Denmark since 1889. These tables have been prepared by interested individuals on their own initiative. In the last 10 years mostly two tables published by *Helms* [1, 2] have been used. Most of the data on nutrients in Danish foods are based on analyses carried out in government laboratories, mainly at the National Food Institute. In 1981 the Nutrition Unit at the National Food Institute began the compilation of data for the first national food composition table which was published in May 1983 [3]. It is a comprehensive table containing information on 370 food items. For each food, approximately 100 nutrients and other compounds of nutritional importance are listed. About two thirds of the data are based on analyses of Danish foods, the remainder has been collected from the literature.

The data collected for the national food composition table will serve as the basis for the national nutrient data bank to be developed within the next few years. The nutrient data bank is to be connected to a data network system linking all official food laboratories in Denmark. It may also contain data on nonnutrients. It is envisaged that the bank will contain data at different levels. For example, the basic level may contain the raw data which could be used for research purposes, whereas the top level may contain the type of data used in food composition tables. Programs have to be developed for the processing of data from food consumption surveys.

At present, there are several nutrient data banks in Denmark, including one at the Technical University which is based on data from the US Agriculture Handbook No. 8[4]. In the near future the data basis will be exchanged for the official Danish food composition data.

A nutrient data bank has been developed on a commercial basis by the Home Economies Committee of the Farmers' Associations. It has been established as part of the Agricultural Computer Centre in Århus. It is also based on the food composition tables of *Helms* [1, 2] and has been developed to process data from food consumption surveys carried out by members of household organizations.

Increasing public interest in nutrition has resulted in an increase in official activities in this area including (1) a surveillance system for nutrient content of foods on sale in Denmark; (2) official recommendations for nutrient intakes, and (3) the planning of a major national food consumption survey. An official data bank for nutrient content of Danish foods is considered to be an integral part of these activities. The National Food Institute is also participating in the activities of Norfoods.

References

1 Helms, P.: Fodevaretabeller (Academisk Forlag, København 1973–1975).

2 Helms, P.: Næringesstoftabeller (Lægeforeningens Forlag, København 1978).

3 Møller, A.: Levnedsmiddeltabeller (Dafolo Forlag, København 1983).

4 United States Department of Agriculture: Composition of foods. Agricultural Handbook No. 8 (United States Department of Agriculture, Washington 1976).

3.4 Finland

M. Ahola

In Finland there are no official food composition tables, and there is no general nutrient data bank. However, the food composition tables complied by *Turpeinen* [1] are in general use in nutrition education and extension training. The first edition of these tables was published in 1952, and since then 20 editions have been published, the latest in 1983. These tables are based mainly on food analyses carried out in Finland. The 20th edition includes 216 food items commonly consumed in Finland. For each food item, the content per 100 g of the following are given: water, ash, fat, carbohydrate, protein, energy, potassium, calcium, magnesium, iron, retinol equivalents, thiamine, riboflavin, niacin, vitamin C, cholesterol, and fatty acid. Analytical data collected 1975–1980 on 28 mineral elements in 396 Finnish foods were published in a comprehensive mineral table of Finnish foods by *Koivistoinen* in 1980 [2]. This table was published in Finnish by *Varo* in 1980 and revised in 1981 [3].

In the early 1970s a data-processing system for dietary surveys was established [4]. This system is used mainly for research purposes by the Department of Nutrition at the University of Helsinki, the Social Insurance Institution in Helsinki, and the Social Rehabilitation Centre in Turku. The system has two programs. The first converts the food consumed into intakes of basic ingredients with the aid of the food composition file, and the second converts these data into nutrient intakes using the nutrient data file. The recipes for prepared foods included in the food data file were revised in 1983. The output files of the food programs can be entered as such into other programs, which means that multivariate analyses of the dietary variables and background can be made easily. The food composition file and nutrient data file included in the data-processing system are much larger than any of the food composition tables published in Finland. At present, the nutrient data file comprises 60 nutrients and other dietary items in 450 food items and 770 prepared foods. Most of these data come from the tables of *Turpeinen* [1], analyses carried out by Finnish food manufacturers, and laboratory analyses carried out by the Department of Nutrition. Some data have been taken from foreign food composition tables. An effort has been made to include new analytical results in the system as soon as they are published. The main limitation of the present system is a lack of resources for updating the nutrient data files.

Recently the Finnish authorities, especially the National Board of Trade and Consumer Interest and the National Board of Health, have shown an interest in establishing a centralized data system to serve the needs of food quality control in particular. A working group has been set up to undertake preliminary planning for the system. The first stage will be to identify the potential users of the system and sources for valid food analysis data, as well as the sources of existing information. Finland is participating in Norfoods.

References

1 Turpeinen, O.: Ruoka-ainetaulukko (Finnish food composition tables); 20th ed. (Otava, Keuruu 1983).

2 Koivistoinen, P.: Mineral element composition of Finnish foods: Na, K, Ca, Mg, P, S, Fe, Cu, Mn, Zn, Mo, Co, Ni, Cr, F, Se, Si, Rb, Al, B, Br, Hg, As, Cd, Pb, and ash. Acta agric, scand., suppl. 22 (1980).

3 Varo, P.: Kivennäisainetaulukko (Finnish mineral element tables); 2nd ed. (Otava, Keuruu 1981).

4 Ahlström, A.; Räsänen, L.; Kuvaja, K.A., et al.: A method of data processing for food consumption surveys. Ann. Acad. Sci. Fenn. *194*: 1–8 (1972).

3.5 Norway

A.H. Rimestad

In Norway, there is one official food composition table. The National Nutrition Council is responsible for the content and the National Society for Nutrition and Health for the design and publication. This table was published initially in 1961, and has been revised several times. The 5th edition was published in 1984[1]. This table was intended for use primarily as a tool in nutrition education and other such activities. It is also used by dietitians and research workers, but they also have to obtain information from other sources. The importance of the food composition table is recognized by government, and finance is set aside annually for its revision an updating.

The table comprises 760 food items and prepared dishes. Most values are derived from analyses carried out in Norway for the nutrients in milk and milk products, meat, fish, cereals, as well as most values for nutrients in fruit, berries, and vegetables. No single laboratory is responsible for these analyses but both government and private laboratories are contracted for particular analyses. There is also close cooperation with various agricultural organizations which contribute test material and also carry out the analytical work in their own laboratories. Analyses which cannot be carried out in the branch laboratories are handled at official laboratories and financed by the related branch. Cooperation with the food industry has been developed, and many manufacturers supply the results of analyses carried out on processed foods in their own laboratories. They also provide the recipes of some processed foods from which the nutrient content can be calculated. Values for the nutrients in imported foods are obtained mainly from the literature and sources outside Norway.

It is considered important that up-to-date analytical data for raw foods and for industrially processed foods are made available. Another task is the collection of data for foods and food products not included in the food composition tables. This can done by monitoring and analyzing food products being offered to the consumer.

The Section of Dietary Research at the University of Oslo has its own nutrient data bank which is used primarily by the research workers in the processing of dietary data. The section is now designing an official Norwegian nutrient data bank. Norway is participating in Norfoods.

Reference

1 The National Nutrition Council: Matvasetabell (National Society for Nutrition and Health, Oslo 1984).

3.6 Sweden

L. Bergström

One of the tasks of the National Institute of Public Health which was founded in 1938 was to analyze food items. The data obtained together with data from the literature were complied in a food composition table, Födoämnestabeller, which was first prepared by *Abramson* in 1947. Since then these tables have been revised several times, the 7th edition was published in 1982 [1].

Analysis of foods for a comprehensive Swedish food composition table began in the early 1960s. In 1971, the responsibility for food matters was taken over by the National Food Administration which published a comprehensive food composition table in 1978 which was revised in 1981 [2]. A second extended edition of this table is planned to be published late in 1985. An abbreviated form of the table was published in 1981 and revised in 1984 [3].

In the early 1960s, a nutrient data bank was developed based mainly on the food composition table of *Abramson* [1] and data supplied by the food industry in Sweden. Since 1981, a new data bank has been prepared by the National Food Administration. This data bank is based on the official food composition table which also serves as an national standard for all nutrient data banks in Sweden. As shown in table I, there are at present in Sweden 28 such systems developed by national, regional, local authorities, universities, food industries, wholesalers, and private firms. These systems have been devised mainly for nutrient calculation and analysis, recipe analysis and product development, diet planning and analysis, menu planning, and food production and control. Most of these nutrient data banks are still in the process of being developed. It will be desirable to develop some coordination between Swedish systems. However, at present, there are no plans to develop a national data base system serving all needs in Sweden, even if this would be possible in the future. Sweden is actively participating in Norfoods.

References

1 Abramson, E.; Andersson, B.-M.: Kosttabell; 7th ed. (Esselte Studium, Stockholm. 1982).
2 Statens Livsmedelsverk: Livsmedelstabeller: energi och vissa näringsämnen (Statens Livsmedelsverk, Uppsala 1978, revised 1981).
3 Statens Livsmedelsverk: Livsmedelstabeller: energi och vissa näringsämnen, skolupplaga; 2nd ed., revised (Statens Livsmedelsverk, Uppsala 1984).

3.7 Austria

M.V. Veitl

In Austria there are no national food composition tables, and there are no plans to produce such tables. Use is made of food composition tables from the Federal Republic of Germany. There is also no national nutrient data bank in Austria. Food analyses are carried out by federal and private institutes mainly to see that legal requirements are being met. From these analyses the content of the main nutrients, some minerals, and the level of contaminants are determined. Although the results are not published in national food composition tables, they are published in national and international journals.

Use is made of data on food composition in the preparation of meals and special diets in hospitals, to assess the nutritional requirements of nursery school children, and to check the vitamin content of foods served in school canteens. In one hospital use is made of a large computer to calculate nutrient intakes from food intake questionnaires, to prepare recipes with the desired nutrient content, and to calculate the desired nutrient balance between ingested food and excreted nutrients.

3.8 Belgium

G. Verdonk, H. Claesen

In the period from 1960 to 1967, a series of six tables on the composition of foods from manufacturers in various regions of the country was prepared [see ref. 1]. In addition, a table was prepared at the University of Louvain under the direction of Prof. *De Vuyst* [2].

In 1970, a nutrient data bank was established in the State University Ghent [3]. This data bank has been used for a number of studies within the university itself and also the multifactorial trial being carried out by five Belgian universities on the relationship between nutrition and mortality from cardiovascular disease and cancer of the digestive tract. The data bank now includes data on 31 nutrients for about 200 foodstuffs and is mainly derived from the Dutch and British food composition tables. Data from Belgian manufacturers for some products such as margarine are also included.

References

1 FAO: Food composition tables: updated annotated bibliography (FAO, Rome 1975).
2 De Vuyst, A.: Food composition tables (Centre de Recherches Zootechniques de Lovenjoul, Louvain 1973).
3 Verdonk, G.; Huyghebaert-Deschoolmeester, M.J.: Computersysteem voor verwerking van voedingsenquêtes. Voeding *45:* 124–126 (1984).

Table I. Nutrient data banks in Sweden, 1985

System owner	The National Food Administration, NFA (Statens livsmedelsverk, SLV)	The National Agricultural Market Board (Statens Jordbruksnämnd)	The National Board of Consumer Policies Konsumentverket	The Material Administration of the Armed Forces (Försvarets materielverk)
Contact person	Lena Bergström	Margot Herbertsson/ Göran Lindblad	Majbritt von Knorring	Gertrud Johansson
Address	Box 622 S-75126 Uppsala	Vallgatan 8 S-55182 Jönköping	Box 503 S-16215 Vällingby	Karolinen S-65180 Karlstad
Telephone	+46-(0)18-175500 or +46-(0)18-175730	+46-(0)36-169480	+46-(0)8-7390100	+46-(0)54-103000
System name	KOST	-	-	under development
In operation since	1981[1]	1978	1984	
Nutrient data sources	Swedish Food Composition Tables: 1978, 1981 USDA Agriculture Handbook No. 8, 1963, British 1978, German 1981 Analyses from own and other laboratories Food industry data	Swedish Food Composition Tables: 1978, 1981	Swedish Food Composition Tables: 1978, 1981 food industry data	
Number of				
foods	850	-	1,500	
recipes	400	-	-	
aggregated foods	130	125	-	
Nutrients per food	35	10	26	
Other data		food cost and consumption data	food cost data	
Nutrition recommendation	Swedish nutrition recommendations	-	Swedish nutrition recommendations	
Recipe calculation				
Food yields	yes	-	no	
Factors for nutrient losses and gains	yes	-	yes	
System is used by	the administration, some departments of the universities of Uppsala and Stockholm, individual scientists and students	The Board	The Board	
System is suited for	nutrition surveys, specially large ones, diet planning, special diet planning,	calculations of nutrients on the Swedish total and per capita food consumption and	diet planning, menu planning, education, calculations of nutrients,	

	menu planning, research, education, food frequency, meal pattern, optimizing recipes, calculations of nutrients, calculations of statistical parameters, calculations per capita food consumption	food supply, food volume calculations - food costs, food consumption statistics	calculations of costs	
Computer	Nord 100/CXE	Nord 100	ABC 806	
Program source	own	own	Diet and Nutrition Co.	
Program language	Cobol	Basic	Basic	
Operating system	Sintran III VSE	Sintran III VSE	-	
Data base management system	MIMER	-	-	
Access	modem, terminal	modem, terminal	-	
For sale				
Nutrient data base system	yes, on magnetic tape	no	no	
Nutrient data base	yes, on magnetic tape	no	no	
Services	nutrition serveys, menu planning, diet planning, calculations of nutrients, etc.	no	no	

[1] A new version with 105 nutrients will become available in 1986.

System owner	Gothenburg University, Computer Centre (Göteborgs Universitet, Göteborgs Datacentral)	Gothenburg University, Dept. of Home Economics Education, (Inst. f. Huslig Utbildning)	University of Stockholm, Dept. of Inf. Processing Computer Science, (CLEA)	Karolinska Institute, Dept. of Medical Nutrition, Inst. f. Medicinsk Näringslära
Contact person	Monica Abrahamson	Inger Jonsson	Anita Kollerbaur	
Address	Box 190 70 S-400 12 Göteborg	Box 15015 S-400 41 Göteborg	S-106 91 Stockholm	
Telephone	+46-(0)31-603029	+46-(0)31-243417	+46-(0)8-162000	
System name	Foodcomp	Kostplan see AIVO Co. Ltd.	Princess	under development
In operation since	(1980) 1982	1985	under development for microcomputer	
Nutrient data sources	NFA Nutrient Data Bank 1984	Swedish Food Composition	Swedish Food Composition	NFA Nutrient Data Bank: 1984

	own analyses food industry data	Tables: 1978, 1981	Tables other
Number of			
foods	840	600 (more can be added)	600
recipes		550	
aggregated foods	510	-	
Nutrients per food	35	24 (48, 72, etc. can be included)	12
Other data	-	food cost data, recipe procedures	
Nutrition recommendation	no	Swedish nutrition recommendations	Swedish nutrition recommendations RDA, WHO energy
Recipe calculation			
Food yields	yes	yes	no
Factors for nutrient losses and gains	yes	no	no
System is used by	Departments of Clinical Nutrition and of Home Economics Education	students of food science and economics and of home economics	
System is suited for	nutrition surveys, diet planning, special diet planning, menu planning, research, education, calculations of nutrients	nutrition surveys diet planning, special diet planning, menu planning, research, education, calculations of nutrients, calculations of costs	diet planning menu planning. education, calculation of nutrients
Computer	IBM 3033	Apple III	
Program source	SAS, Gothenburg Computer Centre	AIVO	Princess project
Program language	SAS	UCSD-Pascal	Simula
Operating system	Guts Terminal System	A III-SOS	TOPS 1020
Data base management system	SAS	AIVO	own
Access	modem, terminal		
For sale			
Nutrient data base system	no	no	not yet
Nutrient data base	no	no	not yet
Services	-	-	-

System owner	Umeå University, Dept. of Nutritional Research (Umeå Universitet, Enheten f. Näringsforskning)	Umeå University, Dept. of Home Economics Education (Umeå Universitet, HTB-Institutionen)	University of Uppsala, Dept. of Home Economics Education (Inst. för BEHT)	Kalmar County Council, Production Kitchen (Kalmar Läns Landsting, Produktionsköket)
Contact person	Charlotte Nygren/ Rolf Sjöström	Karl Sandberg	Berit Lundmark	Valborg Elglund/ Håkan Briddgård
Address		Nygatan 43	Trädgårdsgatan 14	Länssjukhuset
	S-901 87 Umeå	S-901 87 Umeå	S-752 20 Uppsala	S-39185 Kalmar
Telephone	+46-(0)90-166086	+46-(0)90-117800	+46-(0)18-130568	+46-(0)48-81491
System name	Nutridata	Närdat	System för beräkning	Kalmar Kost
In operation since	1979	1983	1982	1985
Nutrient data sources	Swedish Food Composition Tables: 1978, 1981	NFA Nutrient Data Bank 1983	Swedish School Food Composition Tables: 1984	NFA Nutrient Data Bank: 1985 food industry data
Number of				
foods	870	600	300	800
recipes	-	600	-	-
aggregated foods	-	-	-	133 (7 sets of breakfasts, 63 sets of dinners, 63 sets of suppers)[2]
Nutrients per food	20	35	15	35
Other data	-	-	food cost data	food cost data
Nutrition recommendation	no	Swedish nutrition recommendations	Swedish nutrition recommendations	Swedish recommendations for special diets
Recipe calculation				
Food yields	no	yes	no	no
Factors for nutrient losses and gains	no	yes	no	no
System is used by	scientists, nutritionists	students of food science and economics and of home economics	students of food science and economics and of home economics	the production kitchen
System is suited for	education (diet and menu planning and nutrition surveys), calculations of nutrients	education, calculations of nutrients	education, menu planning, calculations of nutrients and costs	menu planning, calculations of nutrients and statistical parameters, production control
Computer	Commodore PET 3032	Cyber 170–730	Cromenco System Zero	IBM 4331
Program source	own	UMDAC Umeå University Computer Centre		

