

# FOOD MANUFACTURE

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## Will it Work ?

**D**URING the past week or so bread rationing has been the most discussed subject among all classes of the community. These lines are written on the first day of rationing and its repercussions are still uncertain. The arguments pro and con are so familiar that their recapitulation here would be wearisome, even were it possible in the space available; the last discussion in the House of Commons occupied fifty-nine columns of Hansard.

The first question was whether bread rationing was necessary. On the whole it was admitted that the necessity existed, although this argument was more or less annulled by the claim that the scheme would save relatively little wheat (the bakers argued that they could save almost as much wheat by receiving the fats and sugar of which they had been deprived), and moreover would be unworkable apart from imposing a severe burden additional to those already borne by long-suffering producers, distributors, retailers, and consumers.

Mass meetings, Press conferences, meetings of Master Bakers' Associations have been held. Bread rationing has been made one of the issues of three coming (as we write) by-elections. Despite a great deal of opposition a necessarily cumbersome and certainly unpopular scheme is now law. Mr. F. Phillips, chairman of the National Association of Master Bakers' Parliamentary Committee, said that bakers gather that the rationing was intended as a short-term policy or insurance scheme which might last only three months. He still thought that the scheme would break down on its momentum and fall on the Government's back with longer and longer queues outside shops. We hope that this may prove to be on the pessimistic side, but some light will have been thrown on this by the time these lines are in print.

In the meantime it is gratifying to know that the baking industry as a whole—an industry that performed miracles during the *blitzes* to ensure that the people did not want for bread—is going

to “play ball.” We are certain that should a breakdown occur it will not be for want of intelligent and energetic measures on the part of all sections of the baking industry.

We are rightly proud of the food industry of this country, of which the baking industry is an important part. By its patience, by its tenacity, by its efficiency, it has overcome almost insuperable difficulties during the past six long years.

Finally, we might piously echo Elizabeth Browning's wishful thinking that “God's gifts will put man's best dreams to shame” for the coming harvests.

## Empire Scientific Conference

The final session of the Empire Scientific Conference having taken place on July 8, it is now the task of the Official Scientific Conference, which consists of Civil Servant scientists from the United Kingdom, Dominions, and Colonies, to consider means of implementing its recommendations covering a very wide range of scientific subjects of importance to the Empire, bearing in mind shortage of manpower, buildings, and money.

The scope of the Conference was perhaps too wide and it is too early to say whether it has been a success, although if only ten per cent. of the recommendations are put into effect it could be considered so. It will take some years—the number has been put at from ten to fifteen—before the Conference can be seen in its proper perspective and its results assessed.

It is hoped, however, that the Conference will exert an early beneficial influence on the progress of scientific co-operation in the Empire, and also on the intensification of scientific effort. The official discussions were undoubtedly of great interest, but we are informed that it was in the unofficial ones and the private talks that perhaps the greatest value will be found.

The recommendations include a considerable number of generalities, but there are also a number of specific proposals on which action could

be taken. One example was the avoidance of waste of pancreas—a by-product of the meat industry—in view of the probable increased demand for it in the production of insulin.

The setting up of a standing central committee (including representatives of the United Kingdom, the Dominions, India, and the Colonies) to advise upon policy for the co-ordination of research into the natural products of the Commonwealth was also recommended. What this amounts to is co-operation of the Dominions with the Colonial Products Research Council.

During the Conference the inter-relation between research on diseases in the tropics, nutritional science, and land conservation was clearly brought out. The last of these is the basic factor, and unless this problem is effectively solved any benefits from the prevention of tropical diseases will be nullified by inability to feed the increases in population.

### Herring Shoal Location

The investigations initiated by the Herring Industry Board into the possibility of using scientific methods to locate herring shoals and thereby reducing the element of chance at present always involved in the industry have been successfully terminated. The Board invited Admiralty assistance in the use of predictors of the type which were so successfully employed in the war years against submarines, and a series of tests have been proceeding for some months.

The *Seaham*, a converted minesweeper now used as a fishery protection vessel, took off from Peterhead recently and proceeded some sixty miles to sea where a series of attacks were made on presumed shoals when the Asdic equipment indicated the presence of moving bodies. The trained operator at the Asdic could tell the approximate lateral spread of the shoal but not its depth, and could determine whether the shoal was a large or small one. To prove the accuracy of these predictions explosive charges were used and the stunned and dead fish gathered as proof of the efficiency of the system.

It is generally agreed that the method employed has a definite value in the location and estimation of shoals, as well as in the prediction of their direction. To what extent these findings will be used rests with the Herring Industry Board, which will now consider all the evidence in relation to cost and utilisation of the equipment, method of operation, and the need to put it into use in a period when shortages may not be as acute as they were.

### Essential Work Order

By August 3 all food manufacturing and processing industries, with the exception of flour milling, will have been released from the provisions of the Essential Work Orders. No date has yet been fixed by the Minister of Labour for the de-scheduling of this industry. A limited number of milk distributive, cheese processing, bread making, and flour confectionery undertakings will continue to be scheduled after these industries are, in general, released.

The Minister has decided that, except in the cases mentioned, it is no longer necessary, from the point of view of production and manpower, to continue the control of food manufacturing and processing industries.

A number of food industries were freed from the scope of the Orders by about mid-May. These included catering services of local authorities; fat melting and bone de-greasing; food (buffer) depôts; food canning; glucose invert and brewing sugar; jam manufacture; oatmeal and pearl barley milling; and potato drying. Beet sugar manufacture was de-scheduled on July 5.

About two dozen milk distributive and processing establishments will continue to be scheduled after August 3. Five of them are in the London and Home Counties Division; ten in the Southern Division; four in the Eastern and three in the North Midland Division. There are also one each in the South-West, North-West, and Yorkshire.

### Toxicity of Rancid Fats

Some rather alarming effects of rancid fats in food are described in an article by F. W. Quackenbush (*Oil and Soap* 22, 12, 336). The scientific literature contains a number of reports of malnutrition resulting from rancid dietary fat. The symptoms include ophthalmia, gastric papillomatosis, and other digestive disturbances, reproductive failure, anaemia, dermatitis, and cancer.

Summarising his conclusions, Quackenbush states that it is evident that one of the adverse effects of rancid fats is the destruction of vitamins and other dietary essentials, but that some symptoms which have been observed and confirmed are not readily explained in such terms. He considers it is probable that further work will provide additional specific instances in which rancid fat exerts its effect through inactivation of dietary essentials. However, until such experimental evidence provides the full explanation, it must be assumed that rancid fats are able to exert a direct toxic effect.

## Fruit Packing in South Africa

South Africa has little to learn from methods overseas as regards fruit canning and packing, according to two Government officials who have recently made an extensive tour overseas. They are the Director of the Western Province fruit research station, Dr. M. S. du Toit, and Dr. G. M. Dreosti, who is in charge of the Union dehydration and cold storage department.

Dr. Dreosti has spent nine months visiting Great Britain, Australia, Canada, New Zealand, Germany, the United States, Hawaii, and Singapore. On his return to Cape Town he said he was satisfied South African canning methods were among the best in the world. There was a big future for the trade in export within the African continent.

"While we have made big strides during the war period in canning methods, other improvements are on the way," he said. "The Americans have discovered a method of canning in which the product is sterilised, but not fully cooked. Now it will be possible to market canned foods which contain their raw freshness and can be cooked to the desired degree on opening the tin."

One industry he hoped would return to its pre-war level was crawfish tails. South African crawfish, he said, was better than the English or American lobster. Even the Americans admitted the fact. There was a big future for the export of frozen tails as well as the canned fish.

Dr. du Toit, who was concerned more with the methods of shipping fresh fruit, said he was greatly impressed with the demand for South African fruit overseas. This was especially the case in Sweden and also in Africa, particularly Egypt. Both Britain and the eastern part of the United States were greatly interested in South African fruit, and he had heard "the most wonderful stories" of South African packing methods. The Union was probably doing the job of packing and grading as well as overseas countries.

## The Food Technologist of the Future

That the food technologist of the future must be a species of superman was suggested by Mr. Bradley Dewey, President of the Dewey and Almy Chemical Co., in a recent address given at the Institute of Food Technologists annual conference at Buffalo, N.Y. He said that emotionally and culturally food technology was closely tied to religion. The priests of the ancient religions were great food technologists of their time. They determined what was to be eaten and what was

taboo. He doubted, however, if today's clergy would make good food technologists, and from his knowledge of food technologists he was quite sure that mighty few of them would make good priests.

Food technology, as it is known today, has grown with the development of modern transportation, centralised slaughtering, and the application of the principles of sanitation, sterilisation, refrigeration, and packaging. These trends demand that food technologists know the principles of biology, comparative anatomy, and physiological processes; that they understand the principles of sanitation and enzymatic reactions; that they have a working knowledge of the principles of mechanical engineering, of physical chemistry, and the technologies of the food industry.

A few years ago many scientists and engineers smiled wryly when chemurgic chemistry was mentioned. Today they are having to eat their words. Tomorrow they will be eating the works of the chemurgic chemist. The food technologist of the future had a large task in front of him, and must recognise that with an increased standard of living the purchaser will constantly demand foods better in every respect which are priced to reflect increased desires for more motor cars and a large number of other things which used to be considered luxuries.

The problem of educating the food technologist of the future was a staggering one. He must have, in addition to all his other basic training, a sympathetic understanding of, and in many cases a good working knowledge of, many of the unit operations of chemical engineering.

A few years ago, high vacuum processes were playthings of the physical chemist's laboratories, now we are asked to look upon them as the working tools of the food technologist. He was also constantly rubbing shoulders with all the complexities of enzymatic action, hormones, vitamins, chemistry of fats, of amino acids, and the chemistry and physics of odours, and many other problems.

It meant, concluded Mr. Dewey, that the food technologist of the future must be trained in the fundamentals of many sciences and many branches of engineering. It was trite to say that all this would take five, six, or eight years. He emphasised that it was up to every man interested in food technology to recognise above all that there was only one way in which the future could possibly keep pace with the ever-changing demands of the field and the ever-increasing number of tools at his command. That was by constant study and interest in a host of other fields.

## Dehydrated Rabbit

In an attempt to assist the fight against world food shortage, a new process has been evolved by Dr. Samuel Tuchner, of Vienna, whereby the protein content of rabbits can be used to make a compact and palatable food.

After skinning and removal of head and viscera, the whole rabbit is crushed and dehydrated at a low temperature, the resulting brown powder not only possessing a high protein content but also calcium phosphate from the bones, the taste being similar to that of other meat extracts.

Machinery brought from Vienna to Manchester by Dr. Tuchner has been improved, and plant capable of dealing with 1,200 rabbits an hour has been produced, the whole process taking only five hours to complete.

It is claimed that four ounces of this dried food, with a small amount of dehydrated potato, would suffice a man for a day. The small quantities involved would be readily transportable to famine areas and would not affect the world stocks of other foods.

## Sunflower Seeds

The sunflower is considered one of the world's most important oilseed crops, the numerous varieties being capable of growth in almost any climate or soil, writes Mr. E. F. Hurt in the *B.M.J.* Its value lies partly in the oil (32 to 40 per cent.) and partly in its high protein content (about 55 per cent.). Up to 1939, the most important growing countries were Russia, with a production of some 3,000,000 tons of seed annually, Rumania, and the Argentine, while smaller quantities were produced in Hungary, Uruguay, India, Egypt, and even France and elsewhere.

The oil is very largely used for the manufacture of margarines and vegetable lards, and was also most extensively used for cooking on the Continent as well as for canning sardines, etc. The seeds have long been considered a national food in Russia, and of more recent years have been de-husked and sold in packets in the U.S.A. in a similar manner to peanuts. But the most important advance is shown by the report in *Science* (U.S.A., April 27, 1945) on the findings of Professor and Mrs. Harry G. Day, of Indiana University, in co-operation with Ezra Levin, of Monticello, Ill. They found that sunflower seed was an important source of B vitamins, superior to wheat germ or corn germ, and far superior to defatted soya bean meal in this respect.

Professor H. H. Mitchell, of the University of Illinois, had already shown the protein in sun-

flower seed, after oil extraction, to be in the same class as oats, wheat, and barley, such residue being nearly 50 per cent. protein. Similar solvent-extracted kernel residue was also experimented on for human food, and a Day-Levin report on the latter described it as a "palatable light-grey powder" which could be satisfactorily blended with white flour, etc., to make very appetising baked goods.

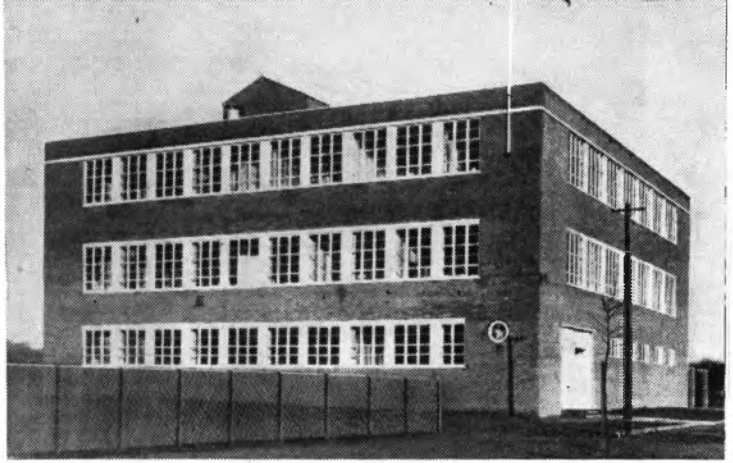
Since this report appeared, commercial manufacture of protein foods from sunflower seed has commenced in the U.S.A., and Mitchell, Hamilton, and Beadles, of the University of Illinois, point out in the *Journal of Nutrition* (1945, 29, 13), that such protein was 94.3 per cent. digestible with a biovalue of 64.5 per cent. By heat treatment, for low-temperature extraction of oil, the protein content was improved and was found to be higher than that of other foods such as soya bean and coconut. A very recent report (January, 1946) from Canada shows the stress that the Canadian Ministry of Agriculture are putting on increased sunflower production in the prairie provinces this year. It is a pity that so little has been done commercially with sunflower in this country in the way of experimenting on its many uses, particularly during the recent war years when the crop was being developed here.

## Food for Thought?

Suggestions that for variety in our diet we should experiment more bring to mind the versatility of domesticated animals in this direction. One can understand Dante, a Derby winner, with a penchant for toffee; but goats which consume cardboard, zoo ostriches engulfing keys and coins, tickets, and match stalks are more difficult to explain. Pekinese with a fondness for strawberries and cats alternating between cheese and butterflies: such examples are snippets with which gushing admirers bombard the correspondence editors of our daily papers. Perhaps the two most striking instances were provided by the pig and the contemplative cow, that steadfast starrer hitherto regarded as a solar engine for turning sunshine via grass into milk, but now permitted, according to a lawsuit, to ignore traffic by standing and staring in our streets. The many things a pig may eat in converting kitchen swill into roast pork (with crackling) are outbid by that cow at Haverfordwest which munched a cake of soap left at the side of a well. Was this but striking a new note in dairy hygiene, or an attempt to terrify its owner by the resulting frothy appearance?

# Spray-Dried Foods

For a considerable time spray-drying has been used in the manufacture of milk powder, but it is only in recent years that it has been developed for a number of other articles of food. One of the pioneers of such development in this country was Atomised Food Products, Ltd., of Welwyn Garden City. This article describes some of their activities.



A modern food factory building.

**T**HE company was formed in 1936 with the sole intention of developing a number of spray-dried, ready-to-use foods and beverages. Their first production, a soluble spray-dried coffee powder, was put on the market in 1938.

The first operation, the roasting of the beans, is carried out in a special roaster designed to retain flavour to the fullest extent. The green coffee is fed into a hopper from floor level and sucked into a second receiving hopper on top of the roaster.

The roasted coffee is conducted into a cooling drum, cleaned by suction, and again conveyed by suction to the blending bins. From these the thoroughly blended and adjusted coffee goes to the grinding plant and thence to the extracting vessels.

Extraction is carried out under strictly controlled conditions at a temperature low enough to avoid loss of flavour. Small additions are made with the object of protecting the flavour still further. After filtration, the extract is pumped to the spray-drier, and the resulting powder, sold under the name "Delicaf," is packed in standardised 4-oz. tins.

## New Developments

By the use of a pilot plant a number of other spray-dried products have been developed, although, owing to the scarcity of raw materials, their marketing has been unavoidably postponed.

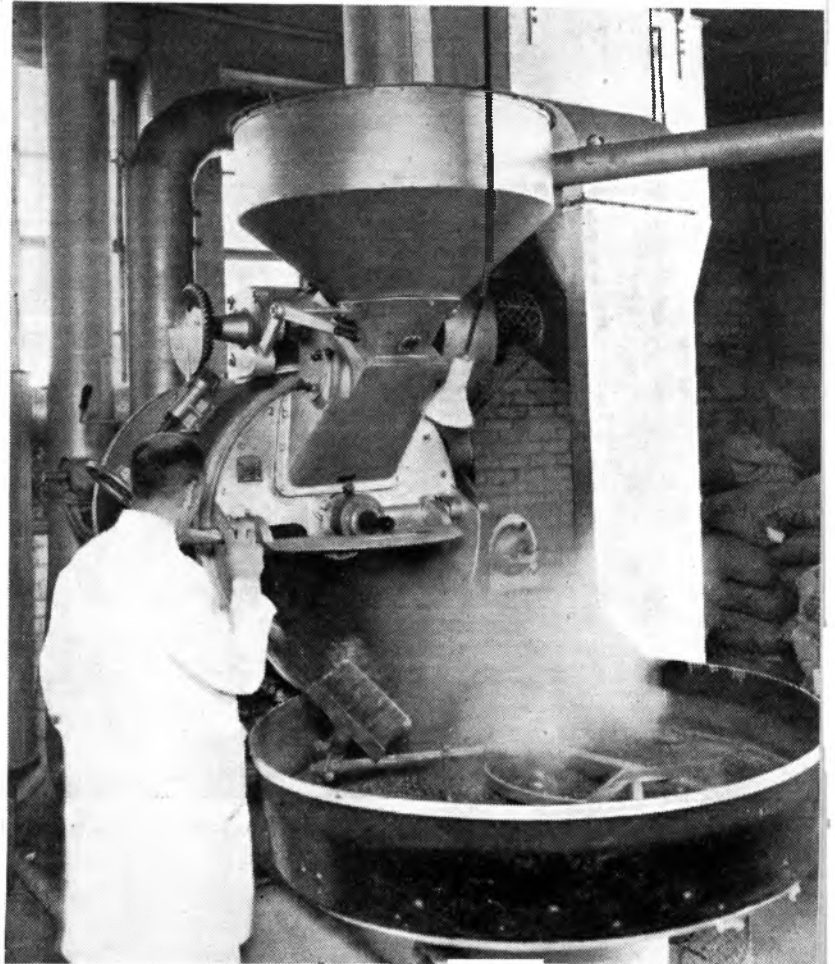
Milk shake powder, ice cream, cold-setting blanc-mange, and *café au lait* are among the class of products which are ready to place on the market as soon as conditions permit.

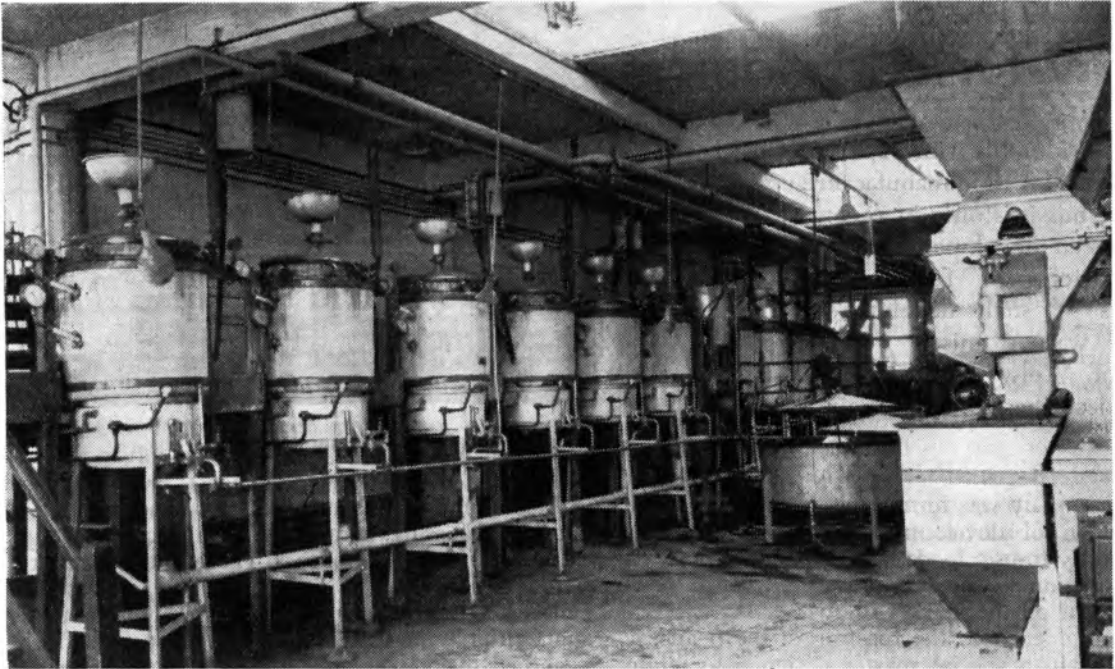
"... the roasting of the beans is carried out in a special roaster."

