

The Role of Fats in Human Nutrition

Edited by

F. B. Padley and J. Podmore

in collaboration with

J. P. Brun, R. Burt and B. W. Nicols

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Foreword

The need to control the level of fat in Western diets to ensure the maintenance of an active and healthy lifestyle is now widely recognized as being of key importance for many people. Numerous governments have commissioned studies in this area and many have made specific recommendations for changes in dietary habits. This symposium, organized by the Society of Chemical Industry at Reading University is particularly timely because of the recent publication of the COMA† report in the UK which included a recommendation for reducing the overall fat level in the diet to 35 per cent of total calorific intake.

The papers given in this book take the reader through some of the fundamental aspects of biochemistry relating to fat adsorption. The role of specific fats is then discussed, leading the reader into discussion papers on considerations for reducing and changing the nature of fat in the diet. Current scientific interest is not just focused on saturated versus polyunsaturated fat, published data is indicating that a number of unsaturated acids have specific physiological activities and a number of papers deal with this subject.

The role of fats in human nutrition is a controversial subject and some of that controversy is reflected in these pages. In drawing this series of papers together we have endeavoured to inform and educate those interested in the subject.

The work of J. Podmore who acted as secretary for the organizing committee and also B. W. Nichols, R. Burt and J. P. Brun who gave their support organizing the symposium and in bringing these papers together is gratefully acknowledged.

F. Padley,
Chairman SCI Oils and Fats Group.

† Department of Health & Social Security 'Report on Health & Social Subjects 28 – Diet & Cardiovascular disease by the Committee on Medical Aspects of Food Policy – Report of the Panel on Diet in Relation to Cardiovascular Disease'.

Dietary trends in Britain

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1. INTRODUCTION

Given the current interest in the dietary patterns of the UK population it is intriguing to realize how poor our information is of dietary trends in the United Kingdom during the course of this century. We can be much happier about the pattern of change on a national basis since the Second World War because there has been a regular system of monitoring the population in the form of the National Food Survey. Before the Second World War, however, we have to rely for general population data on very crude estimates which are often based on economic indices of foods moving into consumption. There is a natural tendency to view these statistics as comparable with current data, but it is important to remember the astonishing changes in the pattern of distribution and the rise of major marketing organizations, food manufacturers and supermarkets in the last 20–30 years. In the pre-war period the sources of food in Britain were many with farmers growing a variety of crops and distributing them locally; this was a major feature of the food supply. At that stage there was also a greater dependence on home growing food so that statistics are really very unreliable.

2. EARLY DIETARY TRENDS IN THIS CENTURY

The limited evidence on general population patterns has been collated and detailed by Greaves and Hollingsworth (1966). Earlier trends were set out by Sir Jack Drummond in his book on the Englishman's food (Drummond & Wilbraham, 1957), and covered 'a history of five centuries of English diet'. A summary, collated by Greaves and Hollingsworth, is given in Table 1. These figures suggest that liquid milk, meat, butter, margarine and lard consumption rose substantially over a period of 80 years. Only cheese consumption showed a negligible change. Although these trends are not intended to be linked with trends in health, Boyd Orr's experiments (1937) clearly showed the growth-promoting effects of additional milk and there is substantial evidence that the

Table 1
Trends in the consumption of foods rich in fat in the United Kingdom^a

	1880	1903-13	1934-38	1941	1950	1962
	(lb per person per year)					
Liquid milk	213	219	217	265	345	325
Cheese	8	7	9	8	10	10
Meat	91	131	129	99	112	142
Butter	12	16	25	10	17	20
Margarine	0	6	9	18	17	11
Other fats	0	4	19	19	19	24
Total fat g/day	—	98	131	115	133	144
Fat % energy	22	32	39	36	38	41

^a Figures extracted from summary of trends in all major foods compiled by Greaves and Hollingsworth (1966).

height and weight of the population on average increased over this period. A commensurate increase in food intake would be expected on this basis in the absence of any substantial changes in physical activity. Greaves and Hollingsworth's calculations suggest that total energy intake did increase from 11.55 MJ (2760 kcal) in 1909-1913 to 12.76 MJ (3050 kcal) pre-war. After a small decline to 12.13 MJ (2900 kcal) in 1941, average energy intakes rose once more to 13.35 MJ (3190 kcal) in 1962. The fall in energy intake during the war led to public dissatisfaction, some weight loss in adults and a slowing in the growth of children (Harries & Hollingsworth, 1953). This suggests that the average figure of 12.13 MJ (2900 kcal) was indeed inadequate. This in turn implies that the figure of 11.55 MJ (2760 kcal) in the years preceding the First World War reflected marked inactivity at that time (which is very unlikely), grossly inadequate intakes or a population with an appreciably smaller average body weight. Both of the last two explanations may well apply.