Program language	Basic	Fortran V	Basic	Cobol
Operating system	-	Cyber 170–730	C-DOS	DOS/VSE
Data base management system	-	CRM	-	DL/1
Access	own use	own use, terminal	own use	terminal
For sale				
Nutrient data base system	no	no	no	not yet
Nutrient data base	no	no	no	not yet
Services	-	-	-	-

[2] At 3 different diets and at 3 different energy levels plus 2 different consistencies; liquid diet for 1 week at 1 energy level; cost distribution of foods atdifferent energy levels; costs for staff, diets and recipients

System owner	Malmöhus County Council (Malmöhus Läns Landsting)	Stockholm County Council, (Stockholms Läns Landsting Finanskontorets Upphandlingsavd.)	AIVO Co., Ltd. (AIVO AB)	Computer Workshop HB (Dataateljen HB)
Contact person	Agneta Kjällman	Mariana Atterhult/ Lena Kanström	Björn Hellström/ Tom Blomqvist	Dag Sandblom
Address	Box 1003	Box 9106	Box 20058	Hyggesvägen 19A
	S-22185 Lund	S-10272 Stockholm	S-161 20 Bromma	S-902 32 Umeå
Telephone	+46-(0)46-127673	+46-(0)8-7372500	+46-(0)8-872810	+46-(0)90-129240
System name	Näringsvärdesberäkning	KIS-PLAN	Kostplan	Matdat
In operation since	1984		1984	1984
Nutrient data sources	Swedish Food Composition Tables: 1978, 1981 food industry data	Swedish Food Composition Tables: 1978, 1981 food industry data	Swedish Food Composition Tables: 1978, 1981	Swedish School Food Composition Table: 1984
Number of				
foods	2,000	2,000	600 (1,500 or more can be included)	500 (700 can be included)
recipes	-	-	550 (2,200 or more can be included)	-
aggregated foods	-	-	-	-
Nutrients per food	26 (50 can be included)	26	24 (48, 72 or more can be included)	9 (11 can be included). P/S ratio
Other data	-	food cost data	food cost data, recipe procedures	food cost data can be included
Nutrition	Swedish nutrition	Swedish nutrition	Swedish nutrition	Swedish nutrition

recommendation	recommendations	recommendations Swedish recommendations for special diets	recommendations	recommendations
Recipe calculation				
Food yields	no	no	yes	no
Factors for nutrient losses and gains	no	no	no	no
System is used by	dietitians and food managers of the Country Council	dietitians and food managers of the Country Council	Örebro and Gärebro and Gävle communes, Gothenburg University. S:t Göran's High School, Karolinska Hospital. Stockholm School Administration. Nutricare Co.	Ängelholm High School. Fyris School Uppsala. Lundsberg's School Vara. Vakstanäs School of Rural Economics
System is suited for	nutrition surveys, diet planning, special diet planning, menu planning, research, education, calculations of nutrients	nutrition surveys, diet planning, special diet planning, menu planning, calculations of nutrients, calculations of costs	nutrition surveys, diet planning, special diet planning. menu planning, research. education, calculations of nutrients, calculations of costs. optimize recipes, nutrition labelling, production and inventory controls	menu planning. education. calculations of nutrients. calculations of costs
Computer	Victor	ABC 800	IBM PC. Apple III. Macintosh	ABC 80, ABC 800, ABC 806. Compis
Program source	-	-	own	own
Program language	Dataflex/Pascal	Basic	UCSD-Pascal	Basic
Operating system	MS DOS	ABC DOS, EM DOS	MS DOS, A III-SOS	Luxor UFD DOS
Data base management system	Dataflex	own	Macintosh own	
Access	own use for the present	used only within the county council	modem, terminal system	
For sale				
Nutrient data base system	yes, on floppy disc	no	yes, on floppy disc and	yes, on floppy disc

Nutrient data base	yes, on floppy disc and paper	no	Winchester drive yes, on floppy disc and Winchester drive	-
Services	-	-	calculations of nutrients menu planning	calculations of nutrients cost calculations of meals

System owner	ITT Scanips	Diet and Nutrition Data Co., Ltd. Kost och Näringsdata AB	AB Värmlandsdata	Östgötadata
Contact person	Anders Westman/ Andreas Sandberg	Lillemor Hvitfeldt-Wallentinson	Gunnar Söderlind/ Roger Gustafsshiöld	Sten Blom/Lennart Gustavsson/B.O. Konor
Address	Box 23058 S-104 35 Stockholm	Bredåkersvägen 7 S-217 63 Malmö	Box 502 S-667 00 Forshaga	S-58101 Linköping
Telephone	+46-(0)8-7360150	+46-(0)40-915530	+46-(0)54-118800/70600	+46-(0)13-107000
System name	A La Carte	Dietist	Prandium	Kaisa
In operation since	1981	(1969) 1980	1985	1984
Nutrient data sources	Swedish Food Composition Tables: 1978, 1981 food industry data	Swedish Food Composition Tables: 1978, 1981 food industry data	Swedish Food Composition Tables: 1978, 1981 food industry data	NFA Nutrient Data Bank: 85-01-01 food industry data
Number of				
foods	700	1,500	2,000	850
recipes	300	-		-
aggregated foods	-	-	-	1 week menu with approx. 50 different diets: 6 more are planned
Nutrients per food	15	26	32	35
Other data	food cost data, recipe procedures	food cost data can be included	food additives, food cost data restrictions: recipe procedures, foods, nutrients, and cooking methods	food cost data, recipe procedures
Nutrition recommendation	no	Swedish nutrition recommendations Swedish recommendations for special diets	Swedish nutrition recommendations Swedish recommendations for special diets	Swedish nutrition recommendations Swedish recommendations for special diets
Recipe calculation				
Food yields	no	no	no	no
Factors for nutrient losses and gains	no	no	no	no
System is used by	restaurants	regional and local authorities private	hospital food departments	hospital food departments of

		firms		Östergötland's County Council
System is suited for	nutrition surveys, diet planning, special diet planning, menu planning, research, education, calculations of nutrients, calculations of costs, calculations of statistical parameters, optimize recipes, nutrition labelling, production control, inventory control, fiscal controls	nutrition surveys, diet planning, special diet planning, menu planning, education, calculations of nutrients. calculations of costs, optimize recipes, nutrition labelling	diet planning, special diet planning, menu planning, calculations of nutrients, calculations of costs, optimize recipes	nutrition surveys, diet planning. special diet planning, menu planning, education. administration of special diet orders, purchasing and inventory control, calculations of nutrients, calculation of costs, production control
Computer	ITT-XTRA, Partner	Facit, ABC 80, ABC 800, IBM PC	IBM PC, AT, IBM PC, XT	Ericsson 2500
Program source	own	-	own	own
Program language	Basic	Basic	Dataflex	Cobol
Operating system	CP/M, CCP/M	modified to each computer type	MS DOS	OS-V6
Data base management system	-	-	Dataflex	IMK
Access	modem, terminal system	-	modem, terminal system	modem, terminal system
For sale				
Nutrient data base system	yes, on floppy disc	yes, on floppy disc	yes, on floppy disc	yes, on magnetic tape
Nutrient data base	no	no	yes, on floppy disc	no
Services	system modifications	calculations of nutrients, menu planning, etc.	-	see footnote 3

[3] Production forecasting, food requirements, recipes, food and supply requisition, serving distribution plan, diet summary, menu planning, pricing diets,inventory report, purchase of foods, production statistics, orderer statistics, etc.

System owner	AB Felix	AB Findus	Semper AB	DAGAB
Contact person	Birgit Hansson	Anita Johansson	Pelle Bruner	Lilian Fredriksson/Eva Bonnier
Address	S-24100 Eslöv	Box 500 S-26700 Bjuv	Box 23142 S-10435 Stockholm	S-17178 Solna
Telephone	+46-(0)423-13100	+46-(0)42-70800	+46-(0)8-247700	+46-(0)8-272980
System name	-	Tina	-	Week menu

In operation since	1971	1977	1982	catering 1982
Nutrient data sources	Abramson/Andersson Food Composition Table: 1982 own analysis	Swedish Food Composition Tables: 1978 own analyses	Several food composition tables, own analyses food industry data	Swedish Food Composition Tables: 1978, 1981 food industry data
Number of				
foods	1,500	1,400	600 raw food items and several hundreds of prepared ones.	800
recipes	-	900	Current recipes for own products	150
aggregated foods	-	-	-	-
Nutrients per food	12	29	123 (83 nutrients are used in all common calculations)	11
Other data	-	-	food cost data, foreign substances	food cost data, recipe procedures, data on purchase and inventory
Nutrition recommendation	no	no	Swedish nutrition recommendations	
Recipe calculation				
Food yields	yes	no	no	no
Factors for nutrient losses and gains	no	no	no	no
System is used by	the staff of Felix	the staff of Findus	the staff of Semper	DAGAB's customers
System is suited for	calculations of nutrients	Calculations of nutrients nutrition labelling	calculations of nutrients calculations of costs optimize recipes	diet planning, menu planning, purchase planning, inventory planning, calculations of nutrients, calculations of costs
Computer	ICL ME 29	Honeywell 66/40	IBM PC XT	SORD M203
Program source	-	own	own	-
Program language	Cobol	Cobol 74	Basic, mostly	Basic
Operating system	-	-	MS DOS	-
Data base management system	sequential files	-	-	-
Access	own use only	own use only	own use only	-
For sale				
Nutrient data base system	no	no	no	yes, on floppy disc

Nutrient data base	no	no	no	yes, on floppy disc
Services	no	no	no	calculations of nutrients and costs

System owner	Nature and Culture (Publisher) Natur och Kultur	Esselte Studium	Östersund Army Garrison Östersunds armégarnison/15	Danish Hospital Institute, Copenhagen: owner: The Swedish Association of Local Authorities[4]
Contact person	Kjell Floberg		Ulla Larsson	Britta Bergström-Reiback
Address	Box 27323 S-102 54 Stockholm	S-17 176 Solna	S-83 185 Östersund	Hornsgatan 15 S-116 37 Stockholm
Telephone	+46-(0)8-232480	+46-(0)8-7343300	+46-(0)63-158000	+46-(0)8-248500
System name	Näringslära			Camp
In operation since	1985	under development	under development	1976
Nutrient data sources	Food Composition Tables: Swedish School Table 1984			Food Composition Tables: Swedish 1978, 1981 food industry data
Number of				
foods	200			660
recipes	-			100
aggregated foods	20 ordinary meals, 5 breakfasts			-
Nutrients per food	8			16
Other data	-			food cost data
Nutrition recommendation	Swedish nutrition recommendations			Swedish nutrition recommendations
Recipe calculation				
Food yields	no			no
Factors for nutrient losses and gains	no			no
System is used by	schools			Gothenburg and Södertälje school administrations
System is suited for	education, calculations of nutrients, nutrition labelling			diet planning, calculations of nutrients, calculations of costs, production planning
Computer	IBM PC, ABC 806, Compis			IBM 370
Program source	-			-
Program language	Basic, Compis-Pascal			PL1 Fortran
Operating system	MS DOS			DOSVS
Data base	-			-

management system		
Access	-	modem, terminal system
For sale		
Nutrient data base system	yes, on floppy disc	yes
Nutrient data base	yes, on floppy disc	no
Services	-	installation of the system planning of menus, nutrition, purchase

[4] Storhushållsgruppen Kommunförbundet Micro Camp will be launched in Sweden

3.9 Federal Republic of Germany

H. Rottka, W. Polenski, H. Scherz

At present in the Federal Republic of Germany there are at least four major food composition tables, all based on the Souci/Fachmann/Kraut food composition tables [1].

Apart from work in various departments of universities, most food analysis is carried out by government agencies which come under the Federal Ministry of Agriculture, such as the institutes for research on milk, bread and potatoes, meat, and vegetables. All these institutes analyze foods mainly for technological and scientific purposes and do not operate a systematic service. Although each institute does not publish regularly, all values are supplied to the Research Institute for Food Chemistry (DFL) in Munich. This institute is responsible for the national nutrient data bank and for revision of the Souci/Fachmann/Kraut food composition tables. Thus raw data are collected from three main sources: analysis carried out by DFL, analyses carried out by other institutes in the Federal Republic, and from the literature.

Since 1978, the rapidly expanding body of raw data has been transferred to the LINDAS (Lebensmittel-Inhaltsstoff-Daten-System) data bank which is based at the Bavarian Academy of Sciences (Leibniz Rechenzentrum of the Bayerische Akademie der Wissenschaften). For each food item, the following data are available: the name in German, English and French, the constituents of the food in German and English, number of samples tested, analytical results, method of analysis, and literature references. The mean and variation of the data for each constituent of the food can be calculated. The fat, carbohydrate, and protein content of each food item, the total energy value, and the amount and energy value of digestible material can be calculated.

Outputs can be provided in the form of tables in German or in English as follows:

(1) Food composition tables (standard tables) similar to the published food composition tables can be obtained and arranged according to the type of food. Values which are significantly different from those in the preceding issue are marked automatically.

(2) Food composition tables (constituent tables) can be provided which list all foods containing one or more particular nutrients or other constituents in a concentration within a range selected by the user. The concentrations of the constituents are given, and the output can be

arranged in either decreasing or increasing order of the constituents specified.

(3) Tables (method tables) can be produced specifying the methods used to determine the concentrations of nutrients and other constituents in foods listed in the food composition tables.

(4) Tables (trend tables) can be produced which list changes in the concentration of one or more nutrients or other constituents in a given food item since a given year.

(5) Tables can be provided which give the major changes in the concentration of all nutrients and other constituents in all foods.

(6) Table extracts may be obtained, for example, for all the constituents and the amount of each in one particular food and for all foods which contain a particular constituent and the amount of that constituent, if necessary separated according to the analytical method.

(7) Lists of all literature sources can be provided corresponding to a given food item: constituent, food and constituent, and analytical method. The lists are arranged according to year and author.

The values from the Souci/Fachmann/ Kraut tables up to the 4th Supplement have now been added to the LINDAS data bank. Together with a considerable number of additions and corrections these data from the basis of the second edition of the Souci/Fachmann/Kraut tables published in 1981 [1].

Since the end of 1981 new data have been added continuously and the tables updated. The data bank now contains about 650 food items. For the preparation of the third edition, research is being carried out in the following areas: the composition of carbohydrates, the content of vitamins and trace elements in each food item, and the composition of cooked foods and prepared dishes.

In response to the needs of those interested in food intake studies, a standard uniform code known as the Federal Food Code (Bundeslebensmittelschlüssel) has been developed. It is a hierarchically structured code designed to meet the needs of research workers and also for use in simple dietary assessment. The code contains 12 digits, but for many uses only 4 digits of the code need to be used. The data bank based on this code contains 5,000 food items, each with up to nine different methods of preparation, including approximately 500 basic foods, 1,300 industrially processed basic foods, 500 vegetarian and dietetic foods, and 2,700 industrially processed and prepared foods required only for more extensive consumption surveys. It also includes 1,000 coded recipes of meals from households, restaurants, and food services. The constituents given are: 3 macronutrients, 13 vitamines, 17 minerals, 32 fatty acids, 18 amino acids, 8 sugars, 5 dietary fibres, 18 organic acids, 5 steroids, 9 organic noxious subsstances, 6 inorganic substances, and 3 risk substances (cholesterol, purine N, and oxalic acid). Losses in nine selected cooking methods for each of the 140 nutrients and active ingredients have been determined. All missing analytical values have been calculated with a specially developed program.

In addition to the food composition tables/nutrient data banks discussed above, there is a large nutrient data bank for animal feeds at the University of Hohenheim in Stuttgart. This data bank contains information on about 800 nutrients and contaminants in about 18,000 feeds.

Reference

1 Deutsche Forschungsanstalt für Lebensmittelchemie: Food composition and nutrient tables 1981/82 (Souci/Fachmann/Kraut

tables); 2nd ed. (Wissenschaftliche Verlagsgesellschaft, Stuttgart 1981).

3.10 France

J.C. Favier, Z.L. Ostrowski

In France there are three national food composition tables compiled by *Randoin* et al. [1], *Ostrowski and Josse* [2], and *Renaud* et al. [3]. There are also complementary food tables for baby foods prepared by *Ostrowski and Josse* [4, 5].

Since the last revision of the *Randoin* tables in 1959, all food composition tables have been developed from published data. Most of these tables do not provide data on recent nutrients or on constituents which can now be assayed better, as, for example, amino acids, fatty acids, inorganic elements, and vitamins. However, it should be noted that the *Renaud* tables, designed for cardiovascular epidemiological surveys, contain information on fatty acid composition.