August, 1946

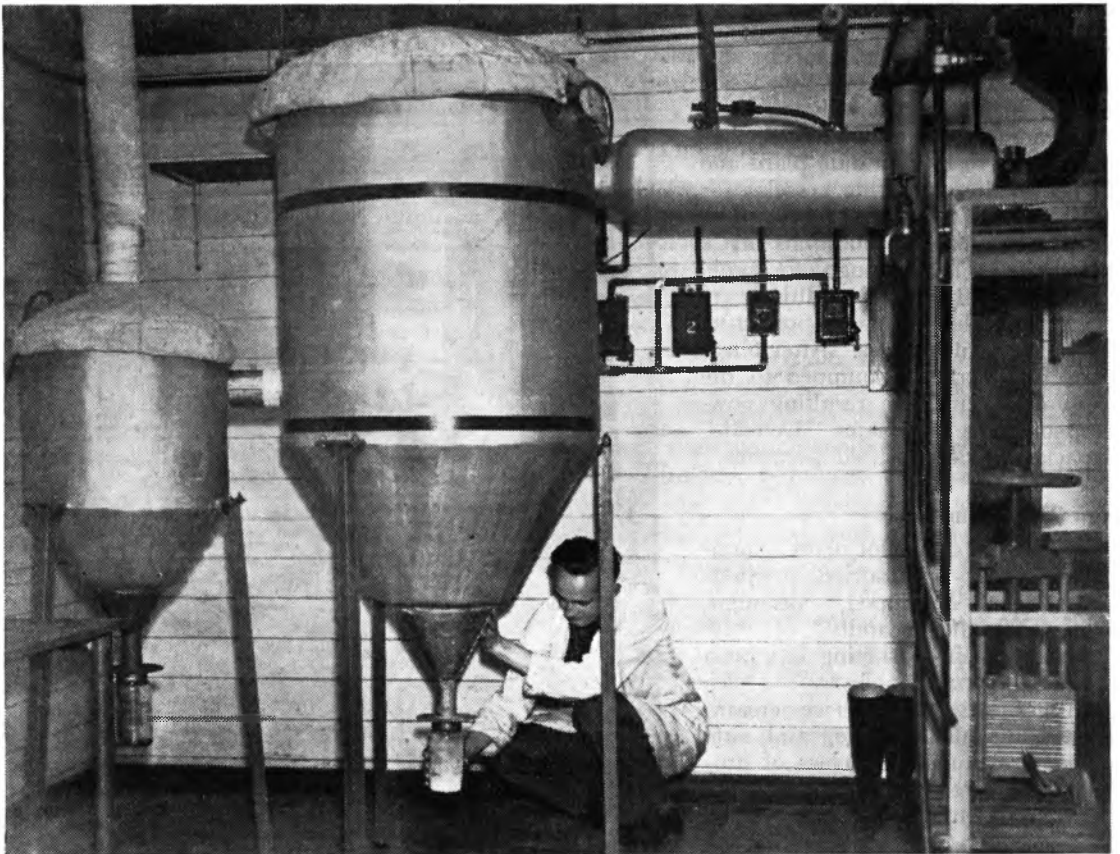
At the moment there are being produced, on a considerable scale, spray-dried, ready-cooked soups in a number of varieties. These soups are prepared and cooked in a way similar to those for canning, then strained and passed through the spray-drier. Most of the soups thus prepared are absorbed by the catering trade for the time being.

In the laboratories, in addition to routine control of existing products, new processes and new products are in course of being intensively studied.





The blended coffee goes from the grinding plant to the extracting vessels.



A number of other spray-dried products have been developed by the use of the pilot plant.



The spray-drier to which the extract is pumped after filtration.

### Hydrolysed Protein

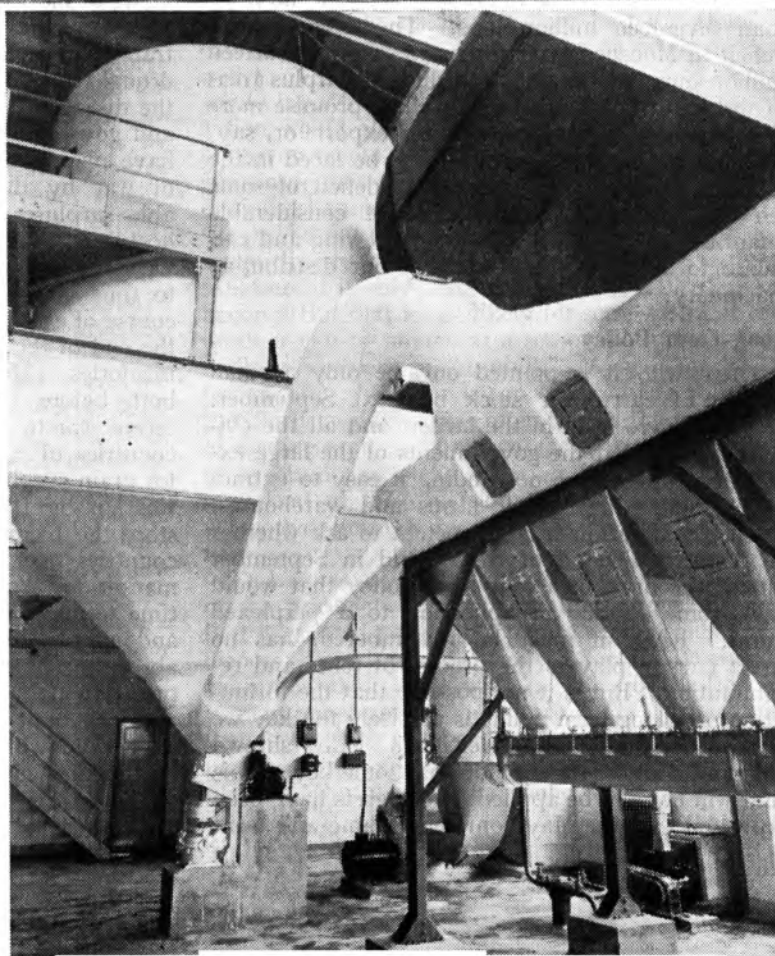
Apart from the activities mentioned, Atomised Food Products are manufacturing, in collaboration with Herts Pharmaceuticals, Ltd., hydrolysed protein for medical use on a large scale. A special department has been set up for this and is controlled by extensive laboratories.

During the war the company collaborated with the Low Temperature Research Station at Cambridge on problems concerning mashed potato powder.

NOTE.—The extractors and other vessels in the Welwyn factory were built, according to the firm's design, by the Aluminium Plant and Vessel Co., Ltd. The pilot spray-drier is of the Atomised Food Products, Ltd., own construction.

“... soups are prepared and cooked in a way similar to those for canning, then strained and passed through the spray-drier.”

August, 1946



# FAO and the Food Crisis

F. LE GROS CLARK, M.A.

The meeting of the new Food and Agriculture Organisation at the close of May had two results. It compelled the countries to digest the obvious but unpalatable fact that the crisis is rather one of three years than one of three months. It overhauled and reconstructed the machinery for dealing with a desperate situation. The world war may be followed by famine as catastrophic as any known in history—a truth that our generation must ponder, but before we ponder we must act.

FAO will meet again in Copenhagen in the early days of September. By that time the newly established Emergency Council may be in process of absorbing both UNRRA and the Combined Food Board. The harvest position for the northern hemisphere will be known, and there will be some chance of assessing the prospects of the later harvests. At the moment predictions are by no means comfortable. Even on a low calorie intake there may be an overall grain deficit in several countries of some thirty million tons. To meet this we have an anticipated exportable surplus that might with luck be as high as twenty-three million tons, but might, if the season be unfavourable, yield no more than seventeen million tons. The expected rice deficit in Monsoon Asia reaches a level of fourteen million tons; and in Asia the ordinarily surplus areas of the south-east are not believed to promise more than 20 per cent. of their pre-war export, or, say, 1.2 million tons. We seem thus to be faced in the crop year 1946-1947 with a grain deficit of some ten million tons, unless we divert considerable quantities from stock-feeding and brewing and calculate to a nicety the gearing of our distributive machinery.

## Long-Term Policy

There will, it is pointed out, be only a small margin of carry-over stock by next September. We shall have little in the larder; and all the evidence shows that the governments of the large exporting countries are not finding it easy to extract these reserves from their farms and warehouses. In such a situation it is competent to ask whether the Director-General of FAO could in September submit the draft of a long-term policy that would have some chance of appealing to a perplexed world. FAO, it must be remembered, has no direct part to play in the process of relief and rehabilitation. But is it not possible that the formulation of a long-term policy is precisely the key we need for the unlocking of fertility? Many shrewd economists are of the opinion that some key of this kind will have to be applied; and regrets have been expressed that the May conference came and went

without the presentation of a clear draft programme. There is patently no time to be lost, and if FAO is to be granted certain executive powers that will involve an adjustment of its constitution, the countries will clearly have to be given a few weeks or months to digest the nature of their new commitments.

There were hints, of course. Farmers, it was said, should be guaranteed a fair and stable price, they should not be penalised for high yields by ruinously low prices; there should be co-ordination and not competition in the purchase of food in short supply. This certainly accords with the views of most economists today; but what precisely does it mean? As economists have begun to penetrate below the superficial effects of war and drought and to examine the more remote causes of the disaster, they have observed that both farmers and governments in the major exporting countries have plainly been obsessed throughout the period of war by the fear of finding large unmarketable surpluses left on their hands at the close of hostilities. There is no space here to cite the various restrictive regulations that were from time to time issued by governments or to review the course of events in the years immediately following the end of the 1914-1918 war. Farmers have long memories. Moreover, it had been the tendency both before and during the early years of the recent war to look upon eastern and south-eastern countries of Europe as the natural drainage area for grain surpluses from overseas. The Old World was, in brief, to be called into existence to restore the balance of farming in the New. These countries may in time prove to be a very useful market for American wheat and maize; but that time seems somewhat remote. They have a small and even a dwindling livestock industry for the absorption of transatlantic grain supplies, and their prime thought in the restoration of their own export economy is to regain in some measure their maize and wheat markets in the western areas of Continental farming. They lie within the Soviet sphere of influence, and they are all passing through a phase of agrarian revolution. There is

little prospect that the grain farmer of America will be tempted to raise his yields of export crops in the expectation of finding *immediately* a stable and permanent market in Europe.

### World Deficiency Estimations

In the final stages of the war it would have been possible for a statistician to estimate the probable world deficiency in grain at the close of hostilities. Taking the progress of the war from country to country in the spring of 1944, he could have calculated that the total extent of the economic disruption was bound to be very large. As far as the author is aware, no such estimate was submitted, at all events officially. Yet it was obvious to anyone who knew what was happening in North Africa and Italy. We may grant that the effect of the atomic bombs in curtailing hostilities in Asia could not then have been predicted. But to balance that we had the subsequent effect of the then unpredictable droughts. In brief, one is inclined to say that the programmes of grain production and conservation in 1945 were in no sense adjusted to the probable level of world deficiency. There was a prevailing mood of optimism, as far as grain stocks were concerned, a common belief that we would somehow "muddle through," a refusal to allow for the rate at which stocks were disappearing into the bellies of farm animals. The inhibiting factor was unquestionably the fear of having an unmarketable surplus piling up along the pipe-line.

Obviously the same fear of post-relief surpluses will continue to restrain production through the coming years unless some drastic measures are taken to exorcise it. The problem affects, as we know, only four or five of the countries of America and Australasia. Most of them have not significantly expanded their wheat acreage in the current crop year. It will be essential to have a far larger acreage for the 1947 harvest; but such signs of recovery as are manifest in the war-devastated countries in the autumn of 1946 will only give rise to a belief overseas that the position was not quite so bad as it had been painted. In other words, we must have some sure technique for inducing high production levels in the grain-exporting countries. It will have to be a technique that works efficiently, whatever be the degree of deficiency in the importing areas. It will have to be guaranteed and of long-term duration. It will have to be capable of inducing a level of production that can overflow any "black market" that emerges in the producing countries. The question is, what technical device we shall select; for we shall have to use it as our criterion in assessing the value of any proposal put forward at the FAO September conference.

### Granting of Operating Powers

The only safe course, in the author's opinion, will be for FAO or some other organ of the United

Nations to be granted operating powers in the surplus grain market. If a grain surplus does develop at some stage in the future it can theoretically be lifted at an agreed price; and there are at least four different channels of disposal.

(1) A reserve stock can be permanently held in the world of, say, ten million tons, turned over at intervals. Any sane world, that has been faced with famine, would realise the sense of holding a reserve larder; and, in any case, there are always flooded areas, earthquakes, and local droughts that demand relief measures.

(2) The "buffer stock" principle can be applied. This formed, of course, part of the Wheat Agreement; and while its terms as then outlined require some expansion, there is little doubt of its value. A "buffer stock" level of an additional five to ten million tons does not seem unreasonable.

(3) It should not be impossible to contrive a surplus grain disposal policy on an international scale. On pure calorie basis the present estimates of world requirements are very conservative; they allow of a *per capita* consumption in several countries of little more than 2,000 Calories as a "safe" level. Clearly, even if this were satisfied, it would still leave many communities "underfed" in the strict sense. In other words, the potential absorption of grain in a number of countries would be far higher than the relief estimates allow. Such communities will probably be "underfed" for many years to come, or would readily, if they had the chance, exchange a wheat staple for the usual maize or millet. The marketing arrangements in such a case would have to be carefully considered. The transaction would almost certainly have to be an affair of governments, and there would have to be a guarantee that the grain would not pass back by devious channels into the normal market.

(4) The natural use for surplus grain is in feeding to livestock. The process is not necessarily a safe one, if it only results in unmarketable eggs or bacon. But that is not likely for some years, if the produce can be offered at a reasonable price. It is really a problem of "timing." A firm market a few months ahead for bacon or dried egg will lead to a fairly rapid increase of stock and the utilisation of feeding stuffs. But once again the anticipation of a sound and steady market for such products may lead to the diversion of grain to stock just when that grain is required for human consumption.

To be precise, it is all a matter of "timing" and of the price schedules. Any international agency that is granted powers to operate as a surplus grain disposal board would merely offer the farmer a guarantee that there will, in fact, be no inconvenient surpluses in the future. The farmer will then be told to go ahead and produce all he can, plough up his spare acres, and lay down his fertilisers. But the disposal policy will have to be defined very clearly. Farmers have not only good

memories; they are shrewd judges of a policy. Both "timing" and prices will have to be declared in advance, at least so far as this is practicable. Viewed in this way, the function of FAO in the present crisis is simply to remove one obvious barrier to fuller production over the next few years. But it is a function that fits in with the declared policy of the promoters of the organisation.

### Supplies for Relief Purposes

On the other hand, FAO can do nothing to secure supplies for relief purposes. This will be the business of the new Emergency Council. How it is going to do it lies beyond the scope of this article. It will make every effort to have the extraction rate of flour raised in every country to 85 per cent. at least; and it will discourage the use of grain for other than human consumption. But it can only recommend, since it is, like every other international agency, in no sense a "supernational" body. The average man has only one method of judging how far the various countries take these international agencies seriously; their governments give proof of their intentions by sending men of greater or of less importance to represent them in conference. As far as we in Britain are concerned, we are heavy claimants upon the world grain market, and it is doubtful how far our international policy is necessarily conditioned by that inconvenient fact. But in our support of FAO as an operating agency we can have nothing to lose. It would indeed be a sound investment, since our grain supplies are likely to be no more secure in the spring of 1947 than they are at present; they might be less secure.

It will be interesting to see what proposals Sir John Orr submits to his conference in September. Almost certainly they will have to follow some such lines as those indicated above. If in that case FAO is converted from a mere fact-finding into an operating or executive body (at least in intention), funds will have to be granted for the purpose of handling the surplus stocks that will later emerge. These funds need not be very large, but they will have to be sufficient to meet the demand. This is probably where the difficulty will arise. It may be sound policy, as the United States found before the war, to embark on a surplus disposal scheme, but when two or three countries may be called upon (as in the case of UNRRA) to meet most of the bill, the whole business begins to smell remarkably like a philanthropic venture. Even with the present modest budget of FAO, the United States is contributing 25 per cent. and our own country 15 per cent. Patently, until the other countries are in position to pay a larger share, there can be no sense of international co-operation about it. Doubtless that will come, and Sir John might be advised to define his policy on the assumption that it will come.

## Ministry of Food

### Latest Statutory Rules and Orders

The list given below is the continuation of the list of Orders published in *Food Manufacture*, July 1, 1946, page 300.

No.	Date. 1946.	PRICE FIXATION ORDERS
613	Apr. 25.	Cucumbers Order. Revokes S.R. & O. 1942 Nos. 477, 1093; and 1945 No. 970.
626	" 30.	Order amending the Bread (Control and Maximum Prices) (No. 2) Order, 1943. (14 ounce loaves.)
654	May 7.	Order amending the Butter (Control and Maximum Prices) Order, 1943.
655	" 7.	Order amending the Fish (Control and Maximum Prices) Order, 1946. (Herrings, Kippers.)
660	" 8.	(Relaxation of Price Control) Order. (Food, Feeding Stuffs, Soap.)
661	" 8.	Order amending the Feeding Stuffs (Maximum Prices) Order, 1943.
708	" 16.	Order amending the Canned Fruit and Vegetables Order, 1946.
709	" 16.	Order amending the Salmon (Maximum Prices and Distribution) Order, 1944.
FLOUR		
662	May 8.	Order amending the Flour Order, 1945. (Extraction Rate.)
FRUIT		
679	May 14.	Imported Soft Fruit Order.
694	" 15.	Home Grown Soft Fruit Order. Revokes S.R. & O. 1945 Nos. 429, 644, 712; and as regards soft fruit only 1946 No. 248.
POINTS RATIONING		
733	May 21.	Order amending the Foods (Points Rationing) Order, 1945.
POTATOES		
724	May 18.	Order amending the Potatoes (1945 Crop) (No. 2) Order, 1945.
RATIONING		
589	Apr. 18.	Order amending the Fats, Cheese, and Tea (Rationing) Order, 1946. (Camembert Cheese.) <i>Corrigendum Slip published May, 1946.</i>
RYE PRODUCTS		
622	Apr. 29.	Order amending the Rye (Control of Mills and Products) Order, 1942.
VITAMIN B <sub>1</sub>		
727	May 20.	Order revoking the Vitamin B <sub>1</sub> (Control) Order, 1941. Revokes S.R. & O. 1941 No. 183.

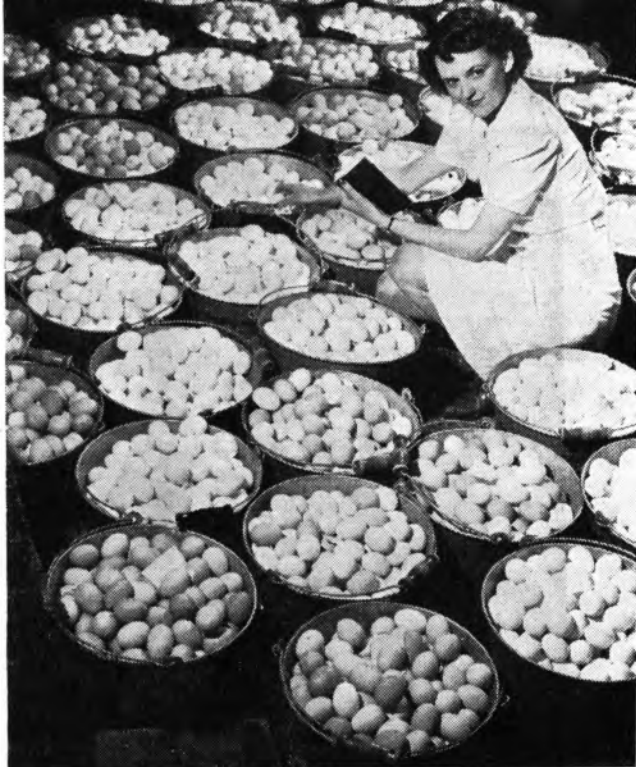
# A Modern Laboratory Tests Dried Eggs

C. F. M. FRYD, B.Sc., A.R.C.S., A.R.I.C.

This is mainly the story of successful improvisation carried out by the Liverpool Branch of the Government Laboratory after having suffered heavy damage during an air raid in the early summer of 1941.

