

An Experimental Study  
of Rationing

**MEDICAL RESEARCH COUNCIL**

SPECIAL REPORT SERIES No. 254

**AN EXPERIMENTAL STUDY  
OF RATIONING**

*by*

**R. A. McCANCE and E. M. WIDDOWSON**

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**LONDON:**

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## PREFACE

The experiment described in this report, on the effect on health of drastic food rationing, was begun at the outbreak of war in September, 1939, and was completed early in 1940. Because of the war-time implications of the research, a brief account of it was circulated as an official paper in March, 1940, to various Government Departments concerned with the subject. In January, 1941, the Medical Research Council proposed to publish a full report, and this was accordingly set up in type and proof copies were again circulated to Government Departments. Certain of the latter, however, raised objections to its publication at that time; and these objections were maintained when the question was once more raised by the Council at a later stage in the war. This unusual imposition of censorship on the results of medical research work ended with the termination of hostilities, and the report can now be published for its scientific interest. It is important to realise that the work here recorded has been in print for five years, *and that statements made at the beginning of that period are reproduced without alteration.*

When Dr. McCance informed the Council in September, 1939, that he proposed to make this investigation, he indicated that, with Miss Widdowson, he intended to study on human beings the effect of a diet (a) which might be available under conditions of war, and (b) at which we ought to aim as a minimum even if the country were in dire straits as a result of the enemy blockade. It will be seen, therefore, that the planning of the work involved some prophecy as to what might happen with regard to feeding arrangements in the war. We can now look back and see how closely the prophecy tallied with reality.

It is interesting to note, in the first place, that the experimental diets were planned to meet much more serious blockade conditions than were actually experienced in the war. Allowing for this, the similarity of the experimental diet to the war dietary is close. Thus, in both the experimental and the war diets, bread, potatoes and other vegetables were unrationed. Under the conditions envisaged by McCance and Widdowson, however, smaller quantities of wheat would have been imported for the production of the same amount of bread, since the test subjects ate a browner bread, made of 92 per cent. extraction flour, as compared with the war-time national flour of 85 per cent. extraction. The experimental subjects ate large quantities of potatoes, and, indeed, during periods of strenuous exercise their consumption of these was enormous—up to 3 lbs. a day in one case. There seems little doubt that, if the country had suffered blockade to the extent foreshadowed by the McCance and Widdowson experiment, a high degree of health and vigour could have been maintained only by growing far larger quantities of potatoes, and probably of other vegetables, than were in fact produced. As regards rationed foods, the McCance and Widdowson diets were more restricted. Thus, the subjects were allowed 4 oz. of fat and 5 oz. of sugar weekly; the war-time rations were 8 oz. of fat, 8 oz. of sugar, and some jam. Again, the milk allowance was only 35 oz. per week, i.e. less than 2 pts., as compared with the 2 pts. up to unrestricted amounts allowed during the war period; and the experimental diets did not contain any dried separated milk, as did the war dietary. Cheese allowance was 4 oz. weekly, as compared with 4 and later 3 oz. in the war dietary. The total amount of meat, fish, poultry and rabbit in the McCance and Widdowson diet was 16 oz. per week—an amount which was clearly smaller than that obtained on the 1s. 2d. ration, together with 3 to 6 oz. of bacon plus unrationed fish, poultry and rabbit. It will be agreed, therefore, that the experimental diet was

generally the more severe, and would have required the importation of much smaller quantities of food than were actually achieved during the war period. In spite, however, of all these conditions, the experimental subjects, at the end of the feeding period of three months, were very fit and could carry out satisfactorily, and without undue fatigue, most severe exercise tests, requiring a very high expenditure of energy.

The results of this interesting work thus indicate that young adults, at least, could have maintained a high standard of health under dietetic conditions much more austere than those actually experienced in the war. What would have happened to children and old people under these dietary conditions is not known, but it is probable that those who could eat the food allotted would have maintained good health. Although the diet, on the basis of ordinary peace-time food standards, might be regarded as unattractive, the fact is that the food was enjoyed by the subjects. So much was made of aestheticism in food questions before the war that this lesson, reiterated by the present investigation, is timely—namely, that, if normal people are living under conditions of stress and qualitative restriction of food, a diet which is biologically good need not be attractive, nor need it be varied, in order to be compatible with the best health. A lesson of this kind is clearly still of the greatest importance, when it is necessary to feed a large portion of the population of the world, in order to maintain life, on food mixtures which are restricted in variety and amount. It is well that we should be reminded again how greatly food can be simplified and yet remain compatible with excellent health, so long as it conforms to certain well defined nutritional principles.

The Medical Research Council recognise that research work of this kind can be carried out only under conditions of much personal inconvenience, which require the highest individual discipline. They wish, therefore, to express thanks to Professor McCance and Miss Widdowson, and all those who submitted themselves to these studies; and to congratulate them on their important and successful contribution to basic knowledge of nutrition. The unequivocal results obtained must have provided solid scientific support to those responsible for feeding the country during the war.

MEDICAL RESEARCH COUNCIL,

38, Old Queen Street,

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*2nd January, 1946.*

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physical work under wintry conditions raises the question of whether diets such as ours would not be quite as satisfactory for soldiers as their present ones. We believe that they would, but again we would not advocate them without modification, and preferably not without trial. We can see no justification, however, for the enormous amounts of meat in the rations of the British soldier, and we consider that troops, in this country at any rate, would be just as well served with bread made from a lightly milled flour, more potatoes if necessary, and less meat.

In conclusion, we would draw attention to the value of experiments such as this in planning relief diets for starving populations in stricken areas.

One experiment can never settle every question. While, therefore, in the meantime we make our deductions and suggestions with reserve, we feel that we have established one point with certainty, namely, that these problems of national nutrition in times of stress can be tackled by experimental methods. We do not expect our studies to have provided more than a first approximation to the truth. Other experiments, however, can easily be designed to cover, to check, and so to confirm or refute every statement we have made.

#### ACKNOWLEDGMENTS

The authors have greatly appreciated the way in which their friends H., R., C., and the Misses B. and T. and Mrs. G. have co-operated in this experiment and put themselves to personal inconvenience on its behalf. They are also beholden to Mrs. Nockolds for cooking many of the evening meals in what would otherwise have been her leisure time, and to Dr. Yudkin for carrying out the vitamin tests and determinations.

Messrs. Glaxo Laboratories Ltd. very kindly presented us with supplies of "Ostelin" (vitamin D) and Messrs. English Grains Co. Ltd. with "Yestact" (autolysed yeast).

This experiment was very largely financed by the Medical Research Council. E. M. W. is also indebted to the Council for a personal grant.

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