Since 1980, the French Nutrition Foundation under Dr. *Favier* and with financial aid from the Research and Industry Ministry has undertaken the preparation of a data bank on the composition of human foods produced and/or consumed in France. In co-operation with Prof. *Martin* from the Medical Information Laboratory and the MEDIMAT Statistics Laboratory, a system has been developed based on data collected with several food items, such as milk, cheese, and vegetable oils. It is now time to apply this system to a wider range of foods. This requires considerable financial means not only for collection of data from the literature, but also to carry out a large number of analyses on representative samples of food items.

While the French government is in favour of developing this data bank, at present it cannot provide the necessary finance. Thus, in order to assemble the considerable human and financial resources necessary, it has been decided to establish a non-profit organization to coordinate interested parties: government research laboratories, control laboratories, agricultural and food industries, consumer organizations, and government ministries.

The data bank is to be national in scope and designed to meet the needs of: (1) dietitians, physicians, nutritionists, epidemiologists, etc.; (2) those responsible for nutritional surveys; (3) administrators responsible for the control of food products; (4) researchers and teachers, and (5) consumers and consumer associations.

Because of the diversity of the users, the data bank will have to be developed in such a way that data can be presented at a number of levels. Results of individual analyses of nutrients are to be coded and recorded on magnetic tape. This will be the archive tape of collected data or the raw data tape. The recorded data will include: the definition of the individual food sample; its geographical origin; production date; treatments, designation of analysis laboratory; components assayed, assay methods, and the values obtained. After the statistical processing of data and comparison with the literature, certain values are retained, referred to as transformed data. These values appear in the transformed data base. The parameters used to describe data on each nutrient in each food are: (1) name of the nutrient; (2) unit of measure; (3) mean (or median); (4) number of samples; (5) dispersion index (standard deviation for a Gaussian distribution, 5% or 95% percentiles or extreme values according to the number of samples if the distribution is not Gaussian), and (6) quality or stability of the data.

More detailed information on each nutrient can be obtained including source of data, assay methods, variability as a function of various factors, data from other food composition tables, etc.

In 1978 an initiative was made to develop a common European food composition table by Dr. *Z.L. Ostrowski* of the European Association for Nutrition and Child Development (ADE). At a meeting of European nutritionists organized by ADE in 1979 it was agreed that there is a need for a joint, comprehensive European food composition table, covering all raw food items consumed in the Member States of the European Community. The most detailed possible breakdown should be provided for each food item. It was further agreed that the table should be easy to understand and suitable for computer processing. Widely used cooked food could also be included. A conversion method for other food items would need to be developed and appended to the table. All data would have to be checked and literature references given. The table could provide references to existing nutritional studies.

A new edition of the food table compiled by *Ostrowski and Josse* [2] is being prepared for publication late in 1985. At the present time it is available on floppy disc for use with an IBM PC microcomputer.

References

1 Randoin, L.; Le Gallic, P.; Dupuis, Y.; Bernardin, A.; Duchène, G.; Brun, P.: Tables de composition des aliments; 3rd ed. (Institut Scientifique d'Hygiène Alimentaire, Centre National de la Recherche Scientifique, Paris 1961).

2 Ostrowski, Z.L.; Josse, M.Ch.: Les aliments. Tables des valeurs nutritives. (J. Lanore, Paris 1978).

3 Renaud, S.; Gosdey, F.; Ortchanian, E.; Baudier, F.: Table de composition des aliments (Astra-Calvé, Paris 1979).

4 Ostrowski, Z.L.; Josse, M.Ch.: Les aliments. Tables des valeurs nutritives. Les aliments préparés industriellement pour l'enfance. (J. Lanore, Paris 1978).

5 Ostrowski, Z.L.; Josse, M.Ch.; Bouagina, A.; Blochet, C.: Les aliments. Tables des valeurs nutritives. Les aliments préparés industriellement pour l'enfance (ADE et Ville de Paris, Paris 1980).

3.11 Greece

A. Trichopoulou

Several laboratories in Greece carry out analyses of foods which are produced or are commonly consumed in Greece. The results of these analyses are published both in national and international journals, but have not been put together and published in a national food composition table. Food composition tables which are published in Greece are based mainly on data from other countries, and a systematic comparision of such data and analyses done nationally has not as yet been carried out. An analysis of the foods commonly consumed by Greek households and in a number of national institutions has been carried out by the Department of Nutrition and Biochemistry, Athens School of Hygiene. This information has been published in a booklet [1] and circulated to hospitals and other institutions. The data have now been expanded and computerized.

Under the auspices of the Greek Society for Food and Nutrition, an attempt is being made to contact various government departments and agencies, laboratories, and other organizations interested in nutrition in order to promote cooperation and to identify areas in which research is needed.

Reference

1 Trichopoulou, A.: Food composition tables (Lenis, Athens 1982).

3.12 Italy

E. Carnovale

The first food composition tables were compiled in Italy in 1946 by the National Institute of Nutrition [1]. The tables were comprised of foods most commonly eaten in Italy and provided information on the content of protein, lipid, and carbohydrate and energy value and waste coefficient. The data were obtained from analyses carried out by the institute and from the literature. Later, the tables were extended to include the mineral and vitamin content of foods. In 1976, the tables were completely revised and extended according to the guidelines prepared by *Southgate* [2]. The revised tables [3] include in total 375 food items which were subdivided as follows: cereals and cereal products; fresh and dried legumes; vegetables; fresh and dried fruit; meat, raw, processed, and offals; fish, fresh, frozen, and processed; milk and milk products; eggs; fats and oils; sugar, preserves and confectionery; miscellaneous foods and prepared meals. Recipes represent only 10% of the items included.

The nutrients and other constituents given for each food item were: water, proteins (total N × the specific factor), lipids, available carbohydrates (soluble sugars plus starch, expressed as monosaccharides), crude fibre, iron, calcium, phosphorus, thiamine, riboflavin, niacin, retinol equivalents, vitamin C, and energy value expressed as kilo-calories and kilo-joules. Edible matter was also included. The conversion factors used for proteins, lipids, and available carbohydrates (expressed as monosaccharides) were 4.0, 9.0, and 3.75, respectively. In addition, information was given on the amino acids, fatty acids, and cholesterol content of specific food items. Revised data from previous tables, data from analyses carried out at the institute, and data taken from the literature after careful evaluation were used as sources for the tables.

In addition to their use in research and teaching and for food surveys, these tables are the official source used by the Ministry of Agriculture for the calculation of nutrients for the national food balance sheets. They are now also used by the Central Institute for Statistics (ISTAT) for the same purpose. These tables have been used by the National Institute of Nutrition as a first approach to calculate the nutrient content of food items, in terms of the daily recommended allowances of nutrients for the Italian population [4].

Food composition tables were also compiled by *Fidanza and Liguori* [5] based on the guidelines proposed by *Southgate* [2]. These tables, which were published as an appendix to a textbook on human nutrition, were revised and extended in 1981. Other food composition tables in Italy are derived largely from the above-mentioned tables.

At present, there is no national nutrient data bank in Italy. However, a number of computerized systems have been developed by food companies and research institutions. In 1982, the food composition tables of the National Institute of Nutrition were computerized, using an IBM series 1 computer. The system used for storage, retrieval, updating, and calculations was EDL, and the work was done on time sharing with a Disk, Diskette 8 system. Food items were coded with 6 digits following the groupings reported above. Within each group the food items were organized randomly. Until now, the system has been used only by the National Institute of Nutrition, mainly for research on dietary intake and heart disease.

References

1 Istituto della Nutrizione: Tabelle di composizione in principii nutritive in

calorie dei piu comuni alimenti (Istituto della Nutrizione, Roma 1946).
2 Southgate, D.A.T.: Guidelines for the preparation of tables of food composition (Karger, Basel 1974).
3 Carnovale, E.; Miuccio, F.C.: Tabelle di composizione degli alimenti (Istituto Nazionale della Nutrizione, Ministero dell'Agricolture e Foreste, Roma 1976).
4 Istituto Nazionale della Nutrizione: Indicazioni nutrizionali per la popolazione italiana (Istituto Nazionale della Nutrizione, Roma 1979).
5 Fidanza, F.; Liguori, G.: Lineamenti di nutrizione umana (Idelson, Napoli 1974).

3.13 The Netherlands

A.B. Cramwinckel

At present there are two food composition tables in The Netherlands [1, 2]: The Netherlands Food Composition Table (NVT) and the table from the Committee on the Uniform Coding of Nutrition Questionnaires (UCV table).

The first edition of the NVT was prepared in 1941 from available analytical data in The Netherlands and abroad. Since then the table has been revised many times, the latest edition being the 34th which was published in 1983 [1]. Data from abroad have been gradually replaced by data from various institutes in The Netherlands. Since 1972, this table has been administered by the Committee for Food Composition Tables set up under the auspices of the Nutrition Council which is an advisory body to the Minister for Agriculture and Fisheries and to the Minister for Welfare, Public Health and Culture. The table, which is published by the Nutrition Education Office, is designed basically for use by those with a professional interest in nutrition such as dietitians, medical practitioners, and nutritionists. The latest edition contains information on the energy value and the content of 15 nutrients for 426 food items. In addition, there are also tables giving data for particular foods on their fat content, fatty acid composition, cholesterol content, maximum level of sodium expected, and alcohol content. A table with data on the sodium, potassium, magnesium, and calcium content of mineral waters is also included. In addition to the NVT, a food composition table especially for use at the household level [3] has been prepared by a working group under the auspices of the Nutrition Education Office.

The UCV table [2] is prepared and administered by a group of research workers. In 1972, a working group was set up with the object of making studies on food composition as efficient as possible by adopting uniform methods for the collection and analysis of data [4]. The results obtained from such studies would then be more comparable with one another. The UCV table or, to be more precise, the UCV nutrient data bank was established primarily with information from the NVT together with other data principally from foreign sources. In the beginning, the first priority was to extend the table to include as much data as possible with the intention of avoiding missing values. As the table developed, more attention was paid to such aspects as reliability and to recording sources of the data. In addition, information on processed foods was expanded. Since its establishment, the UCV table has developed to a stage where it is used in practically all nutrition studies in The Netherlands. This has come about for a number of reasons: (1) the aim of the table is quite clear: it is to provide a data bank on the nutrient content of foods and dishes which is as complete and accurate as possible; (2) the data in the table are checked by computer for mistakes and missing values: (3) quick and efficient mechanisms have been established for the collection and assessment of new data for inclusion in the table and sending such data to users of the table, and (4) the availability within the GVO project (development of health education in kindergarten and primary schools) in Nijmegen of computer facilities and of personnel for the coordination and provision of secretarial assistance. The UCV table is now administered from the Institute of Nutrition and Toxicology (CIVO-TNO) in Zeist.

The 1984 edition of the table [2] has data on about 1,400 foods, 35,000 nutrient values, and 70,000 references and other pieces of background information. The UCV table is thus larger than the NVT and also differs from it in a number of ways. The UCV table has few missing values, and it includes brand names and information on the origin of the data. A handbook giving portion sizes and further descriptions of foods included in the table has also been prepared [5]. Two series of computer programs have been developed for use with the UCV table. The first series enables an updated table to be brought out each year. Existing values in the table can be compared with new data proposed for inclusion, and, if the new data are accepted, the original data can be replaced by the new data. Each new piece of nutrient data is accompanied by codes indicating its source, the year it was included in the table, and the institute that delivered the proposal. The second series of computer programs enables the table to be used. Programs are available to calculate the nutrient composition of complex dishes from the proportion of the various constituent foods in a dish, to calculate the energy value from the proportion of macronutrients, and to check that the sum of the weights of the nutrients, dietary fibre, and water is equal to the weight of a food. In addition, several programs have been developed to carry out calculations on data collected from nutrition studies to assist in the interpretation of the nutrient consequences of the results obtained.

The objective in The Netherlands is to produce one common food composition table. To this end, the Nutrition Council [6] has made recommendations to the Minister for Agriculture and Fisheries and the Minister for Welfare, Public Health and Culture concerning the development and administration of a central nutrient data bank and to encourage the use of such a data book. Regardless of what is finally decided, a number of important questions will have to be addressed with respect to such a table. These include: (1) the basis on which foods are listed in the table; (2) which foods should be listed separately, and which foods should be listed together on the basis of their composition; (3) what criteria should be used for the acceptance of analytical data on foods into the table; (4) what procedures should be followed for the incorporation of new analytical data into the table; (5) how can finance be obtained to carry out food analyses on a regular basis; (6) how should the accuracy and variation of analytical data in the table be expressed, and (7) whether standard portion sizes of foods should be included in the table and, if so, how such data should be expressed.

References

1 De Commissie Nederlandse Voedingsmiddelentabel van de Voedingsraad: Nederlandse voedingsmiddelentabel; 34th ed. (Voorlichtingsbureau voor de Voeding, 's Gravenhage 1983).

2 Commissie UCV: UCV table, uitgebreide voedingsmiddelentabel 1984 (Voorlichtingsbureau voor de Voeding, 's Gravenhage 1984).

3 Voorlichtingsbureau voor de Voeding: Praktische voedingsmiddelengids (Voorlichtingsbureau voor de Voeding,

's Gravenhage 1983).
4 Hautvast J.G.A.J.: Ontwikkeling van een systeem om gegevens van voedingsenquêtes met behulp van de computer te verwerken. Voeding *36:* 356–360 (1975).
5 Vakgroep Humane Voeding, Landbouwhogeschool: Maten, gewichten en codenummers, juli 1980; revised ed. July 1982 (Department of Human Nutrition, Agricultural University, Wageningen 1982).
6 Voedingsraad: Advies inzake een centraal databestand van analysegegevens van voedingsmiddelen: advies van de Commissie Centraal Databestand Analysegegevens Voedingsmiddelen (Voedingsraad, 's Gravenhage 1982).

3.14 Poland

G. Dybowska

Studies on the composition and nutritional value of foods in Poland began after the Second World War, and the first food composition tables were prepared in 1948 mainly from data derived from foreign sources. In 1954, new tables containing information based in part on research carried out in Poland were prepared [1]. A total of 300 food items was included, and information was provided on the content of: energy, protein, fat, total carbohydrates and fibre, ash, calcium, phosphorus, iron, vitamin A, thiamine, riboflavin, niacin, vitamin C, and the proportion of waste.

Additional food composition tables using data both from within Poland and other countries were compiled by *Szabuniewicz and Kierst* [2], *Bielińska* et al. [3], and *Szczygieł* et al. [4, 5]. The magnesium content was added to the list of nutrients.

In 1975 the tables were again revised [6], and data were included concerning the content of the following: sodium, potassium, copper, sulphur, chlorine, fluorine, manganese, molybdenum, iodine, cobalt, vitamin D, total tocopherols, α-tocopherol, pantothenic acid, vitamin B_6, biotin, folacin (including free folic acid), vitamin B_{12}, choline, selected fatty acids, cholesterol, and essential amino acids. Some data were obtained as the result of research carried out in Poland. In 1976 new food composition tables were compiled which included about 750 food items [7]. Food composition tables for use at the household level have also been compiled by *Piekarska and Szczygieł* [8]. These tables include about 300 basic foods and provide information on the main sources of energy and nutrients and give the recommended daily intake of each.

The most recently published tables [9] contain 991 food items and include data on energy content (expressed in kilo-calories and kilo-joules), water, protein, fat, total carbohydrates, fibre, ash, calcium, phosphorus, iron, magnesium, retinol, carotene, retinol equivalent, thiamine, riboflavin, niacin, and ascorbic acid. Data on each food item are provided in two ways: firstly, values are calculated per 100 g of edible part of food and secondly, for 100 g food as purchased. In addition, the proportion of waste is estimated. The previous system of dividing foods into twelve groups [10] has been abandoned. In this table, foods are divided into 38 groups on the basis of, for example, origin, main nutrients, consumption level, and, for the first time, energy and nutrient content of alcoholic and non-alcoholic beverages.

At present, several studies to update food composition tables are being coordinated and carried out by the Institute of Food and Nutrition, under the supervision of the Ministry of Health and Welfare. More detailed information on essential amino acids, fatty acids, trace elements, etc. will be included. From the above-mentioned food composition tables it has been possible to formulate recommended daily intakes for four economic levels [10]. While the recommended intakes are the same, foods are selected for each economic level on the basis of price.

Computers have been introduced to carry out a number of tasks related to food composition tables. About 10 years ago, they were used for designing balanced meals and menus with a minimum cost [11]. Electronic data processing has also been used to develop various menus in large-scale catering units and cafeterias. In 1982, the Institute of Human Nutrition, Warsaw Agricultural University, initiated a program called 'Dieta' which is the first attempt to develop a nutrient data bank in Poland. However, the basic purpose of this program is not to collect data, but to analyze the fate of nutrients from the raw food to the consumers' table and to compare the nutritive values of consumed foods with the recommended daily allowances or intakes. It is intended that this program be used for individuals as well as for specific groups and the population as a whole.