**E**ARLY in 1942 the Liverpool laboratory was back to normal in its temporary premises, and its staff eagerly looking out for an opportunity to play a greater part in the war effort.

While the British public was still for the most part in blissful ignorance of the virtues of dehydration, spray-dried egg from the United States, Canada, and other countries was arriving in this country. The Liverpool Laboratory of the Department of the Government Chemist was chosen as the



The start of the business. Grade A eggs on the way to the breaking room in a Canadian factory.

site at which samples of future consignments were to be examined before distribution was authorised by the Ministry of Food.

## Spray-Dried Egg

At this time very little was generally known, even among chemists, about spray-dried egg. Work had been done, it is true; the Low Temperature Research Station in Cambridge had put in much developmental work, to which access was freely given, and various bodies in the producing countries of Canada and the United States had done something on methods of analysis; but owing to the special conditions of war, and the normal time-lag between research and publication, very little had appeared in the journals and still less in the textbooks. When we first saw dried egg in bulk, to most of us in this laboratory it was nothing more than a golden heap of exciting possibilities. As a subject for a quality report, expressed in prosaic figures, it was still a mystery.

That mystery soon had to be reduced to routine. Plans were made for the examination of a maximum of some five hundred samples every week, and to report in the first place on flavour and moisture content only. The staff were introduced to Dr. Bate-Smith of the Low Temperature Research

The day's work. Each tin or packet is representative of a separate mark or parcel.





**The fluorometer with the receiver cup in position for the preliminary moisture determination.**

is a measure of the solubility of the egg protein in terms of the increase in refractive index of an aqueous medium, usually a solution of KCl or NaCl, when 1 g. of the sample is dispersed in 5 ml. of that solution. The relation between Haenni value and the protein solubility as measured by the more rigorous ratio of soluble to total nitrogen is not linear, but has been shown by Hawthorne<sup>2</sup> to follow a well-defined logarithmic curve. In the meantime it remains a simple and rapid method of finding information about a sample which is of great importance, especially to the commercial baker.

At about the same period the relation between fluorescence and flavour was the subject of much work, especially in Canada, where Pearce and Thistle<sup>3</sup> appeared to claim that fluorescence, particularly that of a fat-free aqueous extract, was a better guide to flavour even than the tasting panel. We were doubtful about this, but thanks to the Ministry of Food, both the L.T.R.S. at Cambridge and the Liverpool laboratory were able to obtain a Coleman photo-fluorometer of the type used by Pearce and Thistle.

### **Formation of Tasting Panel**

The earlier programme to taste a maximum of five hundred samples every week, and to determine moisture on one hundred of these, had been augmented until the task was to taste often a thousand, sometimes twelve or thirteen hundred, samples in six working days; to determine moistures, net weights, and Haenni solubilities on from two to three hundred; to report all this in conjunction with an elaborate code which gave in short form such information as factory and date of drying, packing, etc.; and also to undertake an increasing amount of work on such associated questions as dried egg yolks, albumens, damaged cargoes, and the complaints, sometimes well-founded, of private consumers and commercial users. In such circumstances, to adhere to the full tasting panel of four, each man referring at intervals to established standards, had long ago become impossible. With a staff of ten trained tasters, each man would have tasted five or six hundred times a week, while the consumption of standard samples, limited supplies of which are kept packed in nitrogen at a temperature of 20° C. in Cambridge, would have run into hundredweights a month.

Station, Cambridge, to whom is due the numerical system of scoring flavour, since published<sup>1</sup> and now in world-wide use, but which at the time struck a decidedly novel note. Scores ranging from 0, for an egg which is repulsive, up to 8, for a dried egg indistinguishable from a good-quality fresh egg, are allotted to scrambles made by cooking, with stirring, 60 g. of reconstituted sample. Comparison with standards, and the use of a panel of experienced tasters, give a high degree of repeatability to results. The habit of scoring to the nearest half-point has crept in, and is in universal use in this country.

### **Solubility of Proteins**

In the summer and autumn of 1942 the solubility of the proteins in spray-dried egg was attracting much attention; and experiments were made on the repeatability and accuracy of the Haenni method of determining a solubility index, and afterwards carried out as a routine determination on one sample in every five received. The Haenni index

## Production of New Apparatus

In September, 1943, a paper, crystallising the experience of the laboratory, was produced, and published in January, 1944.<sup>4</sup> In this paper was described a simple formula connecting the Haenni solubility index and the surface fluorescence of the egg powder, determined in a comparatively rapid manner by the Coleman photofluorometer with the flavour index

It was very soon discovered that the Coleman instrument, while doubtless of very great service on its own ground, suffered from some defects when used as routine apparatus in this country. Like much American material, it is constructed for 60-cycle A.C., and to this may perhaps be attributed the fact that neither of the two instruments used appeared to settle down comfortably without frequent adjustment; and it became obvious that if fluorescence was to be used as a useful tool for dealing with really large numbers of samples new apparatus would have to be designed. In a comparatively short time a workable model was produced, made from old meat boxes, etc., which with some modification has been in use ever since, and through which have passed over fifty thousand samples. Valuable assistance has been given by the Radiovisor Parent, Ltd., the makers of the photo-electric cells used.

The original machine was described in a note by Dr. Rose and the author.<sup>5</sup> Since that date, the most important modification has been the incorporation of the receiver cup of the N.P.L. mois-

ture machine for the determination of percentage water. By the use of the combined instrument, two of the staff can now obtain fluorescence and moisture figures at the rate of well over sixty samples an hour with a minimum handling of the material, and a modification is being considered which would enable the primary producer to maintain continuous control over the dried egg as it leaves the drier.

The Haenni index of solubility is another factor which nowadays receives continuous attention. Automatic pipettes, numbered test-tube racks, and so on, are obvious devices, but one small modification of the Abbé refractometer used halved the labour of reading the indices. It was fully described in *FOOD MANUFACTURE* of July, 1945, but briefly may be said to consist in the mounting of the base of the instrument on a turntable, so stopped as to bring the eyepiece or prisms always to the appropriate positions without the necessity for any lifting or adjusting movements whatever.

## Testing Dried Egg

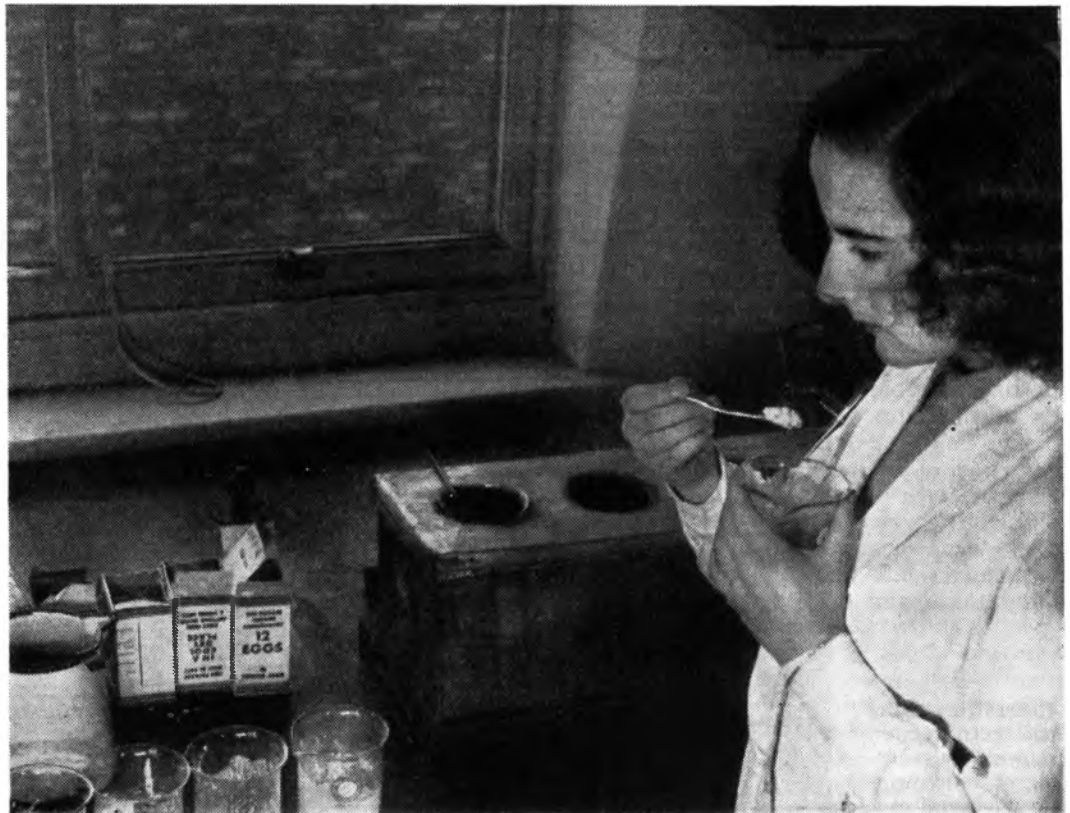
In the present system of testing dried egg, then, the moisture and fluorescence figures are obtained and used for themselves, but in addition they are of considerable use as purely sorting devices which enable any samples to be picked out which, owing to irregularities in manufacture or an error in sampling, differ from the remainder of the batch or mark under investigation. By keeping this critical watch on batch or mark, actual tasting on every sample received was dispensed with. During 1944



General lay-out of one laboratory showing the grouping of instruments for the use of each operator.



Operating the modified refractometer when determining solubilities.



The final judgment.

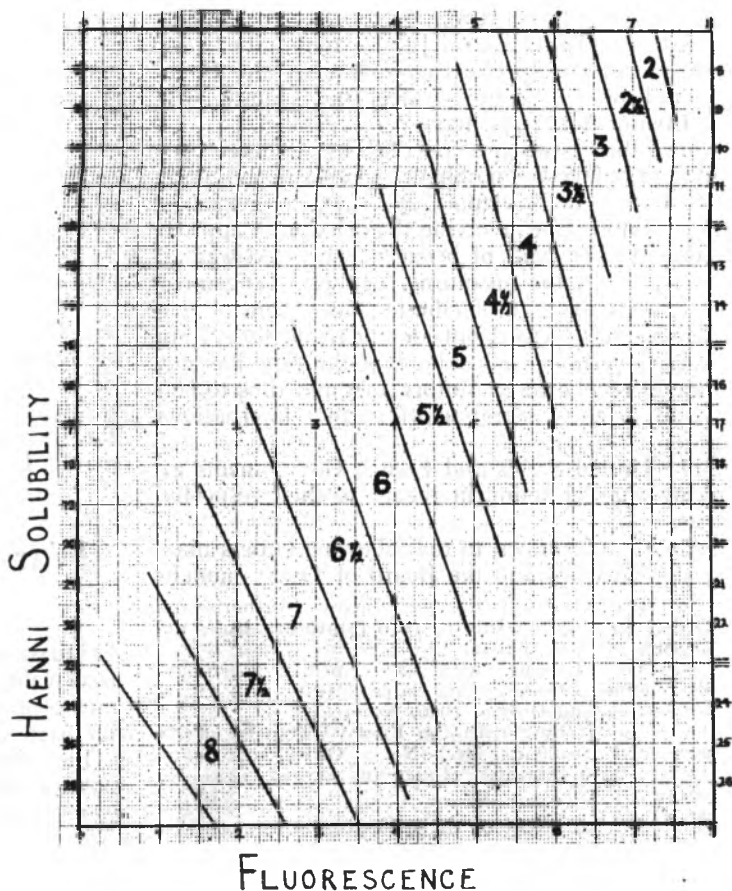
an analysis of 5,000 samples was made with the object of ascertaining whether fluorescence alone could safely replace tasting, even as a purely sorting method for separating the sheep from the goats, but such a method was not practicable, 11 per cent. of cases being wrong, and indeterminate results accounting for a further 13 per cent.

Returning to the consideration of the samples on which a straight fluorescence, or fluorescence combined with solubility, cannot be made to tell the full story of the flavour and quality of the dried egg, research laboratories, working as they so often must on small numbers of samples very probably obtained from one source only, unfortunately may miss the odd sample which behaves in an anomalous way, and yet, by its occasional presence, destroys the validity of any inferential method.

At Liverpool, as a routine matter, they managed to find their way on to the tasting bench, discrepancies between the expected and the found flavours were noted, re-examinations made, and the divergencies recorded as unexplained or otherwise, as the case might be. Some, such as the "acid-cheesy" type, were well known and to some extent explained as the result of drying a contaminated *melange*; others were not so easy to recognise. What was needed was a chemical or physical method of obtaining a flavour index which would be completely independent of tasting and yet be reliable in all cases—an objective court of appeal to which to submit doubtful cases with some confidence. In the end such a method was arrived at, but unfortunately it entails considerable chemical work. Nevertheless, our work on anomalous samples remains to trap the occasional variant which may attempt to elude the best factory control. It is fully described in the *J.S.C.I.*,<sup>6</sup> but may be briefly summarised as being a mathematical function of solubility, fluorescence, two terms involving the unexpended residue of the glucose naturally occurring, and the excess of the fatty acids over a minimum figure which appears to be naturally present.

During the last few months we have begun to think more about the new product, sugar-dried egg, with the analysis of which for the Ministry of Food we have also been entrusted. It has presented some problems, many of which are solved or on the way to solution; a fuller story of our experiences with this material, which may yet prove to be the true peace-time heir to the riches invested

## CALCULATING CHART



in the dried egg industry, must await a further opportunity.

The author extends his thanks to the Chemist-in-Charge of the Liverpool Laboratory and others of its staff for help in the writing of this article and to the Government Chemist for permission to publish it.

### REFERENCES

- <sup>1</sup> *J.S.C.I.*, 1943, **62**, 97.
- <sup>2</sup> *Ibid.*, 1944, **63**, 6.
- <sup>3</sup> *Canad. Jour. Res.*, 1942, **20**, D, 281.
- <sup>4</sup> *J.S.C.I.*, 1944, **63**, 3.
- <sup>5</sup> *Chem. and Ind.*, 1944, 173.
- <sup>6</sup> *J.S.C.I.*, 1945, **64**, 55.

### TO AUTHORS

FOOD MANUFACTURE is prepared to consider the publication of any books on scientific and technical subjects which authors might care to submit.

## Trading with the Enemy

THE Foreign Office and Board of Trade announce that by an Order (S.R. & O. 1946 No. 1041) made on July 6 and effective on July 9, 1946, all existing Lists of persons specified as enemy by the Board of Trade under Section 2(2) of the Trading with the Enemy Act, 1939, have been revoked.

Since the cessation of hostilities steps have been taken to reduce the numbers included in the Statutory List. On November 27, 1945, a revision of the Statutory List involving the deletion of approximately 45 per cent. of persons then listed was announced. In the meantime, further arrangements have been made to facilitate Allied control over enemy assets located outside enemy territory, and H.M. Government consider that the time has now come to revoke the Statutory List and thus to contribute to the restoration of normal international trade.

The United States and French Governments are taking parallel action in regard to their respective Lists.

Attention is drawn to the following Orders made by the Treasury and the Board of Trade, namely,

(a) The Trading with the Enemy (Authorisation) Order, 1946, dated July 6, 1946 (Statutory Rules and Orders, 1946, No. 1042).

(b) The Trading with the Enemy (Custodian) (Amendment) Order, 1946, dated July 6, 1946 (Statutory Rules and Orders, 1946, No. 1044).

(c) The Trading with the Enemy (Transfer of Negotiable Instruments, etc.) (No. 2) Order, 1946, dated July 6, 1946 (Statutory Rules and Orders, 1946, No. 1043).

The general effect of these Orders is to authorise trade as from July 9 within neutral countries and other territory which have at no time been enemy territory, with persons resident or carrying on business therein who continue to be of enemy status and with whom trade would otherwise be unlawful under the trading with the enemy legislation. Board of Trade and Custodian control is removed from moneys or property accruing from such trade. The property in the United Kingdom belonging to such persons and concerns at the date of the Order and income arising therefrom continue under such control, and persons in the United Kingdom who are indebted to or hold property belonging to them should accordingly continue to pay or report such debts or property to the Custodians of Enemy Property.

The Treasury Order sanctions assignments of choses in action, etc., and transfers of negotiable instruments as defined therein, made by or on behalf of persons resident and carrying on business in such territories on or after July 9, 1946.

As part of the continuing control referred to in paragraph 4, the Board of Trade has made two Orders:

(a) The Trading with the Enemy (Custodian) Order, 1946, dated July 6, 1946. (Statutory Rules and Orders, 1946, No. 1039).

(b) The Trading with the Enemy (Custodian) (Specified Persons) Order, 1946, dated July 6, 1946 (Statutory Rules and Orders, 1946, No. 1040).

The effect of these Orders is to vest in the Custodian certain property in the United Kingdom belonging to any persons whose name was included in the Statutory List current immediately before its revocation. Property so invested, which belonged to persons and concerns who ceased to be enemies in consequence of the revocation of the Statutory List, will, however, be released in due course on application, which should be addressed to the Trading with the Enemy Department, 24, Kingsway, London, W.C.2.

The Board of Trade and His Majesty's Commercial Officers abroad are prepared to advise British traders as to the commercial ability and reputation of prospective agents and customers abroad. Enquiries in this connexion should be addressed to the Export Promotion Department, 35, Old Queen Street, London, S.W.1

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## War-Time Investigation in Nutrition

FEEDING stuffs for dairy cattle and poultry, the food value of malt extract, and research into vitamin sources, are summarised in the annual report for 1945 of the Ovaltine Research Laboratories.

Experiments in replacing cereals by dried potatoes in the feeding of dairy cattle and poultry were undertaken with satisfactory results.

Research into the food value of malt extract indicated that a good malt extract should contain considerably more protein than the B.P. minimum. The use of the extract in infant feeding is of particular interest, experimental batches of infant foods made with malt extract supplemented with wheat flour, soya flour, milk powder, and other sources of protein having been prepared for UNRRA.

A search for alternative sources of vitamin C, studies on the development of vitamin C during germination of cereals, and the fluorimetric estimation of vitamin B<sub>1</sub> in tablets and other pharmaceutical products all form part of the work done by the laboratories during the war years.

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### BOOKS RECEIVED

*Sunflower for Food, Fodder, and Fertility.* By E. F. Hurt, N.D.D.

*Dry Milk Solids.* American Dry Milk Institute, Inc.

*The Fisheries of British Honduras.* Report by Ernest F. Thompson, M.Sc.(N.Z.), Ph.D.(Canada).

*Bride's First Cookery Course.* By Jane Creswell.

# Prison Camp Privations in the Far East

Malnutrition, avitaminosis, and beriberi have always been commonplace words in the vocabulary of the tropical doctor. To many in this country, however, their full significance and sadness was only brought home during the recent war, when they became no less familiar than malaria and dysentery in spreading death among our fellow-countrymen in Japanese prison camps. At a recent conference of the Nutrition Society medical officers who had survived the years of privation gave a scientific account of their experiences. The information which was collected under such adverse circumstances will greatly help those responsible for waging the campaign against malnutrition in our colonies.

**W**HEN in 1942 the Japanese overwhelmed South-East Asia they had to contend not only with many thousands of military prisoners, but with those members of the European population who had been unable, or unwilling, to seek refuge in flight. The conditions of imprisonment or internment, living accommodation, food supplies, and the cruelty or consideration of the jailers varied greatly in different prisons, which were as much as three thousand miles apart. It is not surprising, therefore, that the sufferings reported from different prisons should have varied considerably, ranging from a minimum of acute discomfort and boredom to a maximum of slavery, pestilence, and death. In regard to diet, however, the most serious defects were usually the same. Deficiency of good-quality protein and of the vitamin B complex was complicated by excess of indigestible roughage.