Whatever the true explanation for the supposed changes in total energy intakes there is little doubt that there were substantial increases in the total fat intake and in the proportion of energy derived from fat. This latter figure seems to have effectively doubled over the 80-year period (Table 1). The low fat content of the diet at this stage was not a peculiarly British phenomenon since Rubner at the turn of the century (quoted by Lusk, 1921) used statistics on gross consumption to arrive at fat intakes which varied from 31 g (13% energy) per day in Königsberg to 65 g (20% energy) in Munich, 64 g (20%) in Paris compared with 60 g (21%) in London.

Further evidence for this change in diet comes from studies on household food consumption. By 1931 Cathcart and Murray were reporting on the diet of

154 families in St Andrews where the people were deriving 35.4% of their energy from fat, a figure higher than any other previous study in Britain or abroad except for Sweden (38.1%) and Greenland (48.0%). In earlier British studies of miners and others from the labouring classes, fat contributed to energy intake in amounts ranging from 24.4% in 1913 in Glaswegians to 32.2% in Derbyshire miners in the early 1920s (Moss, 1923).

3. SOCIAL CLASS DIFFERENCES IN DIET

Cathcart and Murray found that in the St Andrews area, as in previous studies (Dunluce and Greenwood, 1918), the higher social classes eat *more* fat when calculated on an energy basis. Indeed, Cathcart and Murray consider the increase in fat consumption to be universal and dependent on income and note: 'craving for fat during the periods of fat shortage during the Great War will be remembered by many'.

Table 2
Social class differences in fat consumption in pre-war Britain ^{a,b}

	1900	1904	Late 1920s St Andrews	1928 Cardiff	1928 Reading
Rowntree (York)					
Class I	88 (27.3)				
II	130 (29.5)				
III	161 (37.0)				
Board of Trade					
Class I		59 (17.6)	94 (31.3)	101 (30.4)	91 (32.0)
II		71 (19.6)	116 (34.1)	106 (31.3)	98 (31.0)
III		82 (21.4)	128 (36.9)	114 (34.0)	110 (33.4)
IV		86 (22.4)	125 (37.1)	140 (37.2)	121 (35.7)
V		100 (23.2)	157 (40.8)	—	—

^a Values are mean intakes of fat per day with the fat intake as percentage energy given in parentheses. Data were calculated from household budgets with factors being used to allow for the number of men, women and children of different ages in the household. Data taken from Cathcart & Murray (1931, 1932).

^b Note that in the early investigations the social class rankings are ordered differently from those conventionally used today. Thus, for Rowntree's studies class I families earned less than 26 shillings per week, II 27–38 shillings per week and III had servants. Similarly, the Board of Trade's income groups varied from less than 25 shillings weekly (class I) to over 40 shillings weekly (class V). The St Andrews classification is listed on an income range from I for ≤ £2.10 per week to V at incomes over £10 per week. Rowntree and Board of Trade figures were recalculated on the basis of new dietary analyses and are given by Cathcart and Murray (1931).

Dietary differences between the classes have been repeatedly documented and there seems little doubt that they were substantial (Table 2): the high rejection rate of conscripts in the First World War proved of national concern and the early statistics produced by the Committee on the Appropriation of Wages for the 51st Meeting of the British Association for the Advancement of Science in 1881 emphasized the disparity between the rich and the poor at a time when the middle classes were proportionately very small and the working classes relatively large. Statistical analyses were only just being used at that time and it is by no means clear that there was appropriate weighting of the statistics. Numerous other faults could be cited and caution against the ready acceptance of some of these figures for fat intake. Nevertheless, the data summarized in Table 2 clearly indicate social class differences in fat intake.

Since then Trenchard (1977) has suggested that the fat figures need revision because of the changing nature of animal production. Trenchard's new figures seem to suggest that fat intakes were not particularly low in pre-war Britain. These figures are difficult to contest in the absence of a clear presentation of the primary data and for these reasons I have reverted to more precise data for looking at dietary trends. Anecdotal observations and literary analyses do not constitute good evidence, particularly when it is recognized that there were marked differences in the eating habits of different social classes at the turn of the century.

4. DETAILED DIETARY STUDIES

The studies cited so far deal with household consumption patterns, various adjustments being made for the numbers living in each household. One of the first detailed studies in Britain of the dietary patterns of individuals using modern techniques were those conducted by Moss in 1920 and by Widdowson in the early 1930s. These techniques involve the weighing of each food item consumed by individual men and women and then, by reference to appropriate tables of food composition, the nutrient intakes are calculated. Whereas Moss (1923) investigated miners in different parts of the country, Widdowson studied the English middle classes and found a dietary fat content which was greater than any previously recorded. Widdowson (1936) claimed that 'it was a well-known fact that the higher the income the larger the proportion of calories usually derived from fat, and it is probably also true that a higher proportion of the total calories is derived from fat today than it was 20 years ago'. This conclusion was, as we have seen, based on a substantial series of household studies and matches the observations of Greaves and Hollingsworth (1966) for dietary trends in the pre-war period. By the pre-war period the middle classes were deriving as much energy from fat as they are today (Table 3) if one compares the fat intake calculated by Widdowson and McCance (1936) with those observed by Bingham *et al.* (1981) for a whole population. There is persisting evidence