References

1 Rudowska-Koprowska, J.: Tablice wartości odżywczych produktów spożyczych (PZWL, Warszawa 1954).
2 Szabuniewicz, B.; Kierst, W.: Table i normy odżywiania, Gdańskie Towarzystwo Naukowe; 2nd ed. (Gdańsk 1948).
3 Bielińska, Z.; Klimczak, Z.; Piekarska, J.: Tabele wartości odżywczych produktów rynkowych (Reklama, Lódź 1963).
4 Szczygieł, A.; Klimczak, Z.; Piekarska, J.; Muszkatowa, B.: Tabele składu i wartości odżywczych produktów spozywczych (PZWL, Warszawa 1972).
5 Szczygieł, A.; Pickarska, J.; Klimczak, Z.: Skrócone tabele wartości odżywczej produktów spozywczych (PZWL, Warszawa 1974).
6 Szczygiełl, A.; Piekarska, J.; Horszczaruk, I.: Tabele składu i wartości odżywczych produktów spożywczych, Cześć 2, 3, 4, 5, 6 (PZWL, Warszawa 1975).
7 Sadowska, H.: Warunki zdrowotne zywności i zywienia (PZWL, Warszawa 1976).
8 Pickarska, J.; Szczygieł, A.: Popularne tabele wartości odżywczych żywności (PZWL, Warszawa 1979).
9 Piekarska, J.; Łoś-Kuczera, M.: Skład i wartość odżywcza produktów spożyczych (PZWL, Warszawa 1983).
10 Szczygieł, A.; Siczkówna, J.; Nowicka, L.: Normy wyżywienia dla osiemnastu grup ludności (PZWL, Warszawa 1970).
11 Kierebiński, C.; Zaskórski, P.; Duklewski, L.: Kømputeryzacja w żywieniu masowym. Przegl. Gastronomiczny *30:* No. 7/8, pp. 5 6 (1975).

3.15 Portugal

I. Martins

The first Portuguese food composition table was published by the National Institute of Health in 1961. The analytical work was carried out by the Department of Food and Chemistry in the National Institute of Health, in Lisbon and in Oporto, under the supervision of Prof. *Gonçalves Ferreira.* The second extended edition was published in 1963 and a third revised edition in 1977 [1]. This table is divided into three sections. The first section includes an introduction with a brief definition of the terminology used, the food groups and a description of each, and the methods of analysis used. In the second and third sections the foods are arranged according to six basic groups as follows: group 1: milk and dairy products (excluding butter which is included in the third group); group 2: meat and meat products, fish and fish products, crustaceans, molluscs, and eggs; group 3: fats and oils; group 4: cereals and cereal products, dry legumes, cocoa and confectionery; group 5: vegetables, potatoes, fruits, and nuts, and group 6: non-alcoholic and alcoholic beverages.

Information is given on the composition of more than 700 foods including raw foods, canned foods, and fruit preserves. The foods are listed in alphabetical order according to their common names; their systematic names are also given. In general, manufacturers' names have been used only where otherwise the designation of the food would have been difficult.

Samples of foods were purchased in various shops in several regions of the country so as to be as representative as possible. All the values in the tables were obtained by direct analysis of the food samples and were examined in relation to published data wherever such data were available. Values are calculated per 100 g of edible part of the food and are given for the following: water and proportion of edible matter; energy expressed in kilo-calories; carbohydrates; for fruits, values for saccharose and reducing sugars are given; fats; proteins; dietary fibre; ash; sodium chloride; carotene and vitamin A; thiamine, riboflavin and niacin; ascorbic acid; calcium, phosphorus, iron and copper, and also alcohol content in alcoholic beverages.

In the third section, values for additional constituents in a more limited range of foods are given. These constituents include: sodium, potassium, and magnesium; trace elements such as manganese, zinc, cobalt, fluorine, and iodine; cholesterol; essential fatty acids (linoleic, linolenic, arachidonic, and penta- and hexaenoic acids); essential amino acids (arginine, phenylalanine, histidine, isoleucine, leucine, lysine, methionine, threonine, tryptophan, and valine), and titratable acidity, organic acids, and pectic acid (fruits).

A revised and extended edition of the food composition table is being prepared. Changes will be introduced mainly because of changes in methods of food analysis, of food production, and of food technology. As a result of an increase in awareness of their importance, some nutrients not included in earlier editions will be added. It is also planned to include some new foods in the new edition because of their importance in the national diet.

Two new sections will also be introduced. One consists of foods consumed by children and infants (milk, baby cereals, and other baby foods) and is almost ready. The other section is still in the planning stage. It will contain values obtained by direct analysis of a range of cooked foods, individually cooked items, and also some traditional Portuguese dishes.

The Portuguese food composition table has a very important role to play in the sectors of health, agriculture, industry, and education. As in most countries, this table has been used largely for: calculation of nutrient intakes from records of food consumption, formulation of diets, calculation of desirable food supplies that will provide a specified intake of the nutrients, calculation of the nutrient composition of a manufactured food from its ingredients, and calculation of the composition of cooked dishes from recipes.

At present, in Portugal, there is no nutrient data bank. Data from the Food and Nutrition Documentation Service in the Nutrition Studies and Research Centre have been used largely by the government ministeries of Health, Agriculture and Education and also by private entities. The Nutrition Studies and Research Centre of the National Institute of Health is organizing a nutrient data base which, in a first phase, will include 104 coded foods and 16 nutrients. It will be in operation very soon.

Reference

1 Conçalves Ferreira, F.A.; Da Silva

Graça, M.E.: Tabela de composiçao dos alimentos Portugueses; 3rd ed. (Ministry of Health and Assistance, Lisbon 1977).

3.16 Republic of Ireland

J. Kevany

No national food composition tables are published in the Irish Republic, and few routine analyses are carried out to determine the composition of Irish foods. Some information on composition can be acquired from food manufacturers and has been included in data banks where appropriate.

McCance and Widdowson's Composition of Foods [1] forms the basis of all nutrient data banks in Ireland. These data banks are linked to academic and research institutions. At Trinity College, Dublin, attempts have been made to expand these tables and to make computer analysis of foods for cholesterol values more complete. Such modifications have also been made by other institutions with computer data banks. The Dublin Institute of Technology has developed values for lignin, cellulose, non-cellulose polysaccharide, oxalic acid, phytic acid, purine, and animal protein for appropriate foods.

At present there is no national data bank in Ireland. Dietitians involved in institutional services generally do not have access to a computerized data bank and rely on hand calculations based on the tables of *Paul and Southgate* [1]. No attempt has been made to coordinate nutrient data banks used in the Irish Republic, and the Government has no formal policy on food composition tables or nutrient data banks.

Reference

1 Paul, A.A.; Southgate, D.A.T.: McCance and Widdowson's the composition of foods; 4th ed. (Her Majesty's Stationery Office, London 1978).

3.17 Spain

O. Moreiras-Varela

In 1980, the Institute of Nutrition of the Consejo Superior de Investigaciones Científicas published a review of the recommended daily intakes of energy and nutrients for various strata in the population. Thus, it has been considered necessary to provide an up-to-date analysis of the composition of those foods most commonly consumed. In the selection of foods to be included in the food composition tables, attention was directed towards those which were considered suitable for planning an ideal diet or necessary for mantaining good nutritional status.

In spite of the limitations on the use of data derived from food composition tables, such data are essential in planning nutrition programs and in implementing food policies.

These tables have been compiled from data collected from various sources within the country, and in addition data from the literature have also be incorporated. Such data were selected on the basis of the similarity of the food and the ecological conditions of the country they came from, or because of the reputation of the institution which produced the data.

Considerable attention has been given to what is referred to as the edible portion. Estimation of this is sometimes subjective and difficult to express exactly because of the great number of sources of variation to which it is subjected. Considerable error is made in the estimation of actual intake of a particular food when only the quantity bought in the market is known, whereas logically the composition refers to the edible part.

The Spanish Nutrition Society in collaboration with the Institute of

Nutrition has set up a committee to revise the food composition tables on the basis of the guidelines of *Southgate* [1]. Contact has been made with various laboratories in Spain to undertake analyses in order to provide data which are at a present missing from the tables.

These tables are used on a national basis, and recently the Interministerial Commission for Food Planning adopted them officially as a working document. They are also being used in the National Food Survey which the Institute of Nutrition is carrying out jointly with the National Institute of Statistics in a random sample of 25,000 families.

All data incorporated in the food composition tables are stored on computer in the Institute of Nutrition and form the basis of a national nutrient data bank.

Reference

1 Southgate D.A.T.: Guidelines for the preparation of tables of food composition (Karger, Basel 1974).

3.18 Switzerland

A. Blumenthal

'Official Methods of Food Analyses in Switzerland' [1] contains food composition tables. However, only relatively few foods are included, and many food constituents such as dietary fibre, magnesium, and zinc have not been incorporated. A new edition of this publication is being prepared, but as yet it has not been decided whether food composition tables will again be included.

Various food manufacturers and distributors have prepared leaflets setting out the nutritional composition of their products. Data are derived partly from data banks and partly from food composition tables, but mostly from the manufacturers' own analyses of their products.

There is no national data bank or specific-purpose data bank generally available to interested parties. On a national basis, reference is made to internationally approved food composition tables such as Souci/Fachmann/Kraut [2], and McCance and Widdowson [3]. The Federal Office of Public Health is not considering the establishment of a national nutrient data bank.

At present, except for foods for special diets, manufacturers participate in the nutrition labelling of their products on a voluntary basis, and the Federal Office of Public Health has no plans to make this obligatory in the near future. There are, however, special regulations with regard to the labelling of the vitamin content of foods. Manufacturers are permitted to display the vitamin content of their products only after approval has been obtained from the Federal Office of Public Health. Such approval is only granted after samples have been analyzed by the National Vitamin Institute.

Guidelines are being prepared for the nutrition labelling of foods. It is considered that the nutrient content of foods such as milk and eggs can be obtained from internationally approved food composition tables. However, the nutrient content of prepared foods, such as ice cream and canned foods, will have to be determined by analysis.

References

1 Schweizerische Lebensmittelbuchkommission: Schweizerisches Lebensmittelbuch, vol. 1; 5th ed. (Eidgenössische Drucksachen- und Materialzentrale, Bern 1964).

2 Deutsche Forschungsanstalt für Lebensmittelchemie: Food composition and nutrient tables 1981/82 (Souci/Fachmann/Kraut tables); 2nd ed. (Wissenschaftliche Verlagsgesellschaft, Stuttgart 1981).

3 Paul, A.A.; Southgate, D.A.T.: McCance and Widdowson's the

composition of foods; 4th ed. (Her Majesty's Stationery Office, London 1978).

3.19 United Kingdom

D.A.T. Southgate

The first food composition tables were published in the United Kingdom in 1940 by *McCance and Widdowson* [1] and entitled 'The chemical composition of foods'. This was the first comprehensive series of data for foods eaten in the UK, and it was unique in several respects. First, it gave the composition of cooked foods. Secondly, it gave values for a large range of inorganic constituents. Thirdly, it included values for carbohydrates based on direct measurement, and moreover it separated the carhohydrates into two classes: *available* - the sugars and starches - and *unavailable* - those not digested in the small intestine.

The third edition of these tables was published in 1960 [2] and formed the basis of the first computerized nutrient data bank in the UK. For the first time, analyses carried out in other laboratories were included. This change was necessary because of the large volume of published work on the vitamins and amino acids in foods in which it was considered inappropriate to duplicate. Thus, the preparation of the third edition called for a very detailed and extensive examination of the literature, particularly for the vitamins and amino acids in foods.

Computerized versions of the third edition, including data from other sources, were prepared by two research groups. The Department of Health and Social Security also developed a nutrient data bank based on the third edition and supplemented with data derived by calculation from recipes and with more recent analytical data. While this computerized table was used extensively by the Department of Health and Social Security in studies on the nutrient intake of selected groups and was also used by a number of associated research groups, it was never published or made generally available.

In 1968, work began on revising the third edition of the McCance and Widdowson table. The Ministry of Agriculture, Fisheries and Food provided the organizational framework for the revision and initially with other government departments, but later alone, funded the analytical work. The work was carried out in a Medical Research Council Unit with also a substantial financial commitment. It had been decided to prepare a computerized version of the tables which would be made available and sold alongside the published book.

These data form the basis of the national nutrient data bank. The revision and updating of this data bank, which is now the responsibility of the Ministry of Agriculture, Fisheries and Food was guided initially by the advice of the Subcommittee on Food Composition Tables of the Committee on the Composition of Foods and Food Products and now by a Working Party on Nutrition. A continuous program of revision is in progress based on a detailed assessment of the literature and supplemented by a substantial analytical program. As the work on the various food groups is completed, it is proposed to publish it as supplements. Each supplement will include new data and such old data as are considered to be relevant and reliable. Eventually, the 5th edition will be published. There are plans for issuing the supplements in a computer-readable form, and these supplements will be incorporated into existing data banks. The data base is sold as a punched tape, and individual users have constructed their own programs and data management systems. Most users are involved in research studies and have added data from other sources. Several entrepreneurial groups have produced computer packages for the use of the data bank. While data are not directly accessible on-line, selected portions of data were entered into the Prestel system by the Ministry of Agriculture, Fisheries, and Food, so that these are generally accessible. This mode of operation in relation to the use of computerized nutritional information parallels the early development of food compositional data in the UK. The original impetus for the work of *McCance and Widdowson* arose from work in clinical nutrition in which food composition data were essential in the dietary management of diabetes. The work was developed and expanded for use in the assessment of dietary intake of individuals and populations. Thus, the UK interest in this area has always been primarily nutritional, and the major users of tables and data banks are dietitians, nutrition research groups, and government departments.

An outline of the nutrient data bank reveals the organisation of printed data as follows. The foods items are arranged into the 14 groups: cereals and cereal products; milk and milk products; eggs; fats and oils; meat and meat products; fish and fish products; vegetables; fruit; nuts; sugars, preserves and confectionery; non-alcoholic beverages; alcoholic beverages; sauces, soups, and miscellaneous foods. Within each group the arrangement is usually alphabetically within subgrouping of related types of food, although some groups are not divided in this way. The foods have code numbers and a description of the sample is given and the proportion of edible material in the food as purchased. Scientific (taxonomic) names, description of analytical methods and sources of the analytical data are given in appendices, but these do not form part of the computerized data bank. The proximate nutrients, inorganic constituents, and vitamins are given in the first section of the tables. Values for amino acids, fatty acids, and cholesterol are given in separate sections. Amino acids are quoted as milligrams per g N, and fatty acids as g per 100 g total fatty acids. A printed supplement gives amino acids and fatty acids per 100 g food [3]. The nutrients included are: total nitrogen; protein factor (specific for different food groups) × N (adjusted to allow for presence of non-protein, non-amino acid N where known); fat; sugars (lactose in milk products); starch, available carbohydrate (sum of sugars and starch); dietary fibre (sum of non-starch polysaccharides and lignin); alcohol where present; inorganic constituents, Na, K, Ca, Mg, Fe, Cu, Zn, P, Cl (S values for many foods); vitamin A, carotenes, vitamin D, thiamine, riboflavin, nicotinic acid, vitamin C, vitamin E, vitamin B_6, vitamin B_{12}, folate, pantothenic acid, and biotin; amino acids, protein amino acids (no values for hydroxypyroline); fatty acids coverage varies between food groups, individual fatty acids are given, grouped into saturated, mono-unsaturated, and polyunsaturated fatty acids.

Most values are derived by direct analysis on pooled representative samples of the food in question. The samples are based on consumption data for the UK and for proprietary products, different brands are combined according to their share of the market. Literature values are also considered and evaluated according to the criteria given by *Southgate* [4] and by *Paul and Southgate* [5]. The printed tables include a key giving the sources of all values and references to the literature where appropriate.

References

1 McCance, R.A.; Widdowson, E.M.: The chemical composition of foods. Special Rep. Ser. MRC No. 235 (Her Majesty's Stationery Office, London

1940).
2 McCance, R.A.: Widdowson, E.M.: The chemical composition of foods; 3rd ed. Special Rep. Ser. MRC No. 297 (Her Majesty's Stationery Office, London 1960).
3 Paul, A.A.; Southgate, D.A.T.; Russell, J.: First supplement to McCance and Widdowson's the composition of foods: amino acid composition (mg per 100 g food); fatty acid composition (g per 100 g food) (Her Majesty's Stationery Office, London 1980).
4 Southgate, D.A.T.: Guidelines for the preparation of tables of food composition (Karger, Basel 1974).
5 Paul, A.A.; Southgate, D.A.T.: McCance and Widdowson's the composition of foods; 4th ed. (Her Majesty's Stationery Office, London 1978).

3.20 Summary of Survey of Food Composition Tables and Nutrient Data Banks in Europe

L. Arab

In order to obtain an overview of computerized nutrient data banks in Europe, a questionnaire was sent to 70 research centres in 20 countries. Information was sought on when the system was established, its design, technical specifications, and about number of foods and nutrients included, and the uses to which the system is put. In addition, each centre was asked to calculate the mean intake of various nutrients from a 2-day dietary protocol. In total, 32 centres completed and returned the questionnaire (see table II), and seven also carried out the task as requested. From the responses it is clear that there are three distinct groups of people involved with food composition tables as follows:

(1) food analysts who carry out analysis of nutrients and contaminants in foods: their work ranges from measuring one substance in many foods to measuring many substances in one food group;

(2) food table constructors who are middlemen collecting and assessing data for inclusion in food composition tables which are usually published on a national basis;

(3) users of food composition tables who often have constructed nutrient data bases and developed computer programmes to enable them to be used; usually they want to calculate the nutrient or contaminant content of foods for such purposes as nutritional assessment surveys, toxicological surveys, recipe calculation, and patient counselling.