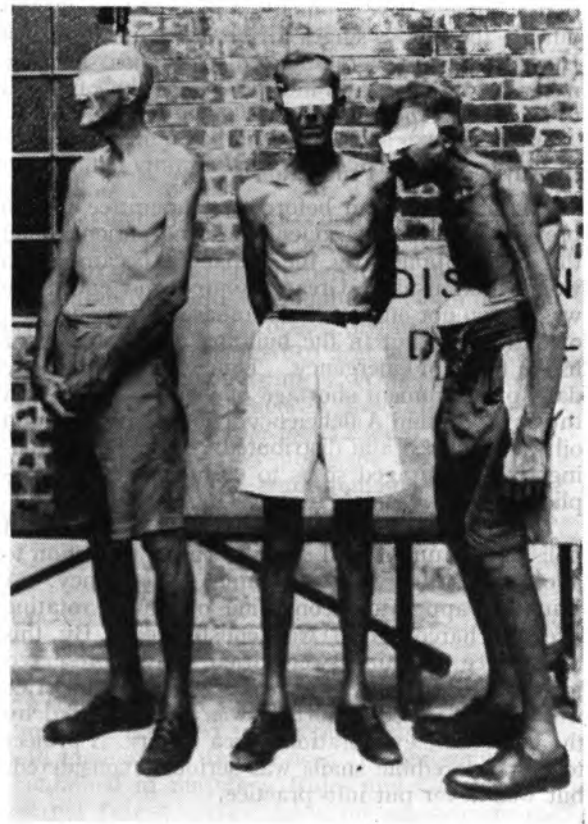
## The Fall of Singapore

Dr. Cicely Williams has given a graphic account of her experiences at Singapore, and her story may be given in some detail as typical of those of many civilians who had to face the ordeal of internment. Shortage of food was only one of their tribulations. Dr. Williams tells how after the capitulation many professional women, including nurses, remained behind. In company with the European or Asiatic wives of male prisoners, often with their children, they were made to parade all day long in the sun at the centre of the town. A painful march to some houses six miles away at Katong followed in the evening, and the next three weeks were spent there with little food and no sanitation. Accommodation was then found in Changi prison, which was their home until 1944.

With men and women housed in separate quarters the prison was made to hold 3,000 internees in accommodation intended for 600. The inevitable turmoil of distress and discomfort will be readily imagined. In the early months the nights were perpetually disturbed by overcrowding, crying babies, women having nightmares, prowling

sentries, quarrels among cell mates, and by attacks of diarrhoea, indigestion, and anxiety. Hunger was not only distressing as a physical sensation, but was generally accompanied by feelings of insecurity and anxiety, and by longings for rich food.

Fortunately the Japanese allowed the prisoners considerable freedom in the internal management of the camp. In the men's section a Medical Refer-



Cases of nutritional neuropathy at the Civilian Internment Camp, Hong Kong, August, 1945. Courtesy of The Nutrition Society.

ence Committee was formed, which sat weekly over a period of three years. The efforts of this committee in advising on dietary matters, and in husbanding and supplementing food supplies, undoubtedly prevented a state of severe malnutrition from degenerating into widespread starvation.

### **The Staple Diet**

As in most other prison camps the diet provided by the Japanese consisted mainly of rice. This was usually unpolished, and therefore contained the germ, which is a valuable source of the vitamin B complex. A little meat was provided in the early stages of internment, but was later replaced by fish. A small ration of oil and a little salt were also allowed. The committee, through a neutral agent, was able to purchase supplementary foodstuffs, such as rice polishings, groundnuts, and green vegetables. The diet in the amounts allowed for healthy men provided 2,000 Calories daily. For invalids the allowance was less, and women and children received only about 1,000 Calories.

On the whole the women, with their lower metabolic rate, stood up to dietary deprivation better than the men, but there was great individual variation. Some native women actually put on weight during the early stages of imprisonment. Most Europeans, however, objected to the coarse bulky nature of the diet, and intestinal irritation often led to severe diarrhoea.

### **Improvised Food Production**

A serious problem before the committee was to prevent harmful consequences during periods when the food supplied by the Japanese became even worse than usual. Great resource and enterprise was shown not only in the purchase and production of extra food but in the building up of stocks for use in times of emergency. Thus when in the early days of internment shortage of vegetables led to a threat of vitamin A deficiency a supply of red palm oil was obtained and distributed. Later on gardening was encouraged so as to ensure adequate supplies of green vegetables.

The occasional substitution by the Japanese of polished for unpolished rice also called for action to avoid recurring risks of vitamin B deficiency. A primitive apparatus, consisting of drums rotating over a charcoal fire, was constructed. By this means rice polishings were dried and so preserved for storage until the next period when polished rice was issued. A salt shortage was circumvented by the large-scale evaporation of sea water. A project to cultivate edible snails was seriously considered, but was never put into practice.

### **The Effects of Malnutrition**

Among the civilians at Singapore the incidence of deficiency diseases was comparatively light.

Although the average age of internees was 44, the mortality was under 10 per cent. The poor diet, however, frequently caused losses of 2 stone in body weight, and of 1 inch in height. The children were all undersized, but it is a remarkable record that only two out of 300 died, and these were babies who were ill before internment. Twenty babies were born successfully in the camp.

According to Dr. D. A. Smith conditions were worse at Hong-Kong, where 1,300 male civilians, 900 women, and 300 children were interned. The main foodstuff here was highly polished white rice, which was of poor quality and usually infested with weevils. Although both the local and International Red Cross Organisation gave what help they could the diet remained low in most nutrients except carotene, vitamin C, and iron. The first effect of malnutrition was loss in weight, but after a rapid preliminary fall the body seemed to adjust itself to a new plane of nutrition. A lowered metabolic rate was accompanied by a slow pulse, lowered blood pressure, weakness, undue liability to fatigue, dizziness, and fainting. About three months after capture the first cases of wet beriberi, the disease caused by vitamin B<sub>1</sub> deficiency, made their appearance, and throughout the whole period of captivity no less than 844 cases occurred. The condition responded readily to crystalline vitamin B<sub>1</sub>, preferably given by injection, but unfortunately only small supplies were available.

Later on many other effects of semi-starvation were noticed in the Hong-Kong camp, including dropsical swelling due to lack of protein, pellagra-like lesions due to lack of the vitamin B<sub>2</sub> complex, and skin disease of the mouth and scrotum due to riboflavin deficiency. Tropical anaemia, an eye affliction known as retrobulbar neuropathy, and "electric feet" were also observed, although it is not yet known to what missing vitamins these conditions correspond.

### **Prisoners of War**

Conditions for prisoners of war were generally more rigorous than for interned civilians. Poor foods, forced labour, and appalling living conditions only too often brought a lingering death to those who had escaped from bullet and bomb. From his experiences in prisoner-of-war camps in Formosa, Lieut.-Col. J. Bennet was unable to decide whether dietary deficiency was the main factor in undermining health. Environmental stress, compulsion to hard labour, a high incidence of malaria, and infectious diseases, combined often with after-effects of sea transport under inhuman conditions, all contributed to a highly complex picture of ill health. Ravenously hungry men, who had a deep elemental fear of starvation, ate large amounts of unpolished rice and of coarse vegetables of low nutritive value and high fibre content. The resulting diarrhoea, or malarial infestation, usually brought

on the swellings in the legs and other parts to which the body was predisposed by the poor protein intake.

Signs of vitamin B<sub>1</sub> deficiency in the Formosan Camp did not appear until later stages of captivity. A painful neuritis then appeared, with severe aching in the bones and joints, and cramping sensations in the feet. In regard to the quantity of food available the prisoners were not grossly underfed. Those who were expected to work received 2,000 to 3,000 Calories daily, while officers who were excused work had about 1,800 Calories. It seems probable that the diet would have maintained a reasonable state of health in the absence of conditioning factors such as overwork, infection, and diarrhoea.

### Obscure Maladies

In most camps clear-cut cases of beriberi and of deficiency of protein were commonplace. Lesions attributed to deficiency of riboflavin were also frequent. Typical pellagra appears to have been rare, although less well-characterised lesions were often attributed to nicotinic acid deficiency. A surprising feature of most reports, however, was the appearance of disabilities which have not hitherto been adequately recognised.

Drs. R. C. Burgess and E. K. Cruickshank had ample opportunity to study "electric feet" in the prisoner-of-war camp at Singapore, where the incidence of deficiency diseases in general appears to have been greater than in the civilian internment camp. The condition was very painful. Some sufferers who were kept awake at night tried to find relief by an endless walk around their sleeping quarters. Others sought comfort by wearing several pairs of socks, or knelt in a bent-up attitude holding their feet with their hands. The condition did not respond readily to treatment with vitamin B<sub>1</sub>. In other camps cases were reported which bore a distinct resemblance to diseases met with in general medicine, such as Paterson's disease and sub-acute combined degeneration of the cord, but which showed important differences from these syndromes. Optical abnormalities were a frequent complication of vitamin B<sub>1</sub> deficiency, and sufferers who attempted to read were troubled by violet-coloured hallucinations. Nocturnal diuresis, presumably of dietary origin, was another cause of discomfort, particularly in women's camps.

### Lessons for Peacetime Application

The problem of improving nutritional standards in our colonial empire was discussed at an earlier meeting of the Nutrition Society, and was recently the subject of an article in this journal. Nutritional Research Committees have already been established in many colonies, and, according to Dr. Selwyn Clarke, a central Colonial Nutrition Committee is shortly to be set up to advise the Colonial

Secretary. The importance of this project needs no emphasis at a time when over-population, reduced cultivation, bad harvests, and the ravages of war have brought the threat of starvation to about 150 million people.

The deficiency diseases occurring in the prison camps may presumably be taken as a rough index of those likely to occur in the general population of the surrounding territories in times of food shortage. To some extent, therefore, prison-camp experience may be regarded as an involuntary "pilot experiment" which will indicate the probable course of famine in the unhappy event of the present food shortage becoming even more acute over wide areas. The survivors of the years of hardship and privation, therefore, may take pride in the thought that their sufferings have not been in vain.

### Future Developments in Colonial Nutrition

Future salvation would seem to lie mainly in improved agriculture, and in the processing and preservation of foods so that the surplus in seasons of plenty may be kept for leaner times. The possibilities of the increased use of canning and dehydration should obviously be explored. In view of the prevalence of beriberi and other diseases due to deficiency of B vitamins in the areas under consideration, there would also seem to be scope for the development of factories for the production of food yeast. The possibility of a more extensive use of crystalline vitamin B<sub>1</sub> as a medicine is worth consideration.

Ample evidence has been collected in the prison camps, however, to show that a diet cannot be relied upon to maintain health merely because it contains apparently adequate amounts of vitamins and other nutrients. The European digestive tract, at least, may revolt if required to deal with an excess of coarse vegetable foodstuffs. While, therefore, the manufacturer interested in the processing of cereal and other vegetable foods should always remember to study his food tables, he must also not forget that much literal truth remains in the old adage "the proof of the pudding lies in the eating."

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## Meat Formulae

THE recipes published in the July issue of FOOD MANUFACTURE are in the nature of *basic formulae* and must be modified to comply with the regulations in force at the time of use. The present ones are contained in Statutory Rules and Orders No. 763, dated July 3, 1944, and in the amendment to this Order, Statutory Rules and Orders No. 1491, dated November 26, 1945. Particular reference should be made to the permitted percentage of meat contained in the products.

# Jam Manufacture

## PART VII

GEORGE RAUCH

Previous articles examined problems connected with the lay-out, equipment, choice, and treatment of raw material for jam manufacture. In this article are discussed finishing methods and the efficiency of handling systems during the whole process of production is reviewed.

**T**HE finishing of jam comprises four main operations:

- (1) Pre-cooling prior to filling.
- (2) Filling.
- (3) Cooling after filling.
- (4) Capping, labelling, and packing.

### Pre-Cooling

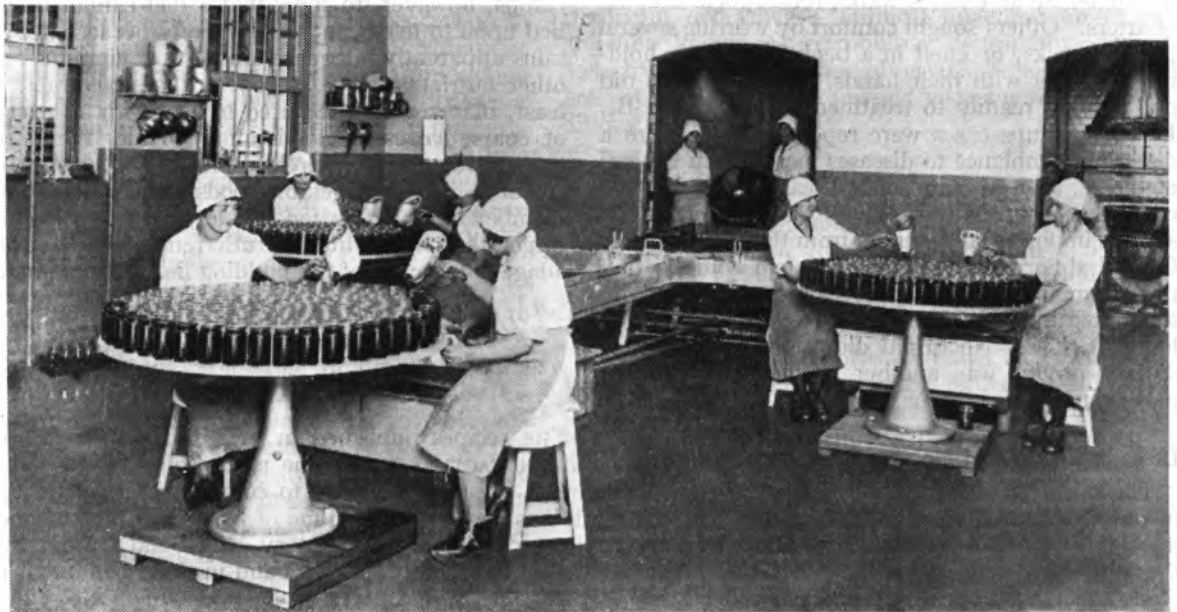
Prolonged heating affects the appearance as well as the keeping properties of the finished product. After being discharged from the boiling pans the jam has a temperature of over 112° F. As the inversion of sugar is greatly influenced by the temperature it is obvious that an efficient cooling system is necessary to control and check the process. Another factor is the danger of discoloration due to caramelisation. Difficulties are also experienced in filling, as some fruit varieties show a tendency to float, the most susceptible being strawberry, cherry, blackcurrant, and stone-fruit jams. These jams should be cooled until they are near setting point,

but great care must be taken not to exceed the limit, otherwise the set will "break" and the jam curdle; this applies particularly to jellies. The practice of retarding setting by addition of buffers—as, for instance, soda—should be discouraged as they invariably affect the colour and destroy the ascorbic acid in jam.

It should be remembered that for canning, jam must not be cooled under 180° F., otherwise it is impossible to obtain an efficient vacuum.

Machines for cooling are of various designs, the most inexpensive types being tanks with a double jacket through which cold water can be circulated. Simpler still are wooden tanks fitted with copper-lined troughs working on the same principle as tanks. This system has the drawback that the jam adheres to the sides of the coolers, which adversely affects the cooling efficiency of the machine. This can be overcome by using a cooler with a revolving cylinder, water being applied to the outside of the cylinder as the jam passes through it.

To obtain a continuous operation it is possible to



“. . . it is possible to connect the cooling system with a receiving tank from which the jam may be hand-filled.”

*Courtesy Aluminium Plant and Vessel Co., Ltd.*

connect the cooling system with a receiving tank. From there the jam is either hand-filled or pumped into the filling machine.

### Machine Filling of Jam

The handling of jam has been revolutionised by the introduction of the automatic filling machine. The jam is pumped into the machine from a receiving tank, which is as close to the machine as possible, and is discharged into the containers through rotary filling nozzles. The machine is also provided with removable adapters for 1-lb. and 2-lb. jars. The amount of jam to be filled is adjusted by a micrometer screw, which in turn regulates the stroke of the pump piston. The filling capacity of a standard machine is approximately 2,000 jars per hour, although some American machines have a far greater capacity.

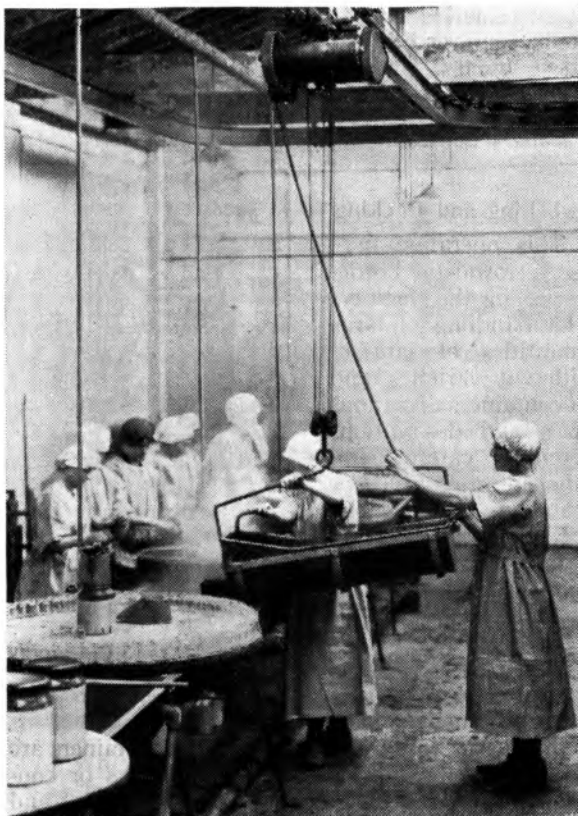
Where large quantities of jars or tins of 1-lb. or 2-lb. size are handled, an automatic filling machine is almost indispensable. Less suitable for machine filling are jams containing a great amount of whole fruits or stones. The main difficulty experienced in filling the latter varieties is the even distribution of fruit or stones in the jar. Moreover, large stones will not pass through the nozzles of the filling machine.

The tissing is carried out at the delivery side of the machine. It is possible to extend the continuous operation of filling to seaming or sealing and subsequently to the cleaning of the containers in the following manner: After being filled and tissued the jars or cans pass on to a star wheel and from there to a delivery conveyor, which is synchronised with the speed of the filler and carries the containers to the automatic seaming or sealing machines. Without interrupting the flow of production, the hermetically sealed jars or cans are cleaned by passing through a battery of steam jets and subsequently through a drying tunnel to the labelling machines.

### Hand Filling of Jam

Manufacturers with a small trade in 1-lb. and 2-lb. containers, or those dealing with lines unsuitable for machine filling, will have to resort to hand filling. The different methods of effecting this will have to be adjusted according to the individual system of production and the lay-out of the factory. If sufficient floor space is available, circular adjustable turntables can be used. The jam is brought to the tables in bogies and emptied into receiving tanks placed beside the tables. After filling a jar the operator revolves the rotary table while another operator takes the filled jars off and replaces them by empty ones.

Another very efficient method is filling on a roller conveyor. The empty jars are packed into trays, each one holding a certain number of containers. These trays are then pushed along the roller con-



**“ . . . jam is brought to the tables in bogies and emptied into receiving tanks.”**

*Courtesy Herbert Morris, Ltd.*

veyor to the filling operators. The containers are filled without being removed from the tray, wiped clear of spillage, tissued, and placed on a truck specially designed to hold a certain number of batches, this method facilitating checking. To prevent spilling it is advisable to run the trays along the roller conveyor on slides fitted with steel bands. The trucks are moved to the cooling room after the preliminary setting has taken place.

Larger containers—as, for instance, 28-lb. tins—are preferably filled in two or three operations. This precaution will prevent the formation of an over-heated centre, which is a frequent cause of discoloration due to burning.

### Cooling after Filling

After being filled, jam in jars must not be cooled too quickly. As far as canned jam is concerned the procedure is simple enough, the cans being passed through a water bath. Glass jars and large containers have to be cooled by air. This can be done by passing them slowly through a tunnel fitted with an air blast, or keeping them in a cooling room constructed on the same principle, until the jam is well set.

**“ . . . containers are put on the conveyor belt and taken to the labelling machine.”**

*Courtesy Purdy Patent Machinery Co., Ltd.*

### **Labelling and Packing**

This operation may tend towards bottlenecks in the factory. The handling of large quantities of jam of different varieties and in containers of various sizes and descriptions requires careful and efficient organisation. Labelling operations are sometimes complicated by the fact that some containers bear as many as three different labels.

Finishing on static tables fitted with one or more conveyor belts is the answer to most problems. The containers are brought to the finishing tables by trucks or conveyors. After being wiped clear of spillage, and capped, they are either labelled by hand or put on the conveyor belt which takes them to the labelling machine.

Labelling machines range from comparatively simple small standard models with an output capacity of approximately forty containers per minute, to elaborate machines constructed to perform several operations simultaneously with production capacities of 200 containers or more per minute. These machines are built to serve individual requirements, and provisions are made to label different-sized containers. They affix in one operation one or more front labels, together with back labels, if necessary.

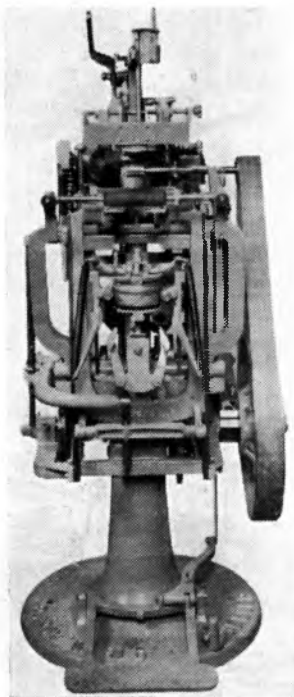
After the labelling operation the containers are placed on a second conveyor, sometimes wrapped in paper, finally inspected, and packed in boxes, crates, or cases.

### **Handling Problems**

It is obvious that, in a production process embracing such a variety of operations, the movement of materials from one operation to another will be of importance.

In considering handling problems two main elements have to be examined:

- (1) The work and handling carried out on the material itself.
- (2) The movement of the material from point to point.



The first item will involve the study of machinery and motion. The second one will require organised planning of the lay-out, an efficient intercommunication system, and the use of handling equipment. The effective co-ordination of both elements will be the main aim of an efficient production management.

The choice of handling equipment is entirely dependent on the individual requirements of the factory. Size of production output, location of the workshops, capacity of the machines are all points to be considered. As a general rule, handling devices must not only be time and labour saving but also justify their initial costs. A great variety of systems and machines are available. For vertical movement from a lower to higher level, elevators, lifts, lifting tackle, and pneumatic conveyors are used. For horizontal conveyance or movement from a higher to a lower level an even greater range of systems is available—as, for instance, roller and belt conveyors, mechanical skids, trolleys and trucks, chutes, etc.



**“ . . . sugar can be brought up by bar-type pilers.”**

“ . . . jam is discharged into containers which are lifted with an electric hoist block, being part of the overhead runway.”

*Courtesy Herbert Morris, Ltd.*



### Handling of Fresh Fruit

Fresh fruit, after arriving in the factory, is handled according to variety and packing. Strawberries and raspberries for pulping purposes are mostly unloaded by hand and emptied into casks. Soft fruits such as blackcurrants and gooseberries, which are processed prior to pulping, have to be transported to the processing machine. If the pulping plant is elevated, belt loaders can be used for conveying the trays to the platform. These are very efficient machines and will deal with up to 80 to 100 tons of material in one hour, using a power drive of  $3\frac{1}{4}$  h.p. Gravity should be used when possible for the discharge of pulp, an alternative being a pumping system. The empty trays are returned by a simple gravity chute. For the pulping of apples or stone fruits another method can be adopted. The fruit is emptied into water tanks and from there removed by goose-neck or bucket elevators, which in turn discharge the fruit directly into the pulping vessels.

For fresh fruit which is sorted prior to processing a band conveyor can be used. The operators stand on both sides of the slow-moving belt and handle the fruit as it moves along. This system is not suitable for plugging strawberries. This operation requires static tables to which the material is brought in trucks.

### Handling of Material for Boiling

The jam pans have to be charged with sugar, fruit pulp, or juice; pectin, acid, and colour are usually added by hand.

Where solid sugar is used, very little can be done as far as mechanical handling is concerned. In factories where syrup melting plants are available, a number of useful handling devices can be employed. If sufficient floor space above the melter is available the sugar can be brought up by elevators, belts or bar-type pilers, and the sugar is then discharged into the melter through a gravity chute.

Sugar syrup, being mobile, can be fed to the boiling pans by gravity. Where gravity feeding cannot be employed it is possible to pump the syrup to elevated receiving tanks or to use compressed air for the charging operation. Fresh fruit, juice, and pulp are mostly charged by hand. Some production systems make use of gravity charging by pumping the juice or pulp into receiving tanks, from there the material is fed by way of a weighing device into the boiling pans. In order to speed up this operation it is frequently necessary to use compressed air in addition to gravity.

### Handling of Jam after Discharge

The handling of jam after being discharged from the boiling pans offers great scope for the ingenuity of the production management. Most frequently the jam is discharged into bogies and wheeled by hand to the coolers. For lifting and emptying the bogies it is advisable to use electric hoist blocks controlled by a pendant switch. Some factories use a system of overhead runways. The jam is discharged into containers, which are lifted with an electric hoist block, being part of the overhead run-



“ . . . for local van delivery, trays, crates, or open boxes are used.”

*Courtesy Margett's Preserves, Ltd.*

way. After being hoisted they travel power driven along the runway to the cooling tanks. Curves should not be less than 36 inches in radius, otherwise it is possible to use turntables.

If the jam pans are slightly elevated, it is also possible to discharge the jam into static tanks, whence the material flows through a pipe-line into the filling vessels.

### Handling of Containers

The conveying system for containers must be synchronised with the filling operation. Both second-hand and new jars should be washed prior to filling. For transporting the washed jars, overhead runways, chain or wire-belt conveyors can be used, the latter having several advantages. After leaving the machines the jars are still wet, and it is therefore necessary to provide facilities to dry the containers during their journey to the filling pan. It is advisable to lead the conveying belt through a drying tunnel through which hot dry air is circulated. The containers are placed upside down and the wide mesh of the wire belt gives access to an efficient air circulation. The same applies to a certain extent to chain conveyors, provided the jars are properly placed. The hot air for drying can be supplied by spiral tube or sirocco-fin heaters. If plain friction drive is unsuitable for the belt conveyance a sprocket chain can be incorporated. A further advantage is the fact that the belts can be easily shortened or lengthened by extraction or insertion of new links. The dried containers pass to a rubber band conveyor and from there an operator feeds the filling run or

places jars straight on the carriers of the filling machine. It is also possible to use overhead runways. In this case the jars, after leaving the washing machine, are packed into wire trays and placed on hooks suspended from the runway. These hooks carrying the trays travel along the mono-rail and take the jars to the filling machines.

### Equipment for Storing and Packing

The final stage of the production process is packing, storing, and despatch.

After being labelled and inspected the containers are ready to be packed. For local van delivery trays, crates, or open boxes with partitions to fit 1-lb. and 2-lb. containers are used. For rail or long-distance deliveries cardboard boxes, cases, etc., are preferred. The jars are packed as they move along from the finishing operation. The full trays can be placed on a belt conveyor which carries them to the despatch department. Different levels of the floor can be overcome by using declined belt conveyors or spiral chutes. If, instead of power-driven conveyors, gravity runways or roller conveyors are used, special attention should be paid to the gradient employed, which normally varies between 2 and 5 per cent.

For storing purposes jars are usually neither labelled nor capped. They are stored after being cooled and wiped of spillage, the handling operation being the same as for despatch.

*This concludes the series of articles on Jam Manufacture; the previous parts appeared in February, March, June, July, and October, 1945, and January, 1946.*

# The Quality of Green Peas Dried in the Frozen State

J. BARKER, R. GANE, AND L. W. MAPSON

The possibility of obtaining frozen peas which can be handled precisely as canned peas or perhaps even as packet peas is envisaged by the process of freeze-drying. Although the production cost of freeze-dried peas would undoubtedly be greater than that of frozen peas, they would possess the advantage that, after preparation, the product could be held at ordinary temperatures and could be marketed or exported without special precautions. The results presented in this article show that the culinary quality of peas preserved on laboratory scale by freeze-drying was comparable with that obtained by the ordinary freezing methods.

IT is generally recognised that green peas preserved by freezing are of high culinary quality. Preliminary trials, using the method of drying from the frozen state developed by Flosdorf and Mudd<sup>2,3</sup> and by Greaves and Adair,<sup>4</sup> gave dried peas of good culinary quality. The results obtained in preserving peas by freeze-drying and by the ordinary freezing process were accordingly compared using freeze-drying equipment developed by Gane. This equipment has been used to dry a wide range of foods, and papers covering this work, and describing the equipment used, will be published separately. Briefly, the material is first frozen by exposure to a high vacuum, the water-vapour being removed by a condenser held at  $-28^{\circ}$  to  $-40^{\circ}$  C. Controlled heating is then applied to create a temperature gradient from the material to be dried to the condenser, and the condenser temperature and vacuum maintained, so that the product is dried while still frozen.

## Experiments in 1939

The freeze-drying technique was compared with the ordinary freezing method of preservation using the following varieties of peas: Kelvedon Wonder, Laxton's Progress, Union Jack, Thomas Laxton, Onward, and Sutton's Superb.

The peas were scalded by immersion in 4.25 times their weight of boiling water for three minutes, followed by cooling in water for about one minute. A part of each sample was then freeze-dried and part frozen.

In freeze-drying the scalded and cooled peas were frozen at about  $-15^{\circ}$  C. in the freeze-drying equipment and then dried to a moisture content of between 2 and 5 per cent. The dried peas were packed in sealed tins and stored at  $15^{\circ}$  C. Certain samples were stored in nitrogen (oxygen content of pack below 1 per cent.) as well as in air; in others

the moisture content was adjusted to equilibrium with a range of relative humidities.

For freezing the scalded and cooled peas were packed in APN tins and frozen either by immersion in brine at  $-20^{\circ}$  C. or in a room at  $-20^{\circ}$  C. The first method gave a rate of freezing which was probably faster than is normally attained in quick freezing in a contact freezer; with the second method the rate of freezing was probably slower than for contact freezing. The frozen peas were stored at  $-20^{\circ}$  C.

Unlike the ordinary air-dried peas of commerce, the freeze-dried peas were only slightly shrunken. The structure was porous and the peas had a low density. The porous structure led to rapid penetration of water in reconstitution, so that only a short soaking period was required before cooking.

After storage for periods of six and fourteen months samples of both the freeze-dried peas stored in air and the frozen peas were compared for culinary quality. The freeze-dried peas were prepared for the tasting panel by soaking in cold water for fifteen minutes, followed by cooking for five to twenty minutes as required. The frozen peas were placed in boiling water and cooked for five to twenty minutes.

Both methods of preservation gave good results, the colour and flavour being well retained and the differences in quality between the two sets of samples small. The freeze-dried peas stored in nitrogen were of slightly better quality than the frozen peas.

The influence of the moisture content of the freeze-dried peas on the loss of culinary quality in storage is shown in Table 1.

Two tests were made of the influence of freezing (in the freeze-drying equipment) at  $-7.5^{\circ}$  C., followed by drying at this temperature, as compared with the usual technique, namely freezing at  $-15^{\circ}$  C. and drying at a low temperature,  $-15^{\circ}$

to  $-10^{\circ}$  C. In one test the culinary quality of the samples dried at the higher temperature was inferior to that at the lower temperature; in the other the two samples were indistinguishable.

TABLE 1.

CULINARY QUALITY AFTER FOURTEEN MONTHS' STORAGE IN SEALED TINS IN AIR AT  $15^{\circ}$  C. OF FREEZE-DRIED PEAS OF DIFFERENT MOISTURE CONTENTS.

Moisture Content. (Per Cent.)	Colour.	Flavour.
2.8	Good	Good
5.4	Good	Good to Fair
8.7	Poor	Poor

### Experiments in 1940

In further comparisons in 1940 the varieties of peas used were Pilot, Kelvedon Wonder, Lincoln, Alderman, Thomas Laxton, and Onward. Trials were made of one, two, and three minutes' total time of scalding in water, and in steam for three, six, and nine minutes in a domestic-type steam-scalding. Serial-scalding in water, the same liquid being used for successive batches of peas, was also tested.

For freeze-drying the scalded and cooled peas were usually frozen in jars at  $-20^{\circ}$  C., and held at this temperature for periods varying from a few days to a few weeks before transfer to the freeze-drying equipment. The temperatures used in freeze-drying were as follows: condenser  $-35^{\circ}$  C., peas  $-10^{\circ}$  C. The final moisture content was usually between 2.0 and 4.5 per cent.

Culinary tests showed that after eleven months' storage, differences between the samples preserved by freeze-drying and by freezing were small; the colour and flavour of the freeze-dried samples, stored in air, were, however, preferred in a higher proportion of the comparisons to those of the frozen samples. Packing the freeze-dried samples in nitrogen gave a slight improvement in colour and flavour over comparable samples stored in air. In general, the texture of the freeze-dried samples was considered inferior to that of the frozen peas.

Scalding in water for a total time of one minute did not prevent the development of an off-flavour during the storage of the freeze-dried product. A scalding time of two minutes in water was usually sufficient to avoid the off-flavour and gave a better flavour than scalding for three minutes. Scalding in steam for three minutes was preferable to six and nine minutes or to scalding in water for three minutes. Samples scalded for one minute in water showed more wrinkling than those given two or three minutes, and also required a longer cooking time than the latter. Contrary to expectation, serial scalding did not give any improvement in flavour; there was, in fact, no perceptible influence on quality even after seven successive scalds.

As in the 1939 trials, deterioration during storage

progressed more rapidly the higher the moisture content, as shown in Table 2.

TABLE 2.

CULINARY QUALITY AFTER ELEVEN MONTHS' STORAGE AT  $15^{\circ}$  C. OF FREEZE-DRIED PEAS OF DIFFERENT MOISTURE CONTENTS.

Moisture Content. (Per Cent.)	Atmosphere.	Colour.	Flavour.
3.9	Air	Good	Good
6.3	Air	Good to fair	Good
8.8	Air	Fair	Good
16.4	Air	Poor	Poor
6.1	Nitrogen	Good	Good
13.0	Nitrogen	Poor	Poor

In neither year's tests did any one variety appear to be markedly more suitable either for freezing or for freeze-drying than the others; in fact, the maturity of the peas when processed seemed to be of more importance than the variety. Samples which were tender and sweet initially were judged of higher quality after processing and storage than samples which were originally starchy in texture; the latter tended to be lacking in flavour after storage, to require a long cooking time after freeze-drying, and to be inferior in texture.

A number of samples of freeze-dried peas were re-examined after four and a half years' storage at  $15^{\circ}$  C. The culinary quality was still remarkably good; there appeared to have been little loss of colour in storage, but some loss of flavour or development of off-flavour. Nevertheless, the bulk of the samples was rated as acceptable and the best as highly acceptable.

### Changes in Content of Ascorbic Acid

Estimations of the losses of ascorbic acid during the preparation of freeze-dried and frozen peas are given in Table 3. The estimations were made by titration against 2:6-dichlorophenolindophenol, using the method described by Harris and Olliver.<sup>5</sup>

The loss of ascorbic acid in the operations of scalding, freezing, and freeze-drying varied from 32 to 64 per cent. in different samples. The few figures available for loss in scalding indicate that the entire loss occurred at this stage.\*

Figures for losses of ascorbic acid during the storage of freeze-dried and frozen peas are summarised in Table 4.

The losses of ascorbic acid from two samples of frozen peas in storage at  $-20^{\circ}$  C. were 13 and 18 per cent. in eleven months. For freeze-dried peas stored at the moisture contents usual in these experiments, namely 1.9 to 4.5 per cent., the losses were greater than for the frozen peas—viz. 20 to 55 per cent.; the losses from the freeze-dried peas

\* Later work has shown that the loss of ascorbic acid during scalding may be reduced by using the methods recommended by Allen, Barker and Mapson<sup>1</sup> for drying cabbage, namely using a small quantity of water in scalding, adopting serial scalding and cooling in air instead of in water.

TABLE 3.

ASCORBIC ACID CONTENT OF FRESH PEAS AND LOSSES OF ASCORBIC ACID, EXPRESSED AS A PERCENTAGE OF THE CONTENT OF FRESH PEAS, IN THE PREPARATION OF FREEZE-DRIED AND FROZEN PEAS.

Variety.	Fresh Peas. (Mgms. per 100 Grams.)	Scalding Method.	Loss in Scalding. (Per Cent.)	Loss in Scalding and Freezing. (Per Cent.)	Loss in Scalding, Freezing, and Drying. (Per Cent.)
Laxton's Progress, 1939 ...	29.5	3 min. water	—	51	64
Onward, 1939 ...	21.5	3 min. water	48	47	49
Sutton's Superb, 1939 ...	22.0	3 min. water	—	24	33
Lincoln, 1940 ...	35.0	2 min. water	53	48	46
		3 min. steam	51	—	44
Alderman, 1940 ...	30.0	3 min. water	—	42	49
		3 min. steam	—	31	32
Onward, 1940 ...	17.5	2 min. water	—	26	34

TABLE 4.

LOSSES OF ASCORBIC ACID FROM FREEZE-DRIED AND FROZEN PEAS DURING STORAGE FOR ELEVEN MONTHS, EXPRESSED AS A PERCENTAGE OF THE INITIAL CONTENT OF FROZEN OR DRIED MATERIAL.

Variety.	Storage Temperature.	Number of Samples.	Moisture Content. (Per Cent.)	Atmosphere.	Loss. (Per Cent.)
(a) Freeze-dried peas :					
Various ...	15° C.	21	1.9 to 4.5	Air	20 to 55 (Mean 32)
Various ...	15° C.	6	5.8 to 7.1	Air	40 to 68 (Mean 57)
Various ...	15° C.	11	1.4 to 3.7	Nitrogen	+ 14* to 23 (Mean 4)
Various ...	15° C.	3	5.6 to 6.1	Nitrogen	12 to 31 (Mean 23)
(b) Frozen peas :					
Sutton's Superb ...	-20° C.	1	—	Air	18
Laxton's Progress ...	-20° C.	1	—	Air	13

were, however, reduced to values of +14\* to 23 per cent. by storage in nitrogen.

Data in Tables 4 and 5 (the latter obtained by equilibrating comparable samples of peas to different moisture contents) illustrate the beneficial effect of decreasing the moisture content on the retention of ascorbic acid in storage.

TABLE 5.

LOSSES OF ASCORBIC ACID FROM FREEZE-DRIED PEAS AFTER ELEVEN MONTHS' STORAGE AT 15° C. AT DIFFERENT MOISTURE CONTENTS AND IN AIR AND NITROGEN, EXPRESSED AS PERCENTAGE OF INITIAL CONTENT OF THE DRIED PEAS.

Variety.	Moisture Content. (Per Cent.)	Atmosphere.	Loss of Ascorbic Acid. (Per Cent.)
Kelvedon Wonder, 1940	3.9	Air	43
	6.3	Air	55
	8.7	Air	87
Union Jack	6.1	Nitrogen	25
	2.8	Air	22
	5.4	Air	45
	8.7	Air	75
	4.2	Nitrogen	+ 12

## Discussion

The results presented above show that the culinary quality of peas preserved on a laboratory scale by the process of freeze-drying was com-

\* Apparent gain.

parable with that obtained by the ordinary freezing method. There was a slow deterioration in quality in freeze-dried peas during storage in air at 15° C., but even after a year the freeze-dried peas resembled closely those preserved by freezing and stored for the same period at -20° C.

Packing the freeze-dried peas in nitrogen retarded the deterioration in storage. Since, however, the quality was quite acceptable when the peas were stored in air for a year, it might be practicable for certain purposes to pack in a moisture-proof carton rather than in tins as in the present tests. In view of the porous structure of freeze-dried peas, it would be essential to make certain that they did not absorb taints when packed in a carton.

The loss of ascorbic acid appeared to be slightly greater during the preparation of freeze-dried peas than with frozen peas; the loss in storage with freeze-dried peas was also higher, unless the moisture content of the dried peas was below 2.5 per cent. or the product (moisture content below 4 per cent.) was stored in nitrogen.

The freeze-dried peas were readily prepared for consumption. It was only necessary to add the appropriate quantity of water, to allow to soak for ten to fifteen minutes, and to cook for five to fifteen minutes.

The marketing and overseas distribution of frozen peas has been severely restricted by the

need to maintain this product in the frozen state until within a few hours of consumption. The production cost of freeze-dried peas would undoubtedly be greater than that of frozen peas. Freeze-dried peas would, however, possess the advantage that, after preparation, the product could be held at ordinary temperatures and could be marketed or exported without special precautions; in fact, the freeze-dried peas could be handled precisely as canned peas or perhaps even as packet peas.

It is desired to acknowledge the loan by Messrs. J. and E. Hall, Ltd., Dartford, Kent, of a refrigerating plant used in this work.

The work described above was carried out as part of the programme of the Food Investigation Board of the Department of Scientific and Industrial Research.

*Low Temperature Research Station, Cambridge, and Dunn Nutritional Laboratory, Medical Research Council, Cambridge.*

*(Crown Copyright Reserved.)*

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- <sup>4</sup> R. I. N. Greaves and M. E. Adair, *J. Hygiene*, 1939, **39**, 413.
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## Applied Bacteriology

THE training and supply of bacteriologists have recently been considered by the Society for Applied Bacteriology in response to enquiries from different sources.