In many cases, respondents were involved in more than one of these functions as shown in tables II and III. In summary, most of the respondents are working in institutes carrying out research mainly on cancer and heart disease. However, considerable use is also made of data banks in nutritional surveys and for teaching purposes. At least one quarter of those centres surveyed offered the system to others on a contract basis.

The major criticism of the existing data systems was that no indication is given on the variability in nutrient composition and on the reliability of the chemical analyses. In general, most computer systems do not give a measure of the variability in analytical results, and it is often assumed that results are accurate without due consideration being given to the variation between food samples and between analyses from different laboratories. Concern was also expressed that most of the tables lacked information on specific nutrients for many foods included in the table. However, specific information on missing values was not sought in the questionnaire.

Table II. Information on food composition tables and nutrient data banks in Europe derived from questionnaire survey

Country	Institute and contact person	Name of system	Data stored			Main use of table/data bank	Computer	Date established
			number of foods	number of recipes	number of nutrients and contaminants			
Austria	Forschungsinstitut der Ernährungswirtschaft Blaasstrasse 29 A-1190 Wien Mr. Pfannhauser	-	?	0	4	food analyses	HP 1000	1978
	Ludwig-Boltzmann-Institut für Stoffwechseler krankungen und Ernährung Wolkersbergenstrasse 1 A-1130 Wien Mr. V. Veitl	-	1,138	101	23	-	Prime	1981
Belgium	Department of Nutrition and Dietetics Faculty of Medicine University Hospital De Pintelaan 185 B-9000 Ghent Prof. G. Verdonk	-	200	-	21	food composition tables	-	1970
	Ecole Santé Publique Campus Erasme ULB Route de Lennik 808 B-1070 Brussels Mr. Kornitzer	-	185	0	20	other	CDC Cyper	1981
	Institut Paul Lambin Clos Chapelle-Aux-Champs B-1200 Brussels Mr. J.M. Pyke	-	700	100	21	food analyses, other	Data	1980
Denmark	National Food Institute Mørkhøj Bygade 19 DK-2860 Søborg Mr. A.	Levnedsmiddeltabel	370	0	83	food analyses, foodcomposition tables, other	MPS 3000/ PDP 11	1983

	Møller							
Federal Republic of Germany	Klinisches Institut für Herzinfarktforschung an der Medizinischen Universitätsklinik Bergheimerstrasse 58 D-6900 Heidelberg Dr. L. Arab	BLS-Bundeslebensmittelschlüssel	5,000	1,000	140	other	Apple II/ IBM	1983
	Institut für Sozialmedizin und Epidemiologie des Bundesgesundheitsamtes Postfach 33 00 13 D-1000 Berlin 33 Prof. H. Rottka	as above				other		
	Dokumentationsstelle der Universität Hohenheim Postfach 700562 Paracelsusstrasse 2 D-7000 Stuttgart Dr. H. Haendler	Datendokumentation des Fachgebietes Futtermittelkunde (feed data documentation)	18,000	0	800	feed composition tables, other	ICL 2900	1950
	Zentrale Erfassungs-und Bewertungsstelle für Umweltchemikalien des Bundesgesundheitsamtes Thielallee 88–92 D-1000 Berlin 33	Datenbank ZEBS	?	0	18	food composition tables	Siemens	1974
	Deutsche Forschungsanstalt für Lebensmittelchemie Lichtenbergstrasse 4 D-8046 Garching Dr. H. Scherz	Lindas	655	0	232	food analyses, food composition tables	Cyber 175	1981
	ENSIG-Institut für Agrarsoziologie Bismarckstrasse 4 D-6300 Giessen Mr. H. Böing	Glanz	2,000	600	38	other	Cyber 174	1982

Finland	Department of Nutrition University of Helsinki SF-00710 Helsinki 71 Ms. M. Ahola	Ravinto-ohilmat (nutrient data processing programs)	1,220	770	60	food analyses, food composition tables, other	Burroughs 7800	1972
	Department of Food Chemistry and Technology University of Helsinki SF-00710 Helsinki 71 Dr. P. Varo	Mineral Composition Tables[1]	400	80	29	food analyses, food composition tables	Burroughs 7800	1971
France	Fondation Française pour la Nutrition 71, av. Victor-Hugo F-75116 Paris Dr. J. C. Favier	Compaliné	1,000	50	90	food analyses, other	Apple II/ Sirius	1983
	Inserm. Unité 63 22, av. du Doyen-Lépine F-69500 Bron Dr. S. Renaud	-	600	10	23	food analyses, food composition tables, other	IBM 360/ 168	1979
	ADE 9, bd des Capucines F-75002 Paris Dr. Z. L. Ostrowski	Krystell	1,650	660	18	food composition tables	IBM PC XT IBM 5110	1976
Greece	Department of Nutrition and Biochemistry Athens School of Hydiene Hof Alexandra 196 Athens 602 Prof. A. Trichopoulou	Food composition tables[2]	280	110	4	food composition tables	Hewlett-Packard	1984
Ireland	Department of Community Health Trinity College 196 Pearse Street Dublin Ms. C. Wickham	-	1,000	100	51	food composition tables, other	-	1981
Italy	Istituto Nazionale della Nutrizione	In, Compo	375	40	40	food analyses, other	IBM	1982

	Via Ardeatina 546 I-00179 Roma Dr. E. Carnovale							
	Istituto Scienza Alimentazione San Costanzo Casella Postale 333 I-06100 Perugia Prof. F. Fidanza	Alime Giuli-Pri	1,072	59	32	food analyses, food composition tables, other	Prime 550	1982
	Esna, room no. C228 FAO, Rome Mr. W. Potaemi	Food Composition Data Management and Food Name International File	848	100	53	food composition tables	IBM 370/168	1982
The Netherlands	Voedingsraad (Netherlands Nutrition Council) Prinses Margrietplantsoen 20 Postbus 95945 2509 CX's Gravenhage Mr. B.C. Breedveld	Nederlandse Voedingsmiddeltable	450	65	22	food composition tables	-	1942
	Institute for Nutrition and Toxlcology (CIVO-TNO) PO Box 360 3700 A.I Zeist Ms. W.G.M. Boeijen	UCV	1,400	50	30	other	IBM 4043	1973
Norway	Section for Dietary Research University of Oslo POB 1117 Blindern N-317 Oslo 3 Ms. K. Trygg	AKFPRG	1,500	800	28	other	DEC 10	1971
	National Society for Nutrition and Health Elisenbergveien 12 N-0265 Oslo 2 Mrs. A.H. Rimstead	Statens Ernaringsrads Mat Varetabell	696	130	14	food composition tables	-	1962
Poland	Institute of Human	Dieta	700	200	87	other	RIAD 10–	1983

	Nutrition Agricultural University SGGW-AR Nowoursynowska 166 02–766 Warsaw Mrs. B. Kowrygo						35	
Spain	Instituto de Nutrición Facultad de Farmacia CSIC Departamento de Fisiologia Ciudad Universitaria Madrid 28040 Dra. O. Moreiras-Varela	Tablas de Composición de Alimentos	231	29	18	food analyses, food composition tables. other	CBM 4032 CBM 8292	1981 1983
Sweden	The Swedish National Food Administration Box 622 S-75126 Uppsala Mrs. L. Bergström	KOST	1,400	530	35	food analyses. food composition tables, other	Nord 100 CE	1981
	Department of Clinical Nutrition Annedalklinikerna Sahlsgren's Hospital S-41345 Gothenburg	Calculation of Dietary Record and Dietary History	1,300	360	33	food analyses, other	IBM 3033 Guts	1978
UK	MRC Dunn Nutrition Unit Milton Road Cambridge CB4 IXI Miss A.A. Paul	MWIN: Recipe	1,300	300	68	other	HP 1000	1979
	Food Research Institute Colney Lane Norwich NR4 7VA Norfolk Dr. D.A.T. Southgate	McCance and Widdowson Composition of Foods 4th ed. plus 1,000 series	1,147	140	69	food analyses, food composition tables, other	PDP 11/34	1982

[1] See ref. 5.
[2] See ref. 6.

Table III. Functions of respondents to survey of those involved with food composition tables

Function	Number of respondents
A	14
C	12
U	24
A+C+U	6
A+C	2
A+U	5
C+U	1

A = Food analysts; C = food table constructors; U = users of food composition tables.

Many respondents felt that more software should be produced which would make nutrients data banks easier to use for inexperienced people. It was also considered desirable that error-checking programmes should be built in. As shown in table II the number of food items in the various data banks ranged from 21 to 5,000, the average number being about 1,000. Most data banks contained less than 100 recipes, and two contained no recipes at all. The number of nutrients or constituents ranged from 4 to 140, with an average of less than 50 per food.

No information was obtained on the initial cost of establishing a food composition table or nutrient data bank, and few people provided information on the cost of maintaining them. However, the answers obtained for the food composition tables ranged from a quarter to 3 full-time members of staff, the average being equivalent to 1 full-time member of staff. Nutrient data banks were reported to be more expensive to maintain and involved on average 2 full-time members of staff.

The most commonly cited source of data on nutrients was *McCance and Widdowson's* The Composition of Foods [1], although the *Souci/Fachmann/Kraut* tables [2] are also widely used in Europe. All the centres surveyed used a variety of other sources including their own food analyses and data supplied from food manufacturers.

A major task in the development of a nutrient data bank is the coding of data. In all centres surveyed, data are coded using numbers or an alphanumeric code with 3–12 digits, but mostly a 4-digit code is used. In the various systems, the numbers are randomly assigned, organized alphabetically by food group or alphabetically within a food group. Mostly, foods are coded according to food group. In some cases the code also contains information on the method of storage, brand names of foods, or country of origin. Generally, the amounts of foods and their codes are entered directly or using special coding forms, but occasionally, use is still made of punch cards. No centre has an optical reader. Of the 32 centres surveyed, 12 makes of computer are in use: IBM was represented by at least six different types of machine. Clearly, it will not be possible to standardize the larger computer hardware. However, this is not a serious problem, because data tapes can be made compatible with most large systems, and all centres have the machines required to read these tapes. Although the use of microcomputers is becoming increasingly attractive with their increasing storage capabilities at low prices, it will be more difficult to standardize microcomputers. The transfer of information is difficult between microcomputers, and programming is practically not interchangeable between languages. Twelve computer languages were listed as being used for storage, retrieval, updating, and calculation. The most frequently mentioned were Fortran, Cobol, and Basic. As at present few centres are using microcomputers, it would be worthwhile considering the development of standardized system for their use with nutrient data.

While it is difficult to generalize from the survey about he quality of the food analysis data included in the tables, several generalizations can be made. In the centres conducting analyses, 1–3 samples of a food item are taken, and analyses are done on 1–3 aliquots of each sample. Internal standards are not used regularly, but when used, they are run with every batch. Data based on average values, after elimination of extreme values, are entered in the tables. Much of the data in the food composition tables are obtained using unpublished methods, and data on the nutrient content of foods and obtained for different laboratories. Thus, it is highly likely, that data within the various tables are not always strictly comparable.

Each centre was asked to carry out the task of calculating the mean intake of a number of nutrients from a 2-day dietary protocol, taken from the paper by *Hoover and Perloff* [3]. Seven centres carried out the task which represented a considerable effort on their part from language translation to updating of systems and printout of results in the required format. The calculation of energy, macronutrients, cholesterol, fibre, four minerals and five vitamins were compared. The results obtained are shown in table IV. The most stable parameter was energy consumption, for which the standard deviation between centres was 10% of the mean. The estimations of calcium and fibre varied considerably, with deviations from the mean of 44 and 42% respectively. Differences between extreme values were greater than 50% for iron, vitamin A and the B vitamins, fibre and calcium. Reference values based on calculations using USDA Handbook No. 8 are also given in table IV.

In general, most data banks are relatively new and undeveloped, most only being in existence since 1980. As yet sophisticated programmes for nutrient interactions have not been developed, and a satisfactory way of dealing with missing values has not been found. Thus, at this early stage, the investment in the development of these nutrient data banks is not so great that compromises in the interest of standardization would be at the sacrifice of great personal time and effort. However, as progress is rapid, the issue of standardization is urgent. Those surveyed showed a great deal of interest in developing a high degree of compatibility between nutrient data banks.

References

1 Paul, A.A.; Southgate, D.A.T.: McCance and Widdowson's the composition of foods; 4th ed. (Her Majesty's Stationery Office, London 1978).

2 Deutsche Forschungsanstalt für Lebensmittelchemie: Food composition and nutrient tables 1981/82 (Souci/Fachmann/Kraut tables); 2nd ed. (Wissenschaftliche Verlagsgesellschaft, Stuttgart 1981).

3 Hoover, L.W.; Perloff, B.P.: Model for review of nutrient data base system capabilities (University of Missouri-Columbia Printing Services, Columbia 1981).

4 United States Department of Agriculture: Composition of foods, Agricultural Handbook No. 8 (United States Department of Agriculture, Washington 1976).

5 Koivistoinen, P.: Mineral element composition of Finnish foods: Na, K, Ca, Mg, P, S, Fe, Cu, Mn, Zn, Mo, Co, Ni, Cr, F, Se, Si, Rb, Al, B, Br, Hg, As, Cd, Pb and ash. Acta agr. scand. *1980:* suppl. 22.

6 Trichopoulou, A.: Food composition tables (Lenis, Athens 1982).

Table IV. Daily intake of energy and various nutrients calculated from a 2-day dietary protocol by seven research centres

Centre	Energy kJ	Protein g	Fat g	Carbohydrate g	Fibre g	Cholesterol mg	Potassium mg	Calcium mg	Phosphorus mg	Iron mg	Vitamin A µg	Vitamin B_1 µg	Vitamin B_2 µg	Vitamin B_6 µ	Vitamin C g
A	4,455	48	50	99	3.5	218	1,092	172	517	6.2	223	700	600	-	34
B	4,757	43	55	115	-	240	1,230	181	542	10.0	390	800	600	800	55
C	5,003	54	65	106	11.6	-	1,383	406	760	6.3	312	621	577	757	50
D	5,227	54	67	113	10.6	-	1,396	384	778	6.5	312	640	580	737	44
E	5,354	55	69	115	11.9	-	1,431	295	711	6.8	278	630	600	732	40
F	5,443	40	71	125	-	269	1,377	225	625	8.8	297	586	541	697	49
G	6,163	66	70	139	-	296	-	111	-	4.7	242	453	433	-	46
Mean	5,200	51	64	116	9.4	256	1,318	253	655	7.0	293	633	561	745	45
SD	547	8.7	8.1	13	4.0	34	131	112	111	1.8	55	106	60	38	7
Coefficient of variation, %	10	17	13	11	42	13	10	44	17	28	19	17	11	5	15
Maximum difference	1,708	26	20	40	8.4	78	304	295	261	5.3	167	347	167	103	21
Reference[1]	5,138	56	59	121	85	283	1,272	272	626	7.7	527	827	795	-	45

[1] Values based on data in reference 4.

4 Infoods: Progress so Far and Plans for the Future

W.M. Rand

For a number of years, there has been a growing awareness of a number of problems with regard to food composition data [1]. These problems are summarized briefly as follows:

(1) inaccuracies in food composition tables ranging from analytical problems to transcription errors;

(2) missing data arising in part from the increasing difficulty of those responsible for nutrient data tables and banks to keep up with new foods being marketed, new and modified analytical methods being developed, and the increasing number of food components being regarded as potentially important;

(3) duplication of effort as demonstrated by the fact that government and industrial laboratories often find themselves analyzing many of the same foods over and over again;

(4) some standard tables, for example the INCAP table for Latin America, are now outof-date, as many foods and methods of analysis have changed thus invalidating the original entries, yet data are still being extracted from these tables to construct new tables;

(5) with the increasing interest in nutrition and the availability of small inexpensive computers, a large number of special-purpose data banks have been developed which in general are neither compatible nor complementary.

In addition, it is often difficult to determine the source, accuracy, or even the exact definition of specific entries in a given data table. As food composition tables and nutrient data banks proliferate, even finding and gaining access to suitable data for a specific application is becoming increasingly difficult. These problems have become increasingly apparent to diverse groups of users, including governments interested in the entire question of the nutritional status of their populations; industry involved in the development of new products and reformulations of old products, the labelling of the content of their products, and the growth of international trade; professional nutritionists concerned with a broad spectrum of activities ranging from metabolic research to individual and mass feeding, and the international nutrition community concerned with nutrition problems which cross-national boundaries, for example international food aid.

Early in 1983 a meeting was organized to assess the status and problems of food composition data [1]. This was the International Network of Food Data Systems (Infoods) Meeting held in Bellagio, Italy, January 30 to February 5, 1983. The main theme of this meeting was that, while there is a great deal of work to be done in individual countries and regions, it is essential that there is international coordination of these activities. To this end the meeting recommended that an organization be formed, to be known as Infoods. The main objectives are to promote formally international participation and co-operation in the acquisition and interchange of data on the nutrient composition of foods, beverages, and their ingredients in forms appropriate to meet the needs of government agencies, nutrition scientists, health and agriculture professionals, policy makers and planners, food producers, processors and retailers, and consumers.