The Committee of the Society recognised at the outset that an adequate supply of trained bacteriologists was a matter of great importance not only to research institutes but to many industrial firms and research associations. The members were, however, unanimous in the view that training in applied bacteriology should not be considered separately from fundamental training in the subject. They therefore decided to approach the Committee of the Society for General Microbiology with a view to the joint consideration of the matter by the two Societies. That Committee indicated that the Society for General Microbiology would be willing to co-operate. On July 23, 1945, the Society for Applied Bacteriology appointed a sub-committee to consider the training and supply of bacteriologists, and the Society for General Microbiology appointed two representatives to serve on it.

At meetings of the Committee courses of training in bacteriology available at Universities and colleges were considered in some detail.

Another subject discussed was the demand for bacteriologists in the applied field.

There is a constant demand for trained bacteri-

ologists to fill posts in Government laboratories, in agricultural or veterinary research institutes, in agricultural advisory centres, in the brewing and fermentation industries, in commercial dairy laboratories, in firms dealing with various foodstuffs, in laboratories concerned with research in and control of water supplies and sewerage, and in a large variety of commercial laboratories such as those concerned with the production of therapeutics and antibiotics, with the manufacture of disinfectants, or with baking and confectionery.

The Committee concludes that there is an urgent need for improvement in the training and supply of applied bacteriologists. In order to effect this improvement the following recommendations are made:

1. That the recognition, in teaching institutions, of bacteriology as a separate biological science should be fortified by the establishment of Chairs of Bacteriology in the Pure Science Faculties of Universities.

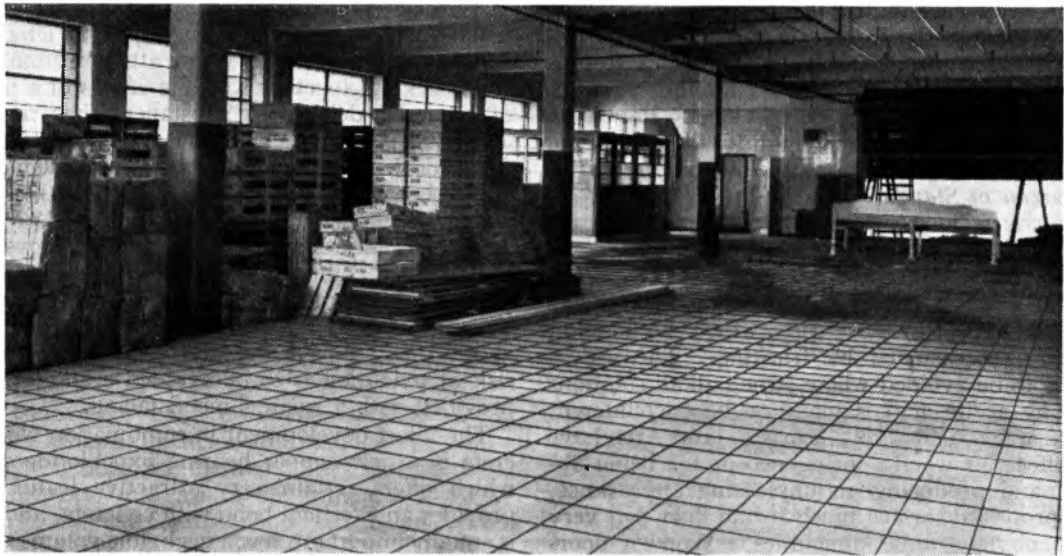
2. That research scholarships in bacteriology, of an annual value of not less than £300, should be established in Universities and research institutes, the holders of these scholarships thus forming a balancing reserve between supply of and demand for trained bacteriologists suited to fill posts of intermediate seniority.

3. That the status and prospects of bacteriologists who enter industry should be improved, with recognition by those responsible for the direction of research in industry that a properly trained bacteriologist is entitled to the same standing as the chemist and the physicist.

4. That a higher standard of training of technicians working in bacteriological laboratories is most desirable, and would be encouraged, in particular, by the formation of an Institute which could confer a suitable diploma on those reaching the necessary standard by study and examination.

## Production of Purer Vitamins

MORE potent vitamins A and D, a New Jersey, U.S.A., inventor claims, can be produced by the following process: a concentrate of vitamins A and D, extracted from fish or other marine oil, is dissolved in an aliphatic hydrocarbon solvent, and vitamin A is extracted therefrom with an aqueous solution of ethanol. The water content of the ethanol solution is adjusted so that vitamin A will dissolve, but little or no vitamin D will be taken up by the solution. To separate vitamin D from the solvent-extracted mass, it is esterified, and the esterified vitamin D, now soluble, is removed by extraction with an aqueous solution of ethanol. The water content of the ethanol solutions is adjusted so that the vitamin D esters will be dissolved to the exclusion of any hydrocarbons present. (*U.S.I. Chemical News*, September, 1945.)



Ferrogran flags in a green fruit department. *Courtesy Prodorite, Ltd.*

## Floors for Food Factories

Few features in the equipment of a modern food producing plant are of more consequence than a really satisfactory floor, the essential points of which are apt to be taken very much for granted until something in the nature of a breakdown occurs, when it will be realised that the requirements are by no means simple and that the provision of a material embodying all the desired qualities is a matter of some considerable difficulty. This article discusses the nature and properties of the principal materials used.

**T**HE first property to be sought for in the flooring material for a food factory is durability. The amount of heavy trucking and general wear and tear consequent upon the normal operation of a plant of this type has a devastating effect on inferior floor construction. The repercussions of flooring which fails to pass the test in this respect are innumerable; for example, a slowing down of transport resulting in increased wear and decreased efficiency of trucks brings with it an inevitable rise in production costs. To this may be added costs of repairs to floors with a consequent redirection and disorganisation of internal traffic.

Evenness and continuity are factors which are liable to be overlooked until such fragile goods as biscuits require to be trucked, or liquid-filled tanks have to be speedily transported across uneven or broken floors.

Resilience and anti-dusting properties may be considered as special aspects of durability. The use of a resilient material will be found to facilitate trucking, cut down breakages resulting from vibration, and at the same time contribute to a marked improvement in working conditions.

Of special importance in food plants is a flooring material which is resistant to the action of acids, fats, greases, and oils. In this connexion concrete calls for special treatment and surface finish. Other properties which, although considered by some as of only minor importance, contribute to the smooth running of the plant are noiselessness and a general appearance of cleanliness; for instance, a white or other light coloured floor if kept clean will considerably increase the value of the lighting system used and so cut down costs of illumination. A clean floor always has a good publicity value in a food plant.

It may be objected that the standard outlined above is too high and incapable of general application, but standards are always desirable if only as yardsticks to indicate what may be attained. In the present case materials are available which largely satisfy the foregoing requirements.

Before dealing with individual materials it may be mentioned that apparatus has been devised for testing the relative resistance to wear of different flooring materials. This is an adaptation of apparatus which has been in use for a considerable period

for the testing of materials for road construction and is known as the Dorry apparatus. Cylindrical cores of the material to be tested are cut from a sample and subjected to a given amount of abrasion by silica sand carried on cast steel. Papers on the application of this method to the testing of flooring materials have appeared in the *Journal of the Bureau of Standards* and in the *Proceedings of the American Society for Testing Materials*.

### Flooring Materials

Wood is still one of the most useful flooring materials, except in those cases where the heaviest of wear is occasioned by trucking. The use of wood is to be avoided where strong alkali solutions or strong acetic acid is likely to be encountered. Water, weak acids, oils, greases, and fats have little effect on wood flooring except for being absorbed and producing an unpleasing appearance. An appropriate surface finish to the floor can very largely obviate these difficulties. Wooden floors afford the advantage of being easily replaced in small sections where necessary. Portions which are called on to withstand especially hard wear can also be replaced by suitable iron or steel plates.

Concrete is not, of itself, to be recommended on account of its reaction with acids, vegetable oils, and fats, and also on account of its tendency to disintegrate with a resulting formation of dust. Concrete can, however, be employed to advantage in a number of cases as a basic material in combination with a protective covering which varies according to the conditions to which the floor is expected to be subjected. Thus iron tiles with a

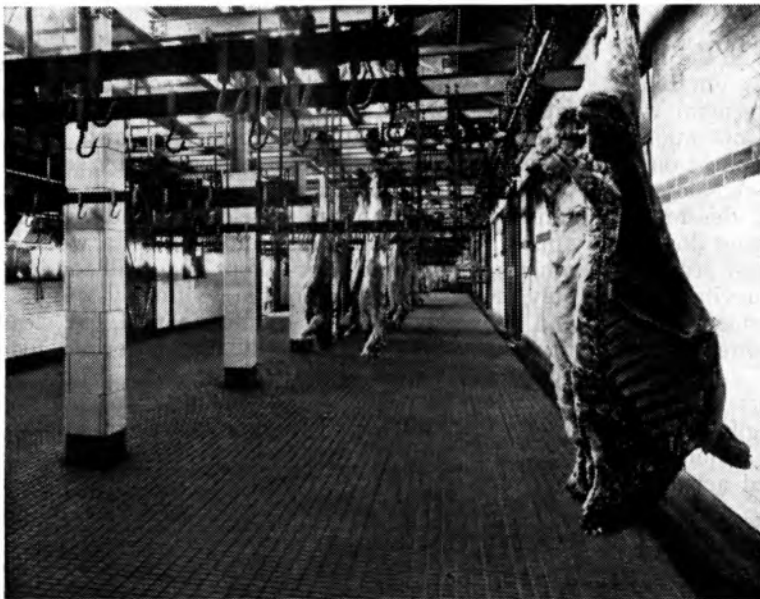
three-point support system, laid in concrete and bedded with mastic joints, have proved effective in a wide variety of plants where attrition from excessive trucking, together with the effects of a number of normally deleterious substances, has presented a difficult problem. The same type of surface carefully laid has been found to satisfy the demands of hard wear coupled with the necessity of mechanically level floors for the transit of fragile products. A further variation of this method employs steel-clad flags of compressed concrete with a steel face, which it is claimed is resistant to heavy abrasive wear, dustless, and practically impervious to oil and water. For those floors where the slightest risk of oxidation is to be avoided a special flag is provided with a rustless metal facing.

The latest development in combination with concrete is a new copper bearing oxychloride cement which offers certain very attractive features. It provides an excellent bond with concrete, and, what is equally important, has a negligible volume change on drying. While being resilient to the feet it does not dent and is non-dusting; it is also fully resistant to cooking fats and greases and is not affected by mineral oils. A further unusual quality is its ability to drain away static electricity at a very rapid rate. Known at present as Robertson-Hubbellite, a wide adoption is expected for this promising material.

A characteristic of concrete floors, known as dusting, can be remedied by the application of what are known as surface hardeners, of which the best known is a mixture of boiled linseed oil and petrol. Preliminary treatment consists of drying and brushing the floor with a stiff brush. Repeated applications are necessary until a glossy surface is obtained, but it should be noted that floors treated with surface hardeners tend to be slippery.

In those cases where a protective surface other than a hardening medium is superimposed on a concrete base, attention should be paid to volume shrinkage on drying, otherwise trouble will ensue. Reinforced concrete sub-floors or structural members call for special protection in those plants where processes are carried out involving the use of salt or where even a slightly salt water is used for cleaning purposes. Inexplicable cases of collapse have on investigation proved to be due to the rapid corrosion of steel reinforcement by salt solutions which have penetrated considerable distances.

Rubber has its uses, being resistant to water, alkali, and weak



Candy tiles bedded in Prodoraqua mortar on asphalt underlay.

Courtesy Prodorite, Ltd.

(Continued on page 352)

# High-Frequency Heating

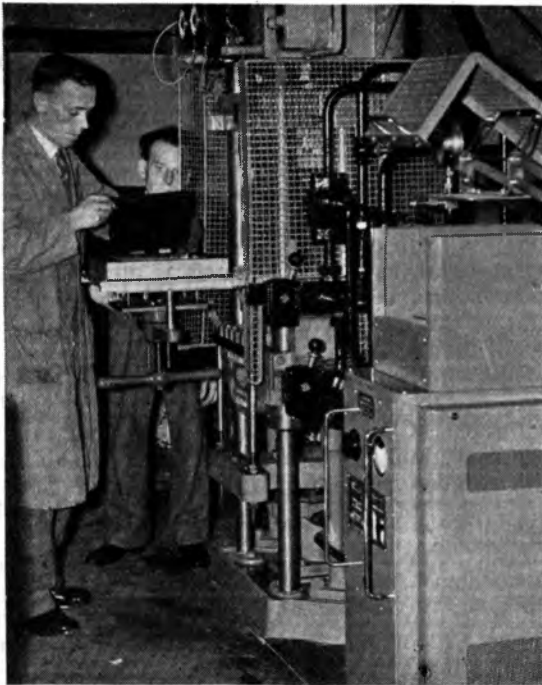
L. E. C. HUGHES, B.Sc., Ph.D., D.I.C., A.M.I.E.E.

*President, Institution of Electronics.*

The subject of high-frequency heating has a considerable history, going back to Tesla, whose technique has developed into the important branch of physiotherapy termed diathermy. The idea of generating heat at a particular point which is inaccessible, either by eddy-currents induced magnetically or by dielectric hysteresis arising from an alternating electrical field, has been applied in recent times to the drying of many types of materials, including food.

SINCE 1920 there have been considerable advances in using frequencies up to 10,000 c/s for eddy-current heating in melting alloys in metallurgical processes, and up to 10 million c/s for "gettering"—*i.e.* evaporating specified chemicals to clean up vacua in thermionic valves. Both eddy-currents and dielectric loss are used in medical diathermy, but it is comparatively recently that industrial applications of both eddy-current and dielectric heating have appeared on a large scale.

Briefly, the apparatus is very similar to that in a radio transmitter and has frequencies between 1 million and 200 million c/s, depending on the nature of the heating to be performed. Industrial high-frequency heating must compete with other



**Fig. 1.**—Heater for heating 2.25 lb. of powder in 1.5 minutes for regular production of mouldings.

*Courtesy Rediffusion, Ltd.*

August, 1946



**Fig. 2.**—Small high-frequency heater for general production with cage for pellet heating.

*Courtesy Rediffusion, Ltd.*

forms of heating and will win, providing that the overall costs are favourable or that the job to be performed can only be done by such methods.

The economics of any particular scheme must be very carefully considered, in addition to the fact that the whole balance between capital charges and running costs may be radically altered, solely because high-frequency heating may, in certain instances, markedly improve speed of production,

improve the uniformity of product, utilise factory space more effectively, or may be desirable for some other specific reason.

Fig. 1 shows a large equipment arranged alongside a press in a factory. Fig. 2 shows a small equipment which generates up to 350 watts output of high-frequency power and which is suitable for small-scale production and laboratory work. In both instances the cages mounted on top of the apparatus are for dielectric heating of samples of material or pellets previous to normal usage.

For eddy-current heating at high frequencies, a tuning-unit accepts power from the heater proper, and applies it through water-cooled coils to the object to be heated—for example, small pieces of steel, or gear-wheels which have to be surface-hardened to a specified depth.

### Outstanding Advantages

In the pre-heating of moulding powder pellets the special advantage of high-frequency heating is (1) that the heating of pellets can continue while the press is using those previously heated, (2) because of their previous heating, the time in the press is greatly reduced, in some cases to a third of that without pre-heating, (3) a greater consistency of product is obtained because of the uniformity of loss in the material under electrical stress, and (4) there is greater life for the service of the tool because of smoother flow of the hot powder during closing of the press.

### Value for Drying

Considerable interest has been aroused by belt-drying various materials, such as powders and various items which might possibly be treated as a continuous process, as the belt provides for carrying the material between electrodes, which are staggered above and below the belt so that a greater uniformity of field in the material is achieved.

The drying depends upon the dielectric loss in water for high frequencies as compared with the dielectric loss in most materials when dried. A comparatively low frequency of operation was accordingly selected, the speed of the belt being adjusted so that the requisite degree of drying was achieved, the moisture being removed by a fan, assisted sometimes by warm air, which has a lowered degree of humidity.

When the water in contact with the material has been evaporated, there is no further heating in the material, which therefore cannot be damaged in any way.

The efficiency of drying off water with these high-frequency electric fields is surprisingly high, over 50 per cent., and there are clearly many obvious applications for such an apparatus.

When the material is such that the temperature cannot be raised for the necessary application of

heat for drying, this can be achieved by applying high-frequency fields to the material under low pressure; for example, a concentrator for chemical solutions can be quite effective without the temperature rising more than a few degrees. Indeed, water can be "boiled" with ice floating in it. For this purpose the electrodes are arranged outside the glass vessel containing the fluid. Likewise, bottles containing powder can be dried at temperatures depending upon the vacuum which can be maintained.

An interesting application is the concentration of apple juice, in which a concentration of about seven times was achieved with about 200 watts of power, the temperature of the solution at no time exceeding 20° C.

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### Floors for Food Factories

*(Continued from page 350)*

acids and being unaffected by salts. The main trouble with rubber flooring is likely to arise from rising damp in the sub-surface which attacks the adhesive medium and causes rising. Some experts on rubber flooring refuse to lay this on concrete unless finished with a layer of not less than ½ in. genuine rock asphalt. The essential trouble appears to be capillary upward travel of moisture from ground level.

Marble and hard limestone are resistant to most chemicals with the exception of acids. Here the main obstacles are expense and a marked tendency to become slippery. Marble flooring in small patches may be rendered non-slippery by the sprinkling of silver sand followed by a vigorous rubbing with a small piece of the same marble.

Blue bricks or clay tiles afford the solution to a number of special flooring problems, being inactive to most of the chemicals normally encountered. Here the main problem consists of a suitable jointing material, as normal concrete is affected by so many substances. An aluminous cement mortar joint is the most generally used, being more resistant than ordinary cement mortar. The greatest trouble with clay tiles arises when excessive porosity gives rise to crystallisation on exposure to alkalis and salts. Clay tiles have a very small drying shrinkage, and when laid on a concrete sub-floor with a higher drying shrinkage are sometimes forced up in the form of an arch by the variation in shrinkage.

Asphalts of a synthetic nature with an inert filler are in wide use as a flooring surface, and are inactive to most of the substances found in food plants. Floors so constructed call for frequent washing if they are not to become sticky.

In conclusion it may be stated that with materials at present available and under experiment, flooring problems generally can be solved in a satisfactory manner when once the relevant data are provided.

# The Debt of Industry to Chemistry

THE third edition of a book\* based on the scheme of the first and second editions has been enlarged and rewritten by more than fifty contributors.

There is a lot that is interesting in this book, and nobody could fail to learn much from reading it, but it is very uneven. This is probably inevitable in view of the number of contributors, but even so it could have been more uniform than it is. The editing has been very poor. Some chapters are excellent—for example, that on food and nutrition by Bacharach—but others are fragmentary and written in a disjointed style. Even in the introduction an irritating vagueness prevails. For instance, it is stated that “the number of trained and competent chemists is now several times greater than in 1914.” Of course it is. Who doubts it? Why not have looked up the figures and have told us by how many times?

The book makes a bad start; the first two articles on “Fertilisers” and “Feeding stuffs” are scrappy. The recent suspicion that the continued and exclusive use of artificial fertilisers may be detrimental to nutrition and health is not even mentioned.

The editing has not been sufficiently careful to prevent some overlapping. On p. 17 we learn the minimum vitamin contents necessary in U.S.A. flour, and we are reminded of them again in detail on p. 23 by a different contributor. The argument on p. 25, “It is curious what an amount of controversy the heating of milk has aroused, when one reflects that we bake our bread, boil our potatoes and eggs, and roast our beef and mutton,” is well in line with the indifferent spelling a little later on the same page.

The paper on paints and varnishes by Keenan, which comprises the major part of Chapter XI, is excellent. It is interesting and informative and could well be used as a reference work by the chemist who is not a specialist in this field. On the other hand, the paper on synthetic resins and plastics, which comprises the remainder of Chapter XI, is of a very much lower standard, and has the appearance of having been printed without being corrected.

In the introduction it is stated that the book is intended for the general reader as well as for chemical students. Here again the work is variable. In some papers, such as that on synthetic resins and plastics, a considerable knowledge of chemistry is assumed on the part of the reader, but somewhere else in the book the smell of sulphuretted hydrogen is described. The book is not wholly suitable for the general reader or for the chemist. Neverthe-

\* *What Industry Owes to Chemical Science*. Issued with the authority of the Council of the Royal Institute of Chemistry. 3rd edition. Cambridge, 1946. Pp. viii + 372. 18s.

less there can be no doubt that either would find much of interest in it. It is probable that the chemist would be the main reader, and that the assumption throughout of a working knowledge of chemistry would have enhanced its value. It is probable, however, that it might prove of interest to specialists and other scientists: mathematicians, physicists, biologists, and the like would be sufficiently familiar with the chemical background of the subject-matter to make the book well worth reading.

The irregularity of the quality of the book, and particularly the scamping that sometimes seems so evident, do little credit to the Royal Institute of Chemistry. It is to be hoped that fairly soon there will be a fourth edition, and that the opportunity will then be taken to pull things together a little. (Abstract of a review by R. W. Moncrieff, B.Sc., A.R.I.C., *Manufacturing Chemist*, June, 1946.)

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## Wrapping Materials in the British Zone

FOOD and agricultural organisations are making heavy and important demands on the paper supply in the British zone in Germany. In April their allotment was 1,600 tons for wrapping butter, paper for margarine, artificial honey, and even sausage skins.

Every sausage skin in the British zone today is made from paper. Originally the skin for this prominent item of the German larder was made from one of three materials—paper which had been specially treated with glycerine, Cellophane, or a material made from artificial silk. These articles are no longer available, and the paper now used for sausage skins has to be treated with glycerine substitute in order not to harm the food. This substitute has a most unpleasant smell, but as garlic is an aggressive feature of most German sausages, those who eat them are not heard to complain excessively.

Jute is in short supply, so paper string has to be used. For the same reason binder twine—essential for harvest needs—is made from paper, and sacks required for agriculture have to be made of paper, too, a demand which will use something like 800 tons a month.

Every German farmer will benefit from the 1,450 tons of paper a month earmarked for chemical industries. A large proportion of this will go to the making of bags without which fertilisers cannot easily be sent to the farmer.

# Gas in the Food Industry

## INCREASED USE IN BAKERY AND OTHER TRADES

The food trades are using more gas than ever, and many of the larger gas undertakings are employing specially trained service representatives to promote the efficient and economical use of fuel in these and kindred businesses (as distinct from the heavy industries on the one hand and the domestic market on the other), and are offering trade tariffs to meet the needs of the larger consumers. While the makers of the ovens, ranges, and other appliances usually arrange efficient maintenance, the gas industry is undertaking burner maintenance and steam boiler cleaning to ensure that full benefit is derived from the fuel supplied.

Mr. W. Johnson and Mr. W. F. Moore (of the Wandsworth and District Gas Company) told the Institution of Gas Engineers in a joint paper at its annual meeting on June 5 that in Wandsworth alone the gas consumption for bread baking was now 90,850 therms per annum. Abolition of night baking, higher labour costs, and general labour shortage have all contributed to the necessity for using a fuel that needs no storage and no stoking, and yet affords exact temperature control and flexibility. While much activity in oven building over the next ten years is anticipated, a great deal of work is being done on the conversion of existing ovens. In most cases the substitution of gas for other fuels is a simple matter. Before the bread economy campaign the average bread consumption per head of

the population was about half-pound per day, and it is estimated that if all bread-baking ovens were gas fired everybody could be supplied with bread at the cost of 1.68 therm of gas per head per annum.

Features of recent advances in gas-fired catering equipment are low initial cost, speed in heating up, flexibility of heat control, pan stability, ease of cleaning, temperature control, low maintenance and running expenses. On a thermal basis solid fuel is cheaper and electricity is dearer than gas, but the thermal basis takes no account of the saving in labour and other advantages. Construction of catering appliances requires further attention by designers and manufacturers in some directions. For example, standardisation of heights and depths, with unit construction, would enable appliances to be added when justified by increased demands.

In catering for the commercial market the gas industry has given special attention to the question of tariffs, for it is well known that the larger the consumption the lower is the actual cost per therm of supplying the gas. The main factors affecting the price charged to the consumer are variations in demand, time of maximum daily demand, and average consumption, but these factors, while comparable within each trade, vary considerably between the different trades. It has therefore been found useful to devise trade or process tariffs, as against a universal tariff.

### More Salvaged Cartons Needed

Salvaged cartons have been used to pack one year's margarine rations for nearly 12,000,000 people. This figure was given merely as a part of Unilever's container recovery service by its director, Mr. F. W. Sadgrove, at a press conference at Unilever House in June. He said the company's vans collected 850,000 cartons a week, many of them for firms outside the Unilever group on a non-profit basis. They had

collected as many as 1,000,000 cartons in a week.

Introducing Mr. Sadgrove, Mr. J. C. Daws, O.B.E., director of salvage and recovery at the Board of Trade, said that without the use of a high percentage of waste paper this country could not hold its own with foreign competitors in the production of fibre-board, nor, with the needs of the paper industry and housing, produce sufficient cartons for food from imported timber.

### Restaurant for Air Travellers

A restaurant for air travellers, providing an eighteen and a half hours' daily service, has now been opened by B.O.A.C. in their air bookings and passenger reception centre at Airways Terminal, Buckingham Palace Road, London, S.W.

The restaurant seats eighty people, and has been designed to meet the needs of the rapidly expanding air-travelling public.

Meals will be served from 6 a.m. to 12.30 a.m. the following morning.

The restaurant is solely for the use of passengers and their friends on B.O.A.C. and foreign air-lines using Airways Terminal, and is not open to the general public.

### Occupational Dermatitis

Occupational dermatitis is caused by organic or inorganic irritants entering the pores of the skin and interfering with its natural function. Occasional contact of the skin with an irritant will, in most cases, not result in harmful consequences as protection is afforded by the natural secretions in the horn cells. There are cases where this natural protection has been sufficient to protect the worker over a period of years, even when in constant daily contact with skin irritants. This has given rise to a belief that such people are immune, which experience has shown is far removed from the truth, as cases of dermatitis frequently occur with workers who have been in contact with the same irritant for many years without any previous trouble.

Avoidance of contact between the skin and the irritants can be achieved by applying a protective layer of "barrier cream" to the skin before it is brought into contact with the irritants.

In the case of foodstuffs, where sugar, flour, fruit juices, tea, etc., are the irritants, it is of paramount importance that the nature of the "barrier" is such that it will not contaminate the food either by taste or smell.

The manufacturers of "Rozalex" have produced a barrier cream especially for this purpose (Rozalex No. 2), which has been used successfully for many years by foodstuff manufacturers throughout the country.

## The Story of Tea

A chart showing that the inhabitants of the United Kingdom drink approximately thirty-five times the amount of tea drunk in such a prolific source of supply as India is one of many interesting exhibits featured at the Tea Centre, the new Empire Tea Bureau at 22, Regent Street, London, which was opened on July 17.

The Tea Centre is designed to give information and help to those concerned with the tea industry and to tell the story to the public of the most common English beverage. This theme is well reflected in an impressive mural illustrating tea as the universal beverage.

The processing, from picking to packing, is demonstrated by numerous photographs and exhibits, including dioramas and small-scale models of machinery. A fine model of an early nineteenth-century East Indiaman being unloaded stands in the foyer on top of a chest containing nine tea drawers, each labelled to indicate the varying strength of the contents, from the weakest, Young Hyson, to Bohea.

The teapot is well represented among other exhibits. An exquisitely designed antique Chinese pot contrasts strikingly with the modern utility type, the design of which was taken from the Wedgwood shape. The Duke of Wellington has lent a Wedgwood teapot to commemorate the victories of his famous ancestor. There are also two which belonged to Nelson and Hardy, and a silver teapot with an ivory handle presented by Queen Victoria to Disraeli.

Displays tracing the history of tea drinking in England include the first written reference to tea, in a letter by an Englishman in 1615 to an official in Japan asking him to send "two pots of the best 'chaw.'"

Of topical interest is the "Tea in the Home" section, showing the latest equipment for everyday use not only for the home but for industrial canteens and social functions.

Post-war designs include transparent teapots and an ingenious contrivance for providing an early morning cup of tea controlled by an alarm clock.

August, 1946



### Automatic Strapping Machine

The strapping and securing of a large and continuous volume of packages is effected by a fully automatic wiring machine supplied by The Package Sealing Co., Ltd. The packages fed to the machine by conveyor are handled by one operator, who, by pressing a foot pedal, enables the strap to be applied to the package, tensioned, and sealed.

The machine has several interesting features. Its capacity reaches to 6,000 packages per

average working day, and packages which vary in size and shape can be strapped consecutively without any adjustment to the machine. The tension on the wire is predetermined and is applied uniformly to all packages, which may consist of wooden boxes, cartons, crates, bales, etc.

The illustration shows a box in the process of being secured with two straps, and indicates how the operator is able to handle a continuous flow of packages of different sizes and shapes.

### Control of Containers and Packaging

The Board of Trade points out that certain of the restrictions placed on the packaging of goods for the home market during the war are still in force, since economy in labour and materials is still necessary.

The Control of Containers and Packaging (No. 4) (General) Order, 1945, and the British Standards Schedules referred to therein, prescribe standard sizes of new and second-hand metal containers (other than collapsible tubes), and of new glass bottles, which must be used for the packaging of goods for sale in the United Kingdom.

On December 10, 1945, packaging restrictions were abolished for metal collapsible tubes, paper, cotton, jute and stoneware containers, and used glass bottles.

### Cheese Factory for Kirkwall

The Kirkwall cheese factory of the North of Scotland Milk Marketing Board was recently inaugurated by Sir Basil Neven-Spence, M.P. The factory produce will be marketed as "Orkney Cheddar." Mr. Alexander Calder, Orkney, County Convener, welcomed members of the Board, and the chairman of the Board, Mr. W. D. Munro, Overskibo, Dornoch, paid tribute to the help given by Mr. Gordon Watt, of the North of Scotland College of Agriculture. Sir Basil expressed gratification at the accomplishment of the cheese factory project, with which he had been associated for a considerable time. Provost Peter C. Flett, Kirkwall, conveyed to the Board and to the milk producers of Orkney the appreciation of the county town at the addition of a new industry.

## Food Group

In the list of officers of the Food Group given in the July issue of **FOOD MANUFACTURE** the following names were omitted:

### Microbiological Panel:

Chairman, Prof. H. D. Kay.  
Secretary, Mr. H. J. Bunker.

### Nutrition Panel:

Chairman, Mr. A. L. Bacharach.  
Secretary, Mr. L. H. G. Barton

These gentlemen are *ex officio* members of the Group Committee

## "Furnace Practice" Film

A new educational film dealing with furnace practice has been prepared for the Ministry of Fuel and Power, and copies, in both 35 mm. and 16 mm., are available on loan from the Central Film Library and on application to Regional Fuel Officers of the Ministry. It is accompanied by a running commentary.

The film is designed to appeal to executives, operatives, and students interested in the operation of furnaces in the ferrous and non-ferrous metal industries and to promote the efficient use of all kinds of fuel. Correct methods of using coal, pulverised coal, coke, gas, oil, and electricity in various types of furnace are illustrated, the film, which is essentially practical, having been taken under ordinary working conditions.

Animated diagrams are used to illustrate the operation of recuperators and regenerators in a sequence devoted to the recovery of waste heat, and in a sequence on the importance of furnace insulation, while the film ends with some examples of waste and a reminder that savings of coke, gas, and electricity lead to savings in coal from which they are derived.

The film is in three reels and occupies twenty-seven minutes. It was made for the Ministry by the C.W.S. Film Unit with Mr. George Wynn as director and Mr. Sydney N. Duguid as commentator.

## Catgut Manufacture

Additional factory space for the manufacture of catgut has been acquired by Paines and Byrne, Ltd., at Bridgend, Glam.

## Brochures and Booklets

Descriptions of test paper books, absorption pipettes, blow-pipes, glassblowers' tools, stills, and electrolytic analysis apparatus are contained in "Service to Science," No. 12, the latest publication issued by Townson and Mercer, Ltd.

In an effort to increase membership, the Ice Cream Alliance has issued a leaflet "Ice Cream Trader, Look to Yourself!" stressing the need for unity among small ice cream traders.

The well-produced house journal of Elliott Brothers (London), Ltd., gives news about the social and other activities of the firm, and items of sports news are enlivened with some amusing cartoons.

The Institute of Incorporated Practitioners in Advertising have recently published a booklet on the standardisation of type area sizes for trade and technical journals, which includes a report of the Technical and Trade Papers Committee of the Institute for the use of the trade and technical press.

This report was compiled after investigation by the Committee of 638 British trade and technical journals covering a wide range of interests.

The Soil Association began at a meeting of the founders in June, 1945. They had one thought in common—the health of the soil. It is only recently that it has been possible to frame a constitution embodying the different views of the founders. A booklet entitled "Mother Earth" has been issued describing the constitution and aims of the Association. It also contains some interesting articles, correspondence, and book reviews, among them being articles by Lady Eve Balfour (President of the Association), Mr. Friend Sykes, Dr. G. E. Breen, and others.

The eighteenth annual report of the Trustees of the Agricultural Research Institute of Northern Ireland for 1944-1945 has recently been received, in which references to research and experimental

work at the poultry research station are given. Investigations are reported by the different divisions of the Ministry of Agriculture covering experimental work on diseases in flax, summer mastitis in cows, the efficacy of dried potato meal in chick rearing rations, and pig experiments.

In commemoration of a quarter of a century of working, United Cattle Products have issued a handsome, illustrated brochure describing the birth, growth, and present activities of a remarkable food business.

The main lines of development followed by the U.C.P. were, first, the establishment and modernisation of a chain of food factories with comparable transport at strategic centres in the Midlands and North; secondly, the organisation of about 146 restaurants, cafes, and shops to serve the busy areas of the North and, at the same time, to supply wholesale and retail traders with their requirements; thirdly, the founding and operation of thirty-seven modern restaurants where meals could be obtained at moderate prices.

One of the founders of U.C.P., Alderman J. S. Hill, J.P., was awarded the honour of election as Lord Mayor of Manchester in 1942-1943.

In 1920 the U.C.P. was formed by the amalgamation of a number of separate companies. When depression hung like a cloud over Lancashire in 1921 and trade was bad the directors faced the alternatives of reducing the number of factories operating or making a courageous bid for a greater volume of business in order to keep them going, and in 1922 initiated an advertising campaign. This policy of appropriate publicity was confirmed by results, and in the year that followed was traced a steady growth of turnover and in the value of U.C.P. properties.

The brochure contains a description of the principal U.C.P. works, on which an article was published in the July, 1939, issue of **FOOD MANUFACTURE**.

An interesting account of the company's operations during the war, and of the present and future policy of the firm, concludes a beautifully produced souvenir.

## Imperial Institute

The four Exhibition Galleries of the Imperial Institute are a magnificent centre in which to study facts about the Overseas Empire. Some of these facts are shown in pictures, some as connected stories, some in the form of dioramas and lighted transparencies, some as models and specimens—not just dull exhibits in jars, but exhibits which come alive and link up with other exhibits to tell the story of the Overseas Empire.

The Galleries are open to the public every weekday from 10 a.m. to 4.30 p.m.; in the Cinema, Empire films may be seen from 3.30 to 4.15 p.m.

The Library of the Imperial Institute comprises many publications of the Overseas Empire.

In addition, a "General Empire" section of the Library is devoted to recent books dealing with the British Empire as a whole, and this should prove of much use to those who wish to study the history, geography, and political and economic progress of the Empire.

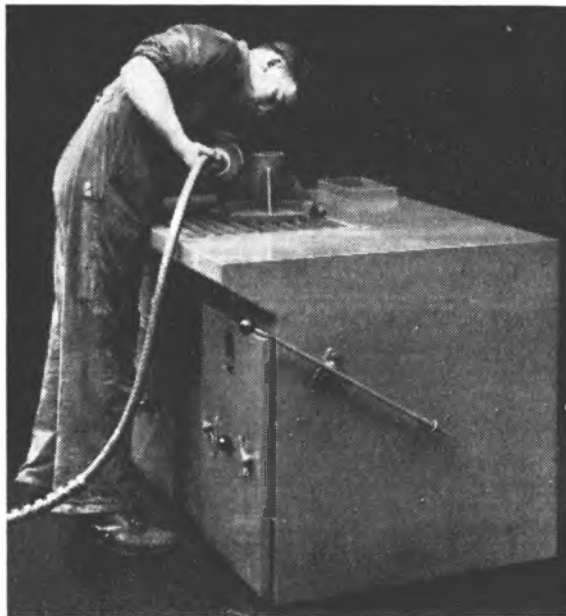
## Society of Chemical Industry

After an announcement by the President at the sixty-fifth annual meeting of the Society held on July 12 that His Majesty the King had been graciously pleased to honour the Society with his patronage this year, Dr. E. K. Rideal, F.R.S., moved that Dr. L. H. Lampitt be elected President for the ensuing year. The proposal was unanimously adopted without the formality of being

## Dust Collecting Equipment

An extension of the Drymat range to include a self-contained bench unit is the dust collecting equipment, comprising a substantially reinforced steel plate bench with an 18-in. square rubberised tubular grid in the front centre, which is under suction. This enables the harmful light floating particles of dust to be drawn downwards and away from the operator in addition to catering for heavy particles let through the openings between the tubes forming the grid. The same basic features of primary dust separation, final dust filtration through a filter of special design, and the application of filter shaking gear are followed as in previous models

This bench unit is finding wide application for flexible shaft grinding, and is also applicable for handling powders of all types when filling boxes, bags, cartons, etc., and surplus dust or powder is easily reclaimed from the dust drawer and can be re-used.



seconded. The following is a list of further elections:

*Vice-Presidents*, Dr. R. T. Colgate, Dr. L. A. Jordan, Mr. C. S. Kimball, and Dr. E. K. Rideal.

*Council*, Dr. H. Baines, Mr. C. H. Diamond, Mr. F. P. Dunn, and Mr. W. C. Petts.

*Hon. Treasurer*, Mr. Julian Leonard.

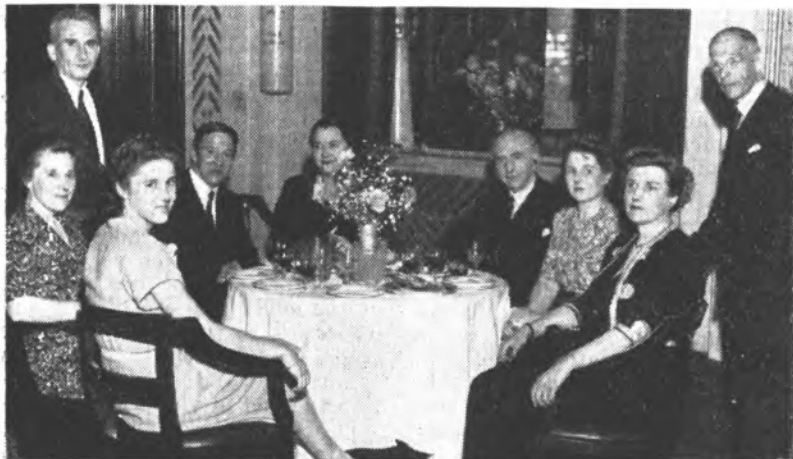
The hon. secretaries and the foreign secretary were unanimously re-elected.

Proposing "The Society" at the luncheon which followed, the Rt. Hon. Sir John Anderson, F.R.S., M.P., stressed the importance of the achievements of the chemical industry during the war just ended. The President, responding, assured Sir John that the Society would give all possible assistance to the Government during the period of reconstruction.

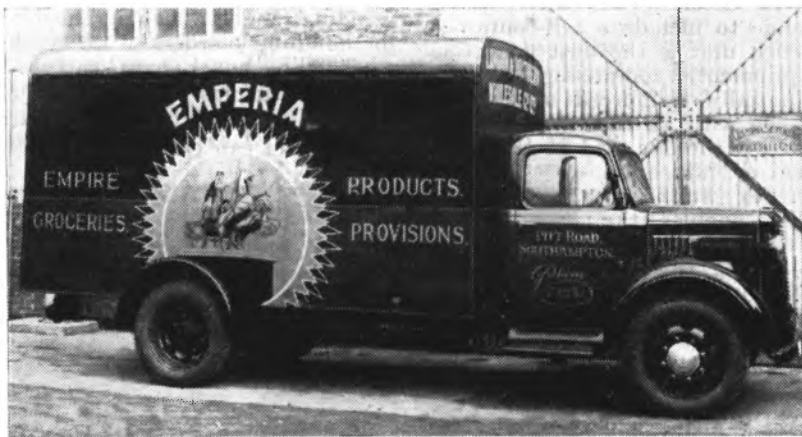
At the afternoon meeting the President presented the Messel Medal to Dr. Wallace P. Cohoe.

Some 230 members and guests attended the "At Home" given by the London Section on the evening of the day preceding the annual general meeting.