The meeting agreed that in order to achieve these objectives, Infoods would need to develop a network or linkage of data banks throughout the world and to develop standards and guidelines for the collection, storage, interchange, and use of data. It was agreed that a secretariat should be set up to coordinate these activities and that an international journal devoted to food composition studies should be published. It is hoped to include papers on analytical methods for nutrient and non-nutrient components of foods, the processing of these data and their application for various uses. A number of activities have already been initiated. The first task is to establish an international directory of food composition tables and data banks. Since Infoods is to develop a network of food data banks, the logical starting point is to survey existing data banks in order to determine their content and format, the facilities at which the data banks are kept, the degree of compatibility of data banks both in terms of content and form, from the point of view of linking them, and the completeness of the data banks in relation to the food actually available to the consumer. This information will not only form the basis of the Infoods network, but will provide basic information necessary for the other activities of Infoods. Five task forces are being set up, each in an area in which international co-ordination is considered to be essential. A task force on quality of food composition data headed by Dr. *Southgate* will develop criteria and guidelines for the quality of entries in food composition tables and data banks. It is proposed that criteria are developed for: methods and laboratory practices, modes of expression of data and conversion factors, calculation of data from analytical values, and criteria for accepting data from the literature. A task force will be set up to consider the development of criteria for the nomenclature to be used in nutrient data banks, i.e., the names to be given to foods and how foods are coded. The task force will review existing systems and methods of classification and description of foods and their components and will also evaluate these methods in terms of their suitability for international exchange of information. In addition, it will recommend priorities for establishing a universal and international standardized documentation language. Finally; recommendations will be made for a nomenclature structure which will be internationally acceptable and which will be flexible and responsive to modern computer technology.

A task force will be concerned with the design of information systems. As Infoods is ultimately conceived as a network linking users and nutrient data banks, a system for moving data about needs to be developed. The task force will examine how the needs of users can best be satisfied in the light of technological realities. More specifically, the task force will develop a model system for data flow and regulation and information services to be provided. They will discuss with existing data centres how they may be integrated into a global network and how their present structure and modes of operation would influence the network (to define the interfaces necessary). A plan of action will be designed including a prototype system. Various aspects of the system will be monitored during development and once operational, the system will be evaluated.

The content and form of the food composition tables and nutrient data banks will be studied by another task force with a view to developing an ‘ideal’ data file. Attention will be given to the items and components to be included, additional information required, and logical formats for data records and files for the storage transfer and distribution of food composition data. A final task force will study the needs of the users of food composition data. The numbers and types of users and how frequently they use such data will also be considered. In addition, attention will be given to what data are most frequently used, requested, or needed, and for what purposes. More generally, this task force will endeavour to determine what type of network would best serve both present and potential users.

Thus, in summary, Infoods is envisaged as a network of regional activities together with an organizational framework for various activities such as the expert task forces. A necessary adjunct to the activities of Infoods are regional committees. These are currently being identified and formed where necessary and will be asked to assist the Infoods secretariat in identifying and obtaining the available food data bases and other relevant information from the region, as well as assisting Infoods in identifying the special problems, needs, and resources of the regions and persons in the region for participation in the various Infoods activities. Moreover, they will provide input into the policy decisions of Infoods through representation on the policy committee and the participation of its members in the various Infoods activities.

It is essential that complete and accurate food composition data are readily available to those requiring such data. At present, such data are mainly available at the national level, and in some areas efforts are being made to collect data together, so that these will be available on a regional basis. Infoods has been established to provide a global structure for the entire range of activities involved in food composition data, from collection to usage. This, of course, can only be achieved by working together with regional groups such as Eurofoods.

Reference

1 Rand, W.M.; Young, V.R.: Report of a planning conference concerning an international network of food data systems (Infoods). Am. J. clin. Nutr. *39:* 144–151 (1984).

5 Criteria to Be Used for Acceptance of Data in Nutrient Data Bases

D.A.T. Southgate

5.1 Introduction

The definition of *compatibility* in the Oxford English Dictionary includes the phrase 'able to be used in combination', and this phrase seems very apt in relation to the objectives of this meeting: to reach the position where we can each use one another's data for the nutrient content of foods. Compatibility does not imply that the same format needs to be adopted or that there is a need to evolve one system to meet all perceived present and future needs, but merely that data can be used in combination.

One important requirement when using data from another worker or published source is confidence. Thus, confidence is required that the data are applicable to the particular situation and that the criteria of quality applied by another worker in accepting the data are equally acceptable in this situation. The range of criteria that need to be applied to data before the data become part of a nutrient data system either in the form of conventional food composition tables or a computerized nutrient data bank, is discussed. While, in general, the criteria are equally applicable to the two systems, the ease with which a computerized system can be revised permits some relaxation of the criteria.

In compiling data on the nutrient composition of foods there are two types of approach: the *direct* approach in which samples are collected, analyzed, and the values incorporated into the data system and the *indirect* approach in which values are drawn from the literature or unpublished reports. In practice, most compilations are a mixture of both approaches [1], although the original tables of *McCance and Widdowson* [2] were entirely based on analyses in their own laboratory. In the direct method, the compilers have control over the identity of the food, the sampling scheme of the analytical method used, and the execution of the analysis itself. Those who have been responsible for this type of operation are well aware of the limitations of their data and can take cognizance of these when presenting and using the data.

The indirect method is often seen as an easy and effective way of preparing data for composition tables, but in fact this method requires painstaking effort, a deep understanding of foods, and familiarity with nutritional analysis. It requires the establishment of criteria [1, 3] for the acceptance of data. These criteria are required to establish confidence in the compositional values and are applicable to the acceptance of data into nutrient data banks. They represent a 'counsel of perfection', but in practice all these criteria may not be met for a variety of reasons. However, if compatibility of nutrient data banks is to be achieved, it is vital that these criteria are used as guidelines.

5.2 Name of Food

The first essential requirement for compatibility of nutrient data is the unequivocal identification of a food item, and thus the choice of the identifying name has very high priority. In addition to the common name, the local synonyms need to be listed, and for international use of data, a thesaurus will be required to relate the locally used name to the names by which the same food is known in other countries. For unprocessed plants and animal foods the scientific taxonomic name will assist in identification, and for plants the variety should also be given. Prepared foods are more difficult to name correctly because some proprietary names have restricted use, and a few are used in different countries for different product formulations. Cooked dishes present even more problems because the composition of a named dish varies within households, between households, regionally, and internationally, and the name alone is often inadequate for unequivocal identification.

5.3 Origin of Food

Description of the origins of a food item will further assist in its identification. Such a description will need to include definition of the locality where a plant food was grown, the soil type, the method of husbandry, fertilizer treatment, harvesting, and post-harvest treatment. For animal products, locality and method of husbandry and slaughter should be defined. A great deal of food composition data originates from experimental studies in connection with plant and animal husbandry. The control groups in these studies can also be a source of data. However, the husbandry used must correspond to that used commercially.

5.4 Nature of Sample

The description of the sampling process, the place and time of sampling, the number of samples and their origin if purchased, by type of retail outlet, and finally the state in which the food was purchased also need to be considered. On the basis of these four criteria, it is possible to identify the food with reasonable certainty and to judge whether the sample is representative of the food as a whole or of a subset of the food, or whether data merely apply to the food actually analyzed.

5.5 Treatment of Samples before Analysis

The criteria required here are the details and conditions of storage and the preparative methods used to bring the food to a state suitable for analysis. At this stage it is usual to remove inedible material, and it is important to have a description of the inedible material removed and consequently the nature of the edible portion taken for analysis. Some compilations are based on analyses on pooled samples, and it is clearly important to know whether or not pooling was adopted. With cooked foods, descriptions of the cooking methods and recipe are also appropriate.

5.6 Analysis

The choice of the analytical method is frequently seen as a major cause of incompatibility of data. While there is some truth in this, it is not usually a major cause of discrepancies between published values, which are more usually due to the different samples analyzed and the natural variation in the composition of foods. However, it is clearly necessary for wider use of data to be aware of the methods used to obtain the values cited. In many cases reference to the method used is all that is required, and a description of any modification used since such a modification may make a significant difference to the values obtained.

For many nutrients there is a range of methods which give comparable results, and frequently the choice lies between one that uses complex instrumentation, for example, atomic absorption spectroscopy or high-performance liquid chromatography, and a time-consuming method based on simple techniques such as colorimetry or titration. The instrumental procedure is not necessarily better than the simple method that it has replaced, because many laboratories have invested in capital equipment and speed of analysis rather than staff. In some cases, the instrumentation enables determinations that were vitually impossible by manual procedures, such as amino acid analysis, while in other, complex and simpler methods give very similar results. Compatibility does not demand that the same analytical methods are used, but at least analyses based on the same principles should be used. Where the chosen methods are known to give different values, these differences should not be interpreted as genuine indications of variations in the composition of foods.

In order to have confidence in data it is essential that the standards of quality control of analytical work need to be agreed. These are as follows: (1) replicate analyses carried out as a matter of course; (2) analysis of reference materials; (3) regular use of standards; (4) recovery of added standards; (5) analysis of concealed replicates; (6) exchange of samples between laboratories; (7) collaborative tests of methodological protocols, and (8) comparisons of values obtained with literature values.

They are in fact the essential elements of good laboratory practice. It is unfortunate that published papers rarely contain any mention of these checks.

5.7 Factors to be Considered in the Choice of Methods

It is not possible here to discuss the choice of analytical methods for all nutrients. The basic principle should be that the method provides information that is nutritionally appropriate. This can be illustrated with some comments on carbohydrates.

One conventional approach to the measurement of carbohydrate is by difference: that is, by directly measuring the percentage of protein, fat, ash, and water, and deducting these from 100 to give the percentage of carbohydrate. This method is clearly inadequate for virtually all nutritional purposes because it combines in one value all the different carbohydrate species: sugars, starch, and components of dietary fibre, together with all the errors in the other determinations. Nutritional users require much more detail, and, therefore, the methods used must provide this detail. The metabolic effects of different sugars are not the same, and there is a need to have some knowledge of the different sugars present-either a range of specific procedures is required, e.g., enzymatic methods [4], or separation and analysis by a chromatographic procedure [5]. The higher oligosaccharides such as stachyose and verbascose are only poorly absorbed and are associated with gas production in the large intestine and should be measured separately. Analogously starch is associated with specific nutritional properties and values for it are also needed; the choice of method here must avoid interference from β-glucans and other non-cellulosic polysaccharides, and it is probable that enzymatic procedures give more relevant nutritional values.

In the case of dietary fibre, the progress in physiological studies of the mode of action is not sufficient to define the level of detail required, but it is clear that estimates of cellulosic and non-cellulosic polysaccharides are required [1] and that measurement of the monosaccharide and uronic acid components of the non-cellulosic fraction can give information which can be used to predict probable modes of action [6]. Consideration of the carbohydrates in foods leads to the remaining criterion that must be applied to data from other sources.

5.8 Mode of Expression

The use of different modes of expression can be a major cause of incompatibility, and it is important that either an internationally recognized system is followed or that the mode of expression used is stated clearly. For many nutrients there are no difficulties, although the basis of expression, for example, the units chosen or expression on ‘dry matter’ basis as opposed to a fresh or ‘as received’ basis, can produce ambiguities. The major difficulties arise where direct analytical data are converted into the quoted values for nutrients. Thus, the long-standing convention of using protein values derived by applying a factor to measured total N values and the calculation of energy values using the energy conversion factors [7] can produce problems of incompatibility. However, it must be emphasized that the magnitude of the discrepancies arising from these conventions is usually small.

The use of vitamin equivalents, for example in the expression of values for vitamin A activity which involves the conversion of carotene values into units of retinol activity, is another source of ambiguity because two systems are in use [8]. However again, with most foods the differences are small [1]. In principle, it seems preferable for the values in a data bank to include both the direct (analytical) values and the derived conventional values. The use of some analytical conventions is another cause of ambiguity, for example fatty acid data are frequently given in grams per 100 g total fatty acid, and amino acids are often expressed on a N basis: either milligrams per gram N or g/16 g N. The primary need in this connection is that the compilers of the data bank establish a uniform convention in their modes of expression and make certain that the convention they use is stated clearly. In some cases, the choice of one convention is a matter of national preference (or because of national legislation), but if the conventions are defined clearly, the necessary conversions can be made when using data from another source.

5.9 Development of Criteria and Their Adoption

Real compatibility ultimately depends on the acceptance of a series of criteria by those involved in the preparation and use of food composition data systems. In this paper only the main outlines have been sketched and so doing I am continuing the process begun by the Group of European Nutritionists [3] who saw the opportunities for a European system of food composition tables in the 1970s. The next stage in the development of these criteria will be carried out under the auspices of Infoods and lead to the production of a series of guidelines describing in detail the points outlined here.

At present, there is a large volume of compositional data to which the criteria suggested here with regard to the identification of the foods, the collection of the samples, and the analysis of the nutrients have not been applied. Most of these data are sound, and it is not suggested that they be discarded and that a mammoth programme of sampling and reanalysis be started. As new analytical work is started, it should be based on these criteria, and the primary need is that individual data banks are constructed and amplified, so that the existing numerical data are accompanied by information that will enable any user to be certain of (1) the identity of the food, (2) the origin and nature of the samples analyzed, (3) the analytical methods used, and (4) the modes of expression used. With this information the user will be able to assess whether he can use the data in combination with his own.

References

1 Paul, A.A.; Southgate, D.A.T.: McCance and Widdowson's the composition of foods; 4th ed. (Her Majesty's Stationery Office, London 1978).

2 McCance, R.A.; Widdowson, E.M.: The chemical composition of foods; 3rd ed. Special Rep. Ser. MRC No. 297 (Her Majesty's Stationery Office, London 1960).

3 Southgate, D.A.T.: Guidelines for the preparation of tables of food composition (Karger, Basel 1974).

4 Bergmeyer, H.-U.: Methods of

enzymatic analysis (Academic Press, New York 1974).
5 Dunmare, D.L.; Otto, S.E.: High pressure liquid chromatographic determination of sugars in various food products. J. Ass. off. analyt. Chem. *62:* 1 (1979).
6 Selvendran, R.R.; Du Pont, M.S.: Problems associated with the analysis of dietary fibre and some recent developments; in King, Developments in food analysis techniques (Applied Science Publishers, London 1983).
7 Southgate, D.A.T.; Durnin, J.V.G.A.: Caloric conversion factors: an experimental evaluation of the factors used in the calculation of the energy value of human diets. Br. J. Nutr. *24:* 517–535 (1970).
8 FAO/WHO Joint Expert Committee: Requirements of vitamin A, thiamine, riboflavin and niacin. Tech. Rep. Ser. Wld Hlth Org., No. 362 (1967).

6 Nutrient Data Banks from the Point of View of the Computer Programmer

K.C. Day

6.1 Introduction

A nutrient data bank or food composition table is of necessity a long document, being a listing of foods, their names, components, and the component values. As national food tables continue to increase in size and complexity, such data lend themselves to computer handling. This discussion of nutrient data banks from the point of view of the computer programmer is based on experience with two sets of food composition tables: the nutrient data bank prepared by the Department of Health and Social Security which was based on the 3rd edition of the tables of *McCance and Widdowson* [1] and the 4th edition revised by *Paul and Southgate* [2].

6.2 Department of Health and Social Security table

This table was by later standards a very simple table, with entries for about 660 food items each with 17 nutrients, the values of which were expressed in units per ounce of edible matter. The file was constructed in a similar way to the McCance and Widdowson tables. There were 34 food groups with gaps between the groups so that any additional food could be added to the appropriate group. Originally there were 16 values for each food item: energy expressed in kilo-calories, total and animal protein, fat, carbohydrate, calcium, iron, retinol, equivalents, thiamin, riboflavin, nicotinic acid, vitamin C, vitamin D, pyridoxine, added sugars and water. To these, energy expressed in kilo-joules was added, but many items of interest to nutritionists today, such as electrolytes and fibre, were missing. The addition of fibre values to the table proved not to be simple. As there were only 660 codes on file, a single code often represented more than one food item, and although they had the same composition with regard to the listed nutrients, they very often had different fibre compositions. Thus, as it was not possible to add fibre values to each record on the file, a separate fibre file was created, each record consisting of the food code, a suffix code, and the fibre values. Each food item in the main table was allocated a suffix. If there was no fibre component to the food, this suffix was zero. During calculation, if the suffix was zero, no action was taken, but if the value was greater than zero, the program searched the fibre file to extract the fibre values for the food in question. This technique was successful, but it did increase operating time.

6.3 4th Edition of the McCance and Widdowson Tables

In 1978, the 4th edition of the tables of *McCance and Widdowson* was published and for the first time was made available on paper tape to facilitate computer handling. Basically, these tables are in three parts: (1) the main table listing up to 39 values for about 960 foods; (2) the amino acid composition table, and (3) the fatty acid composition table.

There were several problems with reading the tapes and storing the data. In the published book it was quite logical that only those constituents should be listed which were likely to be found in a food. Thus, a value for say lactose in non-milk foods would not be found. However, from the computing point of view, this presented a problem. The structure of the record for each food item varied according to the food group to which it belonged. On examination, it was found that for every food item 30 values could be found, but there were nine other values in the file, which varied in number and component from one food group to another. If this structure had been maintained, program time would have been increased by an unacceptable amount, because each food code would have been interrogated as to food group, and then the food group checked to see whether any of these values were required by the program. It was decided that every food would have a common format with a value for every component likely to be found in the table. The 4th edition of the *McCance and Widdowson* tables is divided into 13 food groups with no free codes between the groups, thus additions must be made at the end. As the highest code on the table is 969, it was decided that new food codes would begin at 1001. There were two options open: the addition of new codes to the end of the table without regard to food group or the allocation of blocks of codes, one block for each food group. The second option would then necessitate deciding how big a block to allocate to each group. It was decided to add new foods to the end of the table without regard to the parent food group. This has not made selection of foods by group difficult, because the group is part of each record, and selection is not slower because the foods are recorded randomly.

Some of the values in the book are recorded as 'trace' or 'no data available', and on the computer, these are recorded as - 1 to distinguish them from zero, but for calculation, they are treated as zero. Some other values are marked as 'estimated' values, and these are taken as listed. Such values could have been indicated in the file, but this would have doubled its size. It was decided to store the nutrient values as integers, i.e., whole numbers, because whole numbers only occupy one computer word, whereas real numbers, those with decimal fractions, occupy two words. Each value is multiplied by a factor to eliminate decimal fractions, and the new values are recorded on the file. The maximum value for integers on the computer is 32767, and in a few cases, vitamin D in cod liver oil for instance, the value exceeds this limit. Thus, before storing such a number, it is first divided by 10 and then made negative. This means that a check has to be made for negative values of - 3000 and less, and in such cases, the reverse transformation made to restore them to their correct values. There is the possibility of losing up to 9 parts in 33,000, but this is a very small amount.

The fatty acids are recorded as grams per 100 g fatty acids. It was hoped to store the values as grams per 100 g food, but it was found that the maximum value for some of the fatty acids was too great to be accommodated by the method used for the basic nutrient table. The percentage values were multiplied by 100 and the fatty acids stored as integers, still as a fraction of the total fatty acids.

This table presented two problems. Firstly, many foods were not represented directly, but by recipes with up to seven food constituents. For each such food, the fatty acid composition for each recipe component was calculated, and all added together to give the composition for the whole food. Secondly, there was a variation in the fatty acids listed for each food group. Again, the list was rationalized, every food having a record in the fatty acid file, each record having a value for each of the 40 possible fatty acids or fatty acid mixtures. Cholesterol values were also added to this file. The amino acid table is set out in a way similar to the fatty acid table in that many of the foods are cross-referenced to up to seven constituent foods. There were less problems with this table because there is no variation in the list of amino acids.

6.4 Calculation of Nutrient Intakes

Part of the research at the Dunn Nutrition Unit involves the calculation of nutrient intakes from volunteer subjects. This is done by a suite of programs which does more than just calculate these intakes. It also is used for checking incoming data, listing calculated results or the tables themselves, and for preparing results in such a way that they may be transmitted by telephone for storage or printing at a remote station.

The suite consists of a short mainline program which serves only as an entry point to the suite and making the food tables available, together with about ten segments. Control is then passed to a 'routing' program which presents a list of options. The required segment is loaded into the computer memory and control passed to it. On completion of its task, this segment returns control to the routing segment.

The checking segment checks that only valid food codes have been used and that the date and day of the week agree. A check is also made for missing records. At the Dunn Nutrition Unit the form for recording dietary intake data has been standardized. A subject records on the form the food eaten and the time. The appropriate food code and weight are added in the laboratory in spaces provided on the form. The first 21 spaces on the form hold the numbers of the survey and subject, the date, day of the week, whether the weights are in grams or ounces, and six spare characters which may be used to record other information (for example, sex, age, or religion). The remainder of the record contains the time of consumption, food code, and weight eaten for up to five foods. The times are recorded to the nearest 10 min. Weights may be in grams or ounces, but not both on the same record: ounces are converted to grams by the program. Each page on the form has space for up to four records, and the program can accommodate up to 20 records for 1 person for 1 day. These records are then all combined into a file which is submitted to the program for processing. The first 21 characters are only entered into the computer file for the first record of the day for any subject. This means that such a file cannot be sorted or merged with existing files. To overcome this, there is a 'filling' segment which restores the missing data to each record.

When calculating intakes, the program can deal with up to 19 nutrients which may be selected as required. Kilo-calories, kilojoules, protein, fat, and carbohydrate are always supplied. Intakes for up to six time periods during a day may be assessed. These periods may be of any length and do not have to be of equal length, form a continuous series or start at midnight. However, time periods may not overlap and may not cross the midnight boundary. Total intakes for the day are calculated independently of the intakes during time periods, so any food consumed outside a specified period is still accounted for in the overall daily intake. Results may be calculated from up to 100 selected foods, from all foods except those selected, or from all foods from a specific food group or collection of food groups. Results may be given in absolute amounts or expressed as ratios of kilo-calories or kilo-joules. The program can take into account any time discontinuity in the data file. Should a time discontinuity greater than a given maximum number of days be found during the listing of the results, the program will print the mean values and standard deviations for the nutrients before listing the results for the next time period. At the end of a run, the overall means etc. With the ranges of the nutrients are listed and if required, the output can be limited to this overall summary. The food table can be listed in alphabetical or numerical order, with the values in absolute amounts or as ratios of the energies.

In a study with a large amount of raw data (with about 30,000 records), the nutrient intakes can be calculated in about 2 h. Once calculated and listed, the results are lost to the computer. To save processing time should a second run be required, there is a segment to convert the results, which are in machine code, to a form which can be transmitted by telephone for storage on magnetic tape on any other computer. The results can be retrieved, converted back to machine code, and listed as required. The running time required for calculation in large survey could be reduced if a substantial part of the food tables were read into the computer memory. Then as each food is encountered in the data file, the memory version of the table would be searched not the version on the disc file. The continual reading of the disc lengthens the running time of the programme. Ideally, the whole table should be stored in the computer memory. With large computers this is feasible, but a large memory is required. With the 1,300 foods of the basic *McCance and Widdowson* table [1] plus foods added over 4 years, each record consisting of 41 words, computer storage of over 53,000 words is needed for the table alone. This is double the total memory size of the computer in the Dunn Nutrition Unit.

Fortunately, not all of the table need be held in core. From various studies carried out it has been found that of 822 foods occurring a total of 99,850 times, 9 foods accounted for 50% of the food items consumed, 50 foods for 70%, 100 foods for 80%, and 90% of all food items eaten could be accounted for by 200 foods. If these 200 most popular foods were stored in the computer memory, about 8,500 words would be required, a much more reasonable storage requirement for a minicomputer. Extra programming would be necessary to determine whether data on a particular food item were stored in the memory or on disc, but any increase in program size would be more than compensated for by the reduction in program running time. At the Dunn Nutrition Laboratory, the extra coding amounted to about ten lines in one subroutine, a new subroutine of about 12 lines, and one extra line per segment. This reduced the running time on a file of 400 records by about 50 s and halved the running time to 20 min for one data file of 7,800 records.

6.5 Problems Encountered when Using Microcomputers

Dietary analysis on a microcomputer presents a few problems. Their core sizes tend to be smaller, although memory is becoming cheaper, and microcomputers with larger and larger cores are becoming available. However, these machines tend to be slower in operation mainly because of the mass storage devices and the languages used. The most common mass storage device used on microcomputers is the floppy disc which tends to have a smaller capacity than a hard disc, and the rate of data transfer to and from the disc is slower. The combination of these two factors tends to increase data processing time. Further, there is no agreed standard for recording data, making transfer of program and data files very difficult, except between machines of the same manufacturer.

The language most commonly found on microcomputers is Basic, whereas larger machines use languages such as Fortran. A program written in Fortran is entered into the computer where it is ‘compiled’, i.e., it is converted into machine code and loaded into the memory, with any subroutines, and is ready to run. Any cross-referencing and interpreting of the coding has been done before data are submitted to the program. Basic, however, is not compiled, but each line of coding is interpreted as it is encountered during the running of the program. Thus, in an iterative loop, each line of the program is interpreted, verified, and acted upon as it is met on each pass through the loop. Some microcomputers do have Fortran, but even so their operation, if it involves retrieving data from a floppy disc, will be still slow.

6.6 Considerations in the Design of Food Composition Tables and Nutrient Data Banks

From the point of view of a computer programmer, nutrient data banks should be as 'general' as possible. That is every food item should have a direct reference in subsidiary tables, e.g., the amino acid and fatty acid tables, and every food item should have a value for every possible nutrient or component listed in the table. This will inevitably make the file larger, but this increase in size will be more than compensated for by the reduction in time, effort and duplication spent in programming, and the reduction in the size of software required to make use of the tables. Again from the point of view of the computer programmer, ease of data bank maintenance, that is the correcting and updating of data held on the file, should be considered. While correction of data is really in the province of the individual user, the methods used will be influenced by the format of the data base. More of a problem is updating. There are two forms of update, the addition of new foods and the inclusion of additional data for constituents. The addition of new foods needs to be centralized in some way. As already stated, the Dunn Nutrition Laboratory has added about 300 new foods to the *McCance and Widdowson* tables [2], and, although these have been made available to other units, it has not been the intention that these become 'official' additions to the table. Other additions have also been made to the table, and it is in the interest of all users that these food items should be brought together. This should be the province of the producers of the original table, i.e., central government. The introduction of new data for existing food items should necessitate only some minor alteration to programs.

The object of this workshop is to move towards greater understanding among users of nutrient data banks. As each national data bank increases in size and becomes more complex and more comprehensive, such understanding and cooperation becomes more and more difficult without the use of computers.

Many European countries now have large immigrant populations. Each ethnic group brings its own culinary skills and traditions which must be taken into account in nutrient data banks. For example, in Britain in the past few years, there has been a large increase in the number of Chinese restaurants, most offering a take-away service which has made their food very popular among non-Chinese people. This increase in popularity has taken place since the last edition of the *McCance and Widdowson* tables [2] and thus is not reflected in the tables. There is the movement of workers between countries, especially between member countries of the European Community, and there is the large movement in holiday seasons. If such mobile populations maintain their eating habits to the best of their ability, then their native foods must eventually influence, to some degree, the eating habits of the host country. Therefore, such imported foods will have to be included in new editions of food tables for the host nation. The inclusion of 'foreign' foods in a national data bank could be accomplished by computer, and this could be made easier if cross-linkage tables could be set up to reference foods between national data banks. There would be at least two advantages in this. Firstly, foods not found in one data bank could be found in another, so that permanent additions to food composition tables would not be necessary. Secondly, the task of recompiling data banks to include such imported foods would be simpler, and this in turn would lead to a reduction of work duplication.

References

1 McCance, R.A.; Widdowson, E.M.: The chemical composition of foods; 3rd ed. Special Rep. Ser. MRC No. 297 (Her Majesty's Stationery Office, London 1960).

2 Paul, A.A.; Southgate, D.A.T.: McCance and Widdowson's the composition of foods; 4th ed. (Her Majesty's Stationery Office, London 1978).

7 Summary of Recommendations of the Wageningen Workshop and Subsequent Progress

7.1 Introduction and Principal Recommendations

L. Arab, C.E. West

The initial Eurofoods Workshop held in Wageningen, May 29–31, 1983, was entitled 'Eurofoods: Towards compatibility of Nutrient Data Banks in Europe'. At the workshop, 41 representatives from 17 European countries discussed the status of food analyses, food composition tables, and nutrient data banks. During the workshop, the participants were asked by means of a questionnaire which of the suggestions put forward should receive the attention of Eurofoods in the future. They were asked to express their opinions on the desirability, necessity, and feasibility of implementing each of the 22 suggestions made. The questionnaire used and the results reported by those people who completed it are presented in table V.

Most people agreed with most of the suggestions made, although there were a few execptions. For example, most people were against the idea of a central laboratory carrying out all food analyses. Opinion was almost equally divided on the desirability of having a comprehensive data base containing all available information on the nutrient content of foods. However, further discussion on this point resulted in more people supporting such a project (see section 7.2).

The priority ranking was established from priority scores given to each suggestion by each of the respondents. Highest priority was given to making nutrient information widely available on data tapes. Complete documentation of the sources of information was regarded as being very important. Information on the variability of the nutrient content of foods was listed among the top five priority issues.

The establishment of a quality control programme for nutrient analyses was considered to be of major importance, and this led to the establishment of a committee towards this end (see section 7.5). The desire was also expressed for a catalogue to be drawn up listing the laboratories in Europe carrying out analyses on specific foods or of specific nutrients.

The next highest priority was given to obtaining agreement on uniform yield and retention factors for calculating the nutrient composition of prepared foods which have not been analyzed. A somewhat related task also regarded as being of importance was that related to the uniform handling of missing values in food composition tables. Thus, a joint committee was established to address these questions (see section 7.3).

At the end of the workshop, it was concluded that cooperation on the development and maintenance of food composition tables and nutrient data banks is highly desirable. As computerized nutrient data banks are now being developed in many countries in Europe, it was decided that steps should be taken to ensure that a high degree of compatibility between these systems is achieved. To this end, the workshop made the following recommendations:

Table V. Results of questionnaire distributed to those attending the 1983 Wageningen Workshop on the desirability, necessity, and feasibility of implementing suggestions for carrying out further work on food analyses, food composition tables, and nutrient data banks

	Desirability		Priority	Feasibility		
	yes	no	ranking	yes	no	?
Recommendations: users						
1 Communication vehicle (newsletter)	33	0	15	30	0	0
2 One giant comprehensive, non-edited data base	16	15	21	8	15	4
3 Standardization of microcomputer systems and computer languages	27	1	12	14	17	2
4 Standardization of nutrient-interaction formulaes (e.g., iron, vitamin C)	30	3	11	20	3	5
5 Uniform handling of missing values in food tables	29	8	10	23	5	2
6 Uniform yield and retention factors for prepared foods	24	7	6	16	8	1
7 Factors for estimation of edible portions of foods	27	0	13	16	1	3
Recommendations: analysts						
8 Rapid publication vehicle (journal, newsletter, data base)	34	0	17	27	1	2
9 Catalogue of analytical laboratories for particular nutrients or foods	32	1	4	28	0	0
10 Quality control programs	32	2	3	24	2	1
11 Centralized laboratories for quality control	26	7	18	17	6	1
12 Centralized laboratories for all analyses	4	28	22	2	14	1
Recommendations: food tables						
13 Data tapes made available	32	0	1	25	0	3
14 Documentation of sources of nutrient data	32	0	2	28	0	1
15 Variability of nutrient content within foods	31	1	5	20	3	3
16 Confidence intervals of methods	30	2	7	22	3	1
17 Frequent updating	31	1	8	21	2	3
18 Encyclopedia of foods (pictures)	27	3	14	22	1	0
Other						
19 Reference book with description of foods with code numbers	30	2	9	23	2	3
20 Reference book with standard recipes for Europe	21	11	20	15	10	1
21 Standard for data tape translation	23	2	19	15	1	0
22 Standard software package	28	1	16	17	2	2

(1) to prepare an inventory of information on the resources relevant to food composition data in Europe such as food analyses available, food composition tables, nutrient data banks, the users of such information, and the organizations involved (see section 7.6);
(2) to collect data tapes from available food composition tables and to determine the feasibility of developing a common nutrient data bank (see section 7.2);
(3) to explore the problems and possible alternatives in the standardization of algorithms (flow sheets) and programmes for food nutrient calculations for both large and small computers;
(4) to collect data related to nutrient losses and gains in the preparation of foods in order to recommend factors for use in the calculation of the nutrient of such foods (see section 7.3);
(5) to determine which values are missing in food composition tables and to establish priorities and propose interim solutions for problems of missing values until such time that analytical data become available (see section 7.3);
(6) to set up a pilot program to provide reference food materials to laboratories that contribute analytical data to food composition tables, so that the

comparability of analytical results and the feasibility of a program for quality control of analyses can by determined (see section 7.5);
(7) to investigate the need for compiling and publishing information the nutritional value of foods in various countries of Europe for use of tourists and other visitors (see section 7.4).

Committees were formed to prepare grant proposals and to carry out the recomendations if and when funds are obtained. The tasks of these committees and the progress made are outlined in sections 7.2–7.6.

It was also decided that Eurofoods would work both independently and within the framework of Infoods. As mentioned in the Introduction, Infoods aims to promote international participation and cooperation in the acquisition and interchange of data on the nutrient composition of foods in forms appropriate to the needs of a wide range of people and organizations. Eurofoods will play an important part in reaching the goals established by Infoods, but at the same time will follow the recommendations made at the Wageningen Workshop.

7.2 Computer-Related Projects

The Eurofoods project which has received the most attention is the project aimed at developing a European nutrient data bank system. This will be formed by harmonizing and unifying nutrient data from different countries in Europe to form a common nutrient data bank for both on-line and off-line use. As shown in section 3, in Europe there are numerous sources of information on nutrient and non-nutrient levels in foods. Practically every country analyzes foodstuffs and publishes data on nutrient levels in such foods, but most of the data available are on foods from the country concerned. Although trade and travel have brought about the widespread use of foreign foods, it is often difficult to obtain and to use information on foods from another country because of difficulties with language, unfamiliarity with food names, difficulties in identification of foods in different countries, especially proprietary foods and prepared dishes, differences in units of measure, differences in units of analysis, and differences in the way data are presented. Often national data do not fulfil the needs of national users because of ‘holes’ or missing values in the tables (see section 7.3), poor documentation, and varying reliability of the data (see section 7.5). When local analyses are not available, national tables often include data from foreign tables, and often it has not been possible to verify if such data are strictly comparable.

It has, therefore, been thought necessary to bring together the various European food composition tables. Such a step will help:
(1) to bring about a better exchange of data between countries and a more efficient utilization of resources within countries because no single country can afford to carry out analyses of all foods consumed by its people;
(2) to enable intercountry epidemiological studies involving nutrition to be carried out: such studies include those relating diet to the aetiology of cancer and heart disease;
(3) to enable studies examining changing food patterns in various countries to be carried out (monitoring);
(4) to enable information about the nutrient content of foods in various countries to be supplied to occasional enquirers;
(5) to ensure that European data on food composition are of a consistent high quality and comparable with developments elsewhere in the world;
(6) to set up a pilot program to provide reference food materials to laboratories that of foods between countries,

especially those of the European Community;

(7) to lighten the burden of requests which nutrition experts receive to supply information on foods in various countries;

(8) finally, to bring about the harmonization of food composition tables in Europe which is an aim of the Council of the European Community.

It is for these reasons that Eurofoods approached the Commission of the European Communities for funds to bring about a truly European nutrient data bank system. The means are not available within individual countries to solve the problems, and if they were, repetition of the same tasks in the various countries would occur. The Commission has the responsibility of promoting co-ordination between member states on such problems. As found in the survey carried out prior to the 1983 Wageningen Workshop (see section 3.20), food composition tables in European countries differ in the way data are presented, and this leads to apparent differences in the nutrient content of similar foods when calculated using different food composition tables or nutrient data banks. If each country has easy access to data in other European countries, the individual national food composition tables could be improved and expanded in a constructive and efficient manner. Early in 1985, the Commission approved a grant towards the cost of paying for a preliminary study which is intended as the first phase of a three-phase project. Phase two is the design and construction of the data base, while phase three involves making the data base available.

The preliminary study can be divided into a number of separate but interrelated activities: (1) development of a common coding system; (2) examination of the differences between national food composition tables and developing ways that they can be harmonized; (3) development of a test data bank; (4) inventory of food composition tables, examination of the needs of potential users of a merged data base (see section 7.6), and (5) market survey.

Development of a Common Coding System

One of the most important tasks in establishing a nutrient data bank system is to develop a common coding system. In addition to being an essential part of the merging process, a common coding system would provide the user with a system for checking food identity and resolving most of the problems in using data from other countries. The identification of the appropriate series compositional data appropriate to the food of which the intake has been measured would also be assisted by this coding. Initial development of a common coding system has been carried out by the Federal Health Office of the Ministry of Family, Youth and Health of the Federal Republic of Germany in cooperation with representatives from The Netherlands, Sweden, Denmark and more recently France. A draft code was developed and has been discussed at tow workshops, the first of which was in Luxembourg in December 1984 and the second in Heidelberg in February 1985. The initial work on the code was coordinated by Prof. *Helmut Rottka* in Berlin, while the subsequent work is being coordinated by Dr. *Lenore Arab* in Heidelberg who is being assisted by Miss *Marion Wittler.*

Examination of the Differences between National Food Composition Tables and Developing Ways in which the Tables Can Be Harmonized

As shown in section 3, food composition tables and nutrient data banks in the countries of Europe vary in the number of foods covered and the nutrients included. In addition, from the survey carried out prior to the 1983 workshop, it can be seen that there are also differences in the conversion factors applied to deriving data (for example, for calculating the protein content from nitrogen analyses and for calculating the energy value of carbohydrate) and in the reliability of the data. Much work has been done on the development of guidelines for the preparation of food composition tables. This work is being carried out by Dr. *David Southgate* in Norwich and Dr. *Heather Greenfield* in Sydney under the aegis of Infoods and the International Union of Nutritional Sciences. An initial draft of the guidelines was discussed at an Infoods workshop early in 1985, and a draft for general distribution should be available for comment in August 1985. However, in addition to this work, it will be necessary to examine the differences between national food composition tables and to examine ways in which the tables can be harmonized. This work will also be carried out in Heidelberg by Dr. *Arab* and Miss *Wittler.* At the same time, the Eurofoods group working on nutrient losses and gains during food preparation and on missing values in food composition tables will also be working (see section 7.3). The results of this work will also be able to be incorporated into the Eurofoods nutrient data bank system.

Development of a Test Data Base

It is planned to develop a test data base in Heidelberg for a limited number of foods and nutrients using data tapes from several national nutrient data banks. This is expected to be available for presentation at the Eurofoods meeting to be held in Norwich in August 1985.

Market Survey

Before the expensive work of the second and third phases of the development of the Eurofoods nutrient data bank system, it will be necessary to carry out a market survey to estimate the number and characteristics of potential users of a merged European data base in its various forms.

It is expected that all of the work in phase one of the project will be carried out before the end of 1985. By then, it is hoped that funds will have been found to carry out phase two which is the design and construction of the data base. Then funds will have to be sought for making the data base available in a variety of ways suitable for a wide range of users including the research workers who initiated the project, government agencies, and casual users. It is envisaged that the data base will be available on-line and that a variety of products including books, data tapes, and floppy disks with appropriate programs will be produced.

7.3 Projects Related to the Collection of Data on Nutrient Losses and Gains in the Preparation of Foods and on Missing Values in Food Composition Tables (Eurofoods NLG and MV Project)

This project is divided into two parts: the first related to nutrient losses and gains and the second to missing values. The main task related to nutrient losses and gains in the preparation of foods is to collect data, so that factors can be recommended for use in the calculation of the nutrient content of such foods. These factors have two components. The first component is the yield when primary ingredients (at the pre-preparation stage) are compared with prepared food and also with food as consumed. The second component is the change in the amount of a specific nutrient when a food is prepared. Data on such nutrient losses and gains are still lacking for many foods consumed in

Europe, although a start has been made with the study carried out by COST 91 of the Commission of the European Communities; the results of which have been published [1]. Much of the work on nutrient losses and gains to be carried out under the aegis of Eurofoods will be done in Uppsala under the guidance of Mrs. *Lena Bergström*, while some work will also be done in Stuttgart by Dr. *Bognar* of the Institut für Ernährungsökonomie und -soziologie der Bundesforschungsanstalt für Ernährung.

The task related to missing values in food composition tables is necessary because data on the concentration of nutrients are not available for all foods listed in most food composition tables. In order to obtain such data, analyses have to be carried out, but it will be a long time before the data will be complete, especially for those foods which do not make a major contribution to the national diet. However, many of these foods make a major contribution to the intake of specific nutrients for certain individuals or groups of individuals. Thus, it is necessary to make an estimate because it is preferable to have an estimate rather than to have a zero when calculating nutrient intake. For the estimation of missing values, it would be highly desirable if there were international guidelines which may need to be different for different types of foods and for each nutrient. The work on missing values will be coordinated from Wageningen by Miss *Wija van Staveren.* Miss *Brigitte Meyer* who worked with Prof. *Karg* and Dr. *Bognar* in Stuttgart will be working on the project in Wageningen for the first half of 1985.

Reference

1 COST 91: Home cooking: nutrient changes and emerging problems. Proceedings of a workshop held at the Istituto Nazionale della Nutrizione, Rome 1982.

7.4 Project on Food Tables for Tourists and Other Travellers in Europe

The aim of this project is to compile information on foods commonly eaten in individual countries in Europe and to publish it in a form suitable for tourists and other visitors to the countries. Attention will be directed towards the requirements of particular groups such as:

(1) those people who need to choose foods in order to adhere to a diet for medical reasons, e.g., people with diabetes, hypertension, or coronary heart disease;

(2) those people who need to avoid strictly certain foods for medical reasons such as people with food allergy to egg protein or gluten and those with congenital or acquired enzyme deficiencies (e.g., lactose deficiency);

(3) those people who wish to avoid strictly certain foods because of religion (e.g., Muslims, Jews, and Hindus) or because of personal preference (e.g., vegetarians).

For each country, one manuscript will be prepared and then distributed to other countries participating in the project where it will be translated, if necessary, and incorporated into a book for people from that country. For example, for the Dutch edition of the Eurofoods travellers food guide, information on the most important foods available will be obtained in Dutch. This material will then be edited in a book for the use of Dutch visitors to other countries. A proposal has been completed, and funds are being sought for preliminary investigation. This investigation will examine the feasibility of the project and try fo find support for the necessary background work and for publishing the food guides. Contact is being made with organizations and government agencies responsible for supplying nutritional information to the public as well as with commercial publishers. The project is being coordinated by Dr. *Cramwinckel* in Wageningen.

7.5 Food Analysis Project

The aim of Eurofoods is to improve the compatibility of nutrient data banks in Europe. At the Wageningen Workshop, it was proposed that a trial be carried out to determine to what extent discrepancies between nutrient values for apparently the same product in the food tables of different countries are caused by differences in analytical procedures in laboratories that contribute to these tables. The aim of such a study would, therefore, not be to establish reference methods; on the contrary, all participants would be encouraged to apply the methods used routinely in their respective laboratories.

The proposed trial is now being implemented, and 20 laboratories in 10 countries are participating. It is being organized by Prof. *Martin B. Katan* and carried out by the State Institute for Quality Control of Agricultural Products (Dutch acronym: Rikilt) in Wageningen under the direction of Ir. *Peter C.H. Hollman.* Rikilt has had much experience in the execution of collaborative trials.

During February 1985, samples of egg powder, full-fat milk powder, rye meal, whole-wheat meal, biscuits, and butter beans were distributed. The samples had been carefully homogenized and checked for homogeneity by analysis for nitrogen and, where considered necessary, also for ash and total fat. Each laboratory has been asked to analyze the samples for moisture, protein, total fat, available carbohydrate (i.e., the sum of sugars and starch, total dietary fibre, and ash). All reports from the participating laboratories are due in by the end of May, and the results will be reported at the Eurofoods Workshop in Norwich in August 1985.

If the trial should bring to light serious discrepancies in analytical results between laboratories, then a follow-up would be done to try to establish a collection of reference food materials with known nutrient values. The BCR (a department of the Commission of the European Communities concerned with the development of reference materials) has expressed an interest in the study, and this could lead to the establishment of materials with certified nutrient values. If the BCR were to decide to establish such materials, some of its concerns would be: (1) to establish the long-term stability of nutrient values in candidate reference materials; (2) to have large uniform batches of materials produced and to determine their homogeneity, and (3) to bring together expert laboratories from member countries of the European Communities to have analyses perfomed, and to try to reach agreement on nutrient values which can be considered to be the most accurate at the current state of the art.

BCR has funds at its disposal to allow it to contract laboratories to do this type of research. It also has funds for workshops in Brussels where studies such as the one being carried out can be evaluated and where new studies can be planned.

7.6 Inventory Project

As outlined in section 3, prior to the Wageningen workshop in May 1983, information was collected both through the country reports and through the questionnaire on food composition tables and nutrient banks. The task of this project will be to continue and to expand this work by collecting information on the resources relevant to food composition data in Europe. Such information includes: (1) food composition tables and other sources of data; (2) nutrient data bases including information on methods of organization, funding, and availability to other users; (3) methods of nomenclature and classification of foods including food dictionaries; (4) analytical resources including a list of institutes and individuals analyzing foods with information on foodstuffs and nutrients analyzed, sampling methods, analytical methods, and quality control; (5) a list of major users of food composition data in its various forms, and (6) a list of organizations or groups interested in the activities of Eurofoods.

The collection, analysis, and dissemination of all this important information is a major undertaking. It will be necessary first to define the tasks more specifically and then to find the resources to carry them out. As the results of this work are vital for Infoods, it is hoped that much of the funding for these activities can come from Infoods. It will also be necessary to apply money and resources which become available to Eurofoods from other sources to the inventory project. It is planned to present an updated list of European food composition tables and nutrient data banks at the Eurofoods Meeting in Norwich in August 1985.

7.7 The Future

Since Eurofoods was established, much work has been carried out in obtaining the various projects started. This work is now beginning to bear fruit as has been discussed earlier in this section.

Eurofoods has developed strong relationships with Infoods at the global level and with Norfoods at the regional level. This has led to cooperation and the avoidance of duplication of effort.

Money has been the major problem of Eurofoods up until the present. Grants have been obtained to carry out a number of specific projects. However, more money is required not only for such activities, but also to provide an adequate secretariat to strengthen coordination and to keep participants in Eurofoods and others fully informed of what has happened and what is being planned for the future. Thus, the most urgent task is to seek and obtain adequate funds to allow this work to proceed.

Progress will be reviewed at the meeting to be held in Norwich August 25–28, 1985, immediately after the XIIIth International Congress of Nutrition in Brighton. At the meeting, the future of Eurofoods will be mapped out. There is certainly a lot to be done, but a good start has been made towards bringing about compatibility of food composition tables and nutrient data banks in Europe.

Appendix

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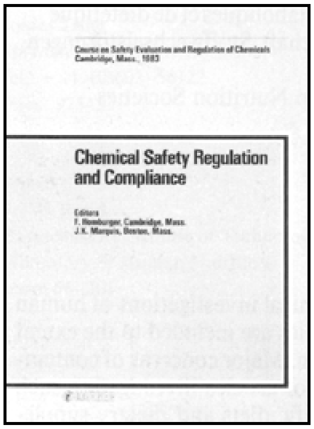
Course on Safety Evaluation and Regulation of Chemicals, Cambridge, Mass., October 1983

Chemical Safety Regulation and Compliance

Editors: F. Homburger, Cambridge, Mass.; J.K. Marquis, Boston, Mass.



This book provides a comprehensive overview of current US regulatory policies and requirements governing the control of chemicals in foods, the environment, and the workplace. Chapters, authored by representatives of the government, industry, science, and labor, assess the content and implications of recent legislation from a variety of perspectives. The result is both a balanced, authoritative account of regulatory policies and a sourcebook of the testing and toxicity studies required for compliance.

The book opens with a group of chapters covering safety regulations set forth by the Food and Drug Administration. Regulatory legislation and policies are evaluated as they apply to food additives, food-borne carcinogens, and the use of drugs in food animals. Information is also provided on the recent edition of the FDA's 'Redbook', which delineates the amounts and types of information needed for safety evaluation. Chapters in the second section focus on federal and state safety regulations designed to protect the environment. Policies governing drinking water, air quality control, the siting of hazardous waste treatment facilities, and the response to toxic chemical spills are considered in the context of Environmental Protection Agency regulations. In the third section, chapters evaluate the Occupational Safety and Health Act and its implications in terms of the interests of government, industry management, labor unions, and the workers themselves. The book concludes with two chapters addressing the problems of compliance with the increasing complexity of regulations at several levels of legislative authority.

Expert and informative, the book allows an overview of chemical safety regulation from a variety of perspectives useful in the decisions of regulators, safety officers and risk management specialists. Toxicologists, food scientists, corporate planners, and product development specialists will also benefit from the extensive information consolidated in this work.

Fields of Interest

Pharmacology; Nutrition; Occupational Diseases, Toxicology

Contents

Chemical Safety Regulation and Compliance
Course on Safety Evaluation and Regulation of Chemicals, Cambridge, Mass., October 1983
Editors: F. Homburger, Cambridge, Mass.; J.K. Marquis, Boston, Mass.
X + 129p., 5 fig., 8 tab., hard cover, 1985
SFr. 115.-/ DM 138.-/ US$ 49.00
ISBN 3-8055-3941-X

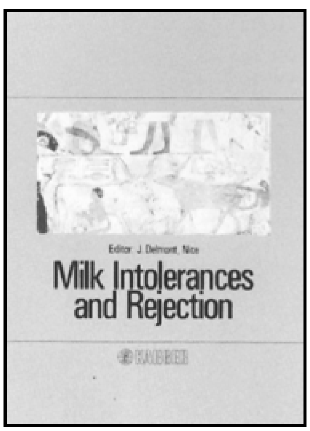
KI 85037

Milk Intolerances and Rejection

Editor: J. Delmont, Nice

Lactose intolerance is a normal physiological reaction for over 80% of mankind. Progress in food technology has made it possible to counteract some types of intolerance, but not enough to justify the extent to which milk consumption is advised at present. This multi-authored book focuses on all types of milk rejection and examines ways of dealing appropriately with related problems, especially in developing countries.

All those interested in nutrition, whether members of a medical profession, agroalimentary technicians, consumer advisers, or public officials, will find the information in this book highly useful and educational.



Fields of Interest

Nutrition; Allergy, Behavioral Research, Dietetics, Gastroenterology, Pediatrics

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Milk Consumption and Rejection throughout the World

Lactose Digestion and Lactase Deficiencies

Digestion of Lactose - Contribution of the Large Intestine to Digestion of Carbohydrates - Bacterial Adaptation to Lactase Deficiency - Genetics of the Human Adult Lactase Polymorphism - Diagnostic Tests for Lactase Deficiency - Non-Invasive Assay of Intestinal Lactase in Humans with 3-Methyllactose - Clinical and Nutritional Consequences of Lactose Intolerance in Adults - Can Lactose Intolerance Account for Abdominal Pains in Children?

Is Hydrolyzed Lactose Milk Usable and Useful?

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Milk Lipid Intolerance and Psychological Problems

Digestion of Milk Lipids - Technological Modification of Milk Lipids: Effects of Processing on Milk Flavor - Do Lipids Play a Role in Milk Intolerance? - Distaste for Milk: Psychological Aspects

Milk Intolerances and Rejection
Editor: J. Delmont, Nice
XII + 170 p., 26 fig., 22 tab., hard cover, 1983
SFr. 140.-/ DM 168.-/ US$ 59.75
ISBN 3-8055-3546-5

KARGER