The photo shows a group taken at the "At Home." Sitting, left to right: Mrs. Krase, Miss Krase, Prof. Rideal, Lady Leverhulme, Lord Leverhulme, Mrs. Vernon, Mrs. Rideal. Standing, left to right: Mr. Krase and Dr. Vernon.



## New Commer Box Van



The new Commer "Superpoise" 2-3-ton chassis fitted with a metal panelled van body with an approximate capacity of 550 cu. ft. A feature of this van is adequate protection of the load by an all-metal hull with matchboard lining over the lower half of the interior.

## Vacuum Filling Machine

The main object of a recently developed vacuum-operated machine manufactured by Ekem Engineers is to provide a simple, hygienic apparatus capable of dealing rapidly and efficiently with liquid to be filled in bottles, tins, and other containers.

Interesting features are the interchangeable filling nozzles; they are made in three sizes, and by changing them one machine will fill all usual-sized bottles, tins, or containers. A fourth type of nozzle, specially designed, can be used for filling sprinkler-type bottles and can be fitted to the machine in the same manner.

Operation of the machine is simple: the bottle is placed under the filling nozzle, when the vacuum formed draws in the liquid within seconds and fills the bottle to the required level. The bottle is then removed, and as any drips are sucked up automatically the outside remains clean.

The machine fills rapidly without waste, as any surplus liquid drawn up after filling the bottle to the required level returns to the bulk container via the glass cylinder and liquid return tube.

The vacuum is provided by an Edwards Direct Coupled Rotary Vacuum Pump and motor with automatic lubrication, suitable for any standard electricity supply.

## Lectures on Industrial Microbiology

Evening classes in this subject will again be held at Chelsea Polytechnic from the end of September.

Applications should be made before September 1 to the Head of the Department of Biology, from whom details of the courses may be obtained.

## A Contribution to Packaging Progress

A typical example of high-speed printing machines is the Chambon rotary multi-colour, which made its first appearance about fifty years ago, being designed to meet the demand for a machine which could automatically and continuously produce the same printed job—label, wrapper, or carton—without variation in any detail. A host of improvements, in keeping with expanding trade requirements, followed in rapid succession. Today this machine can be adapted for letterpress, dry offset, aniline, photogravure, or intaglio printing, or a combination of all these methods. Based upon the multiple unit principle, it is possible in the same operation to use it for a variety or combination of the processes involved in producing package printing, thus reducing production costs and ensuring a high standard of work.

## Standards for Ice Cream Mixes

A brief outline of the history of the trade and of its present-day difficulties was recently given by Mr. L. J. Hynes, Hon. Secretary of the Midland Division, Ice Cream Alliance, in a talk to the Sanitary Inspectors' Association (Midland Centre).

Mr. Hynes, discussing "the cold mix," said that he knew that it found little favour with Public Health officials, but pointed out that there was no such thing as "the cold mix," but that there were *cold mixes* products of two very different types. One, he said, would be better described as a cold mix ice cream powder. This was ordinarily intended for use with cold milk, etc., and was generally used at the rate of 8 oz. per gallon of milk. It was not, therefore, a complete mix but a supplement to the main ingredients of a mix, adding solids, stabilising material, and flavouring.

The second type of cold mix preparation provided everything that ice cream required except water, and it was possible to heat treat 73 per cent. of this product in the manufacturing process, whereby the bacterial content of the finished product was low.

Discussing the matter of standards, Mr. Hynes gave it as his personal opinion that a bacteriological standard would not be introduced by the Government, but that instead there would probably be some form of compulsory heat treatment for ice cream mixes. Regarding chemical standards, he stressed the many difficulties of framing an equitable standard, and strongly advised the Association not to think too much in terms of butterfat in any "standard" recommendations they might be inclined to make. The Government's food experts, he said, were more interested in the milk-solids-not-fat content of ice cream.

Appealing to sanitary inspectors to be patient in their dealings with the small traders, whose difficulties were often very great, Mr. Hynes said he was gratified at the evident desire of so many inspectors to co-operate with the trade, and he felt that by such sympathetic and mutual co-operation the end in view—the production of clean ice cream—would be attained.

## OBITUARY

### Mr. G. W. Sherwood

Mr. G. W. Sherwood, who represented the firm of White, Tomkins, and Courage, Ltd., in the North of England for twenty-two years, passed away on June 17. A large number of appreciative letters has been received by the firm, testifying to Mr. Sherwood's great courtesy and kindly manner, which endeared him to all with whom he came in contact.

### Changes of Address

The address of the Livestock Export Group is now c/o The Farmers' Club, 3, Whitehall Court, London, S.W.1. Tel.: Whitehall 3160; extension 107.

\*

Mono Pumps, Ltd., have now moved to their own premises, Mono House, 67, Clerkenwell Road, London, E.C.1.

\*

The Institute of Export have moved from Royal Empire Society Building, W.C.2, to Holland House, 140, Cromwell Road, London, S.W.7. Tel.: Western 3124-8.

\*

The address of the Organising Committee of the National Coal Board is now Lansdowne House, Berkeley Square, London, W.1. Tel.: Grosvenor 4070. This will for a time be the address of the National Coal Board when it is constituted.

### Baking Research

Several large public companies are among the foundation members of a recently formed body to organise research into the baking industry. The new association has been registered as a company limited by guarantee, without shares capital, under the name of British Baking Industries' Research Association.

John Barker and Co., general stores, Fullers, confectioners, Gray Dunn and Co., biscuit manufacturers, Huntley and Palmers, a subsidiary of Associated Biscuit Manufacturers, and J. Lyons and Co., refreshment contractors, are included in the subscribers to the memorandum of association.

### Lord Woolton

Lord Woolton has accepted the Presidency of the Caterers' Association of Great Britain.

### Representative's Return

J. H. Fenner and Co., Ltd., announce the return of Mr. G. Toll as their West Lancashire and Wirral Peninsula representative, after five years' service in the Forces.

### Mr. C. B. Morton

Mr. C. B. Morton, D.S.O., D.F.C., has rejoined George Scott and Son (London), Ltd., on his release from the R.A.F., and is now taking over the duties of representative for the northern part of England previously exercised by the late Mr. Alexander Campbell.

### All-India Manufacturers

In meeting the delegation from the All-India Manufacturers' Association, members of the Council of the British Engineers' Association were able to afford preliminary guidance as to the changes in this country to be found in the engineering manufacturers' sphere. Reference was made to the progress already evidenced in reconversion and to the recognition of the importance of collaboration between industrialists of India and Great Britain.

### J. Lyons and Co., Ltd.

At the fifty-second ordinary general meeting of J. Lyons and Co., Ltd., Mr. Harry Salmon, J.P., one of the directors, presiding, the chairman in his statement circulated with the report and accounts said that the balance from trading account, after providing for contingencies, was £970,130—some £63,000 more than in the previous year—and that it was proposed to restore the dividend on the equity capital to the rate paid for many years before the war. There then remained a balance of £62,118, which, added to the amount brought forward from previous years, made a total of £551,461 to be carried forward to the next account.

### Beecham Food Products

Beecham Food Products has been formed as a private company with a share capital of £1,000,000, divided into 500,000 4 per cent. Preference shares of £1 each and 500,000 Ordinary shares of £1 each, to take over the shares of C. and E. Morton and of the other food companies recently acquired by Beecham Group. The latter will hold the whole of the share capital of Beecham Food Products.

### The Journeymen Bakers' and Confectioners' Pension Society

In presenting the seventieth annual report of the Committee of the Journeymen Bakers' and Confectioners' Pension Society, the secretary, on behalf of the Committee, mentions the efforts of Mr. R. H. Rose in gathering in the sum of £2,443 11s. 5d. for the use of the Society. The report also contains a full statement of Receipts and Expenditure for 1945, together with the list of donations subscribed in response to Mr. Rose's appeal and the accumulated amounts of subscriptions from life subscribers.

### Associated Biscuit Manufacturers

At the twenty-fifth annual general meeting of the Associated Biscuit Manufacturers, Ltd., Sir C. Eric Palmer, D.L., J.P., chairman, said that the revenue of the company for the twelve months ended March 31, 1946, was £80,044, as compared with £65,065 in the previous year. With the carry-forward from the 1945 accounts, namely £38,514, there was a total of £118,558, and after deducting the Preference dividend to date, namely £19,500, and a payment on January 1, 1946, of an interim dividend of 2 per cent., less tax, on the Ordinary shares, £14,001, there was a balance available for dividend of £85,057.

The directors recommended that a final dividend of 4 per cent., less tax, making in all 6 per cent., less tax, for the year, with a bonus of 2 per cent., less tax, should be paid on the Ordinary shares of the company, absorbing £46,205, and that the sum of £38,852 be carried forward to next account.

## OVERSEAS NEWS

### Canadian Cheese for Britain

First shipments of Canadian cheese this season, consisting of 20,457 cases, have been despatched for delivery to London and Manchester. Canada is to send Britain 125,000,000 lb. of cheese this season.

### Synthetic Honey

A synthetic honey product called Vitamin Honey, and made mainly of fruit juice and sugar, has made its appearance in the Soviet Union.

It looks exactly like the real product, but tastes faintly of blackcurrant and raspberry, the juice of which is largely used in its manufacture.—*Reuter*.

### The Food of the Future

The United States is already quick-freezing about 400 different food products, and frozen food packers have predicted that within the next ten years half the £5,000,000,000 food bought may be frozen.

Foods which will be frozen are soup, coffee, biscuits, sandwiches, and complete pre-cooked meals, baby foods, and animal foods.

Fluid milk freezing is now in prospect, and is expected to make a considerable saving in distribution costs.

There are already 6,000 locker plants where housewives can rent locker space in cold storage warehouses, and these plants offer further outlets for frozen food sales.—*Reuter*.

### Frozen Food Container

Made of paperboard, with a snap-in metal closure, Vapocan, a liquid tight container for frozen foods, has been announced by the Container Corporation of America. No heat sealing or folding is necessary to close the container, and when filled it is sealed simply by pressing in the metal closure until it snaps tight.

The container can be opened and reclosed several times without damaging the protective seal.

### New High-Yielding Sunflower Strain

A virile new strain of sunflower seed, producing a hybrid which testing at experimental farms and stations throughout Western Canada has demonstrated is capable of producing 49 per cent. more oil than the Mennonite variety now in general use, has recently been announced by the Canadian Department of Agriculture. The new strain has been named "Advance," and is said to have a seed yield between 25 and 30 per cent. higher than the Mennonite type.

Extremely successful results were obtained with the new seed at the Morden Experimental Farm in Manitoba in 1945.

### American Food Container

The mass production of a new type of container for the frozen food industry commenced in June in the U.S., when the American Can Co., the designers, started operations at their Jersey City and Seattle plants.

The new product is a semi-rigid rectangular container with sides of paraffin-impregnated fibre and ends of light-weight metal. These containers, which more than thirty frozen food packers in the U.S. will be using shortly, according to the manufacturers, are designed to be closed on automatic machines at a rate up to 200 a minute. Output of containers this year is estimated at 50 million.

A third plant at Sacramento, California, is scheduled to commence production of the new containers this month.—*Reuter's Trade Service*.

### Brazilian Burity Oil

A highly nourishing oil containing 5,000 international units of vitamin A per cubic centimetre is being developed from palm trees in the north and north-east of Brazil. Brazilian chemists state that the kernel has a very high calcium content and a percentage of vitamin C higher than that of citrus fruits.

Burity oil, which has a pleasant taste, can be used in the sardine canning industry and also as a colouring matter for margarine.—*Reuter*.

### Kenya Wants Consumer Goods

Kenya Colony announces that the Government's Imports Control is willing to consider issuing permits to import cheap consumer goods, suitable for the Kenya market, from any source.

The absence of such goods has long been recognised as an important economic factor, at a time when there is a good deal of money available for purchases of the kind, but the inability of the principal manufacturing countries to supply has hitherto made it impossible to remedy the lack of goods in shops dealing with cheap consumer trade.

### Electronic Coffee Roaster

One of the first post-war adaptations of electronics to commercial use was introduced in New York recently by the Silex Co., Hartford.

It is an electronic coffee roaster, and will be installed in retail stores, hotels, and restaurants on a per pound royalty basis. Royalty has been provisionally fixed at 5 cents per pound.

In actual demonstration the machine showed nine minutes between green beans and the finished brew.

The company say that the machine will be used by firms promoting and merchandising their own brands and blends.

### New Zealand Linseed Industry

Initial production of linseed oil at the new factory at the Dunedin waterfront is expected to be at the rate of 1,000,000 gallons per annum. The factory was ready to go into full production on June 1, and provision has been made to raise production to 1,500,000 gallons a year at a later date.

The machinery used by the plant is of the continuous expeller type and has been supplied by a Hull firm.

Meanwhile, 12,000 acres of linseed were sown for the 1945-1946 season, and arrangements are being made with the farmers' organisations to plant 30,000 acres of seed for the 1946-1947 season, which, given favourable conditions, should meet the requirements of the industry.—*Reuter's Trade Service*.

# Canadian Egg Production

1,665 REGISTERED EGG-GRADING STATIONS

War-time demands in the United Kingdom, both for shell and dried eggs, furnished the stimulus which has made egg production in Canada one of very considerable importance to those engaged in its rapid development since 1942. The Ottawa Government's announcement that enormous supplies will continue to be shipped to this country between now and the end of 1946, and as long after as the British market can absorb such great supplies, has therefore been welcomed by consumers.

The effect of this expanding business of egg production is shown by the existence of 1,665

registered egg-grading stations in the Dominion on May 1.

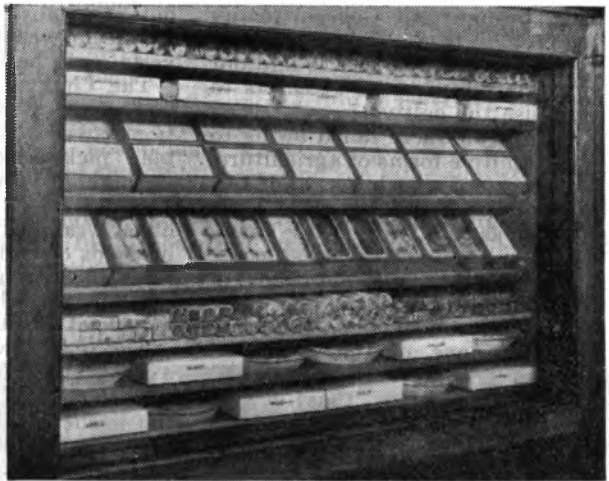
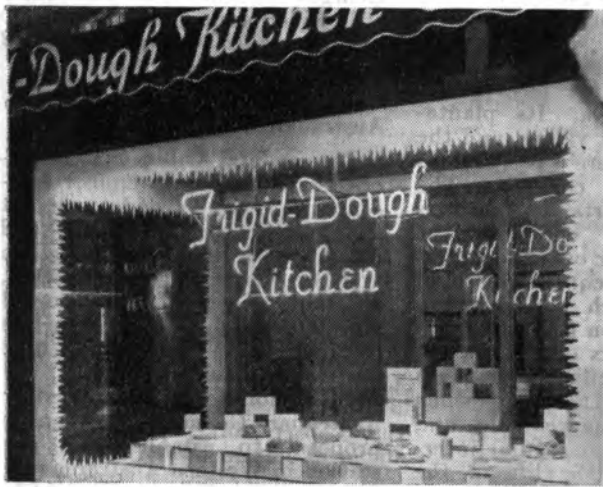
All eggs are dealt with on the basis of grade according to Canadian Standard Egg Grades, which is carried out only in the registered stations, with the single exception that a producer may grade his own eggs for sale. It is the business of the Poultry Products Inspection Service to check and supervise grading, including returns to producers, to check the grading of eggs as sold in wholesale and retail channels, and to inspect and issue grade certificates for eggs moving in car-lots between provinces or to export markets.



Another phase of Canadian egg production. Eggs en route to the drying plant.

## Quick Frozen Foods

A FRESH DEVELOPMENT IN THE U.S.A.



A revolutionary process known as "Frigid-Dough" has been put on the market after seven years of research and experimentation by the American Frigid-Dough Corporation, who have perfected formulae and methods for freezing yeast dough and other raw bakery goods, later to be de-frosted and baked or even baked in their frozen form. Anyone can

buy today in Chicago frozen dough in packages for everything from bread to fruit cake, baking-powder biscuits, pies, and even cream puff shells.

Some of these new-fangled bakery goods can be put right into the oven while still frozen, others should be thawed out first; bread and dinner rolls should be de-frosted and then left to rise a

bit. "Frigid-Dough" is a registered trade name of a line of frozen, ready-to-bake bakery products.

In this process freezer units take the place of ovens, and all products stay fresh for more than sixty days in their frozen form.

The inventor of the new method is Mr. E. Gordon Male, a Chicago baker.



Gathering tea leaves on the Chakva State Farm.

## Tea Planting in Soviet Georgia

In the western regions of Georgia lie vast valleys covered with tea plantations. Tea was first brought to Georgia many years ago from China, and the first small plantation was laid out near Batumi; but all attempts to organise the cultivation of tea on a large scale there failed owing to the primitive forms of agriculture, the lack of machines and fertilisers. In all, the total area under tea cultivation for many years did not exceed 2,250 acres.

Today the tea plantations of the Georgian collective and State farms spread over 125,000 acres, becoming one of the most important crops of Soviet Georgia, and thousands of tons of tea leaves are picked annually from the plantations, yielding millions of pounds of high grade tea.

This development is due to the help the Soviet Government has given to the collective and State farms cultivating this crop. They are supplied with all the necessary machinery, mineral fertilisers, and seeds of new varieties of tea that have a high crop yield. Vast areas of land that were formerly covered with impassable thickets have now been transformed into model tea plantations.

The up-to-date methods of cul-

tivation have resulted in extremely good yields, the average crop of tea leaves picked working out at almost one ton per acre. In recent years even better harvests have been gathered.

The Chakva State farm is the largest in Georgia. Its plantations cover a vast valley, and the tea picked there is famous throughout the country. The agricultural experts and workers have radically changed the methods of laying out the plantations, achieving equal growth of the bushes, which has a highly beneficial effect on the crop.

The tea growers of Chakva use a good many fertilisers. Mineral fertilisers are first spread when the bushes are one year old, and this is continued at regular intervals throughout the life of the plantation. Potash fertilisers are placed on plantations of bushes grown both for harvesting and for seed purposes from the age of five years. Secondary fertilisation of the bushes with mineral and organic fertilisers, which is of great importance for the harvest, is carried out during the period of the greatest vegetation of the tea bushes and again after the leaves have been picked, i.e. the periods when the plants are weakest and need the greatest

amount of feeding. Fertilising is done by hand and by machinery.

Another innovation of the Chakva tea growers is to pick the leaves at more frequent intervals than was formerly practised. This forces the plant to throw out new shoots, and leads to an increase in the crop yield.

Georgia not only grows tea, but now has thirty-two modern tea-dressing factories producing high grade teas, such as the "Bouquet of Georgia." In addition to the ordinary gunpowder teas, special sorts of green and brick teas are produced, which are in great demand in the Central Asian republics and in the north.

The technological process of tea manufacture has also been organised along new lines in Georgia, and is carried out by machinery from beginning to end. A type of roller, invented several years ago, has made it possible to accelerate considerably the production of gunpowder teas. Tea that is picked in the morning can be used in the evening of the same day.

In the fourth Five-Year Plan, the cultivation of tea in Soviet Georgia will be developed on a still wider scale, and some 6,000 new tea plantations are to be laid out in this period.

### Australian Whaling Activities

The Federal Cabinet Sub-Committee on whaling in Canberra recently decided to endeavour, at the Washington Conference and directly with the United Kingdom and the Norwegian Governments, to obtain practical recognition of Australian rights to take part in whaling with a workable share of any quota fixed internationally.

Discussions with the Western Australian Government about a proposal to establish a shore station in Western Australia were in progress and a report would be issued on any developments.

The sub-committee decided against placing an order for a factory ship at the present time, but to reconsider the matter within six months. The Minister of Post-war Reconstruction, Mr. Dodman, stated that a factory ship could not be delivered before 1948, and then would have to be constructed on a cost-plus basis, which would increase the cost considerably.—*Reuter's Trade Service.*

## New American Bag Sealer

A new bag sealer has been developed by Pack-Rite Machines, Milwaukee, Wis. It is a machine to heat-seal unusually large bags and sheets made of a wide variety of materials. A feature is a foot pedal switch allowing the operator full freedom of his hands. Thermostatic controls regulate the heat from room temperature to 550° F. The unit can be mounted horizontally or vertically.

## Meals-by-Mail Service

Gifts for the Year, Inc., a company organised in New York to send out monthly gift surprise boxes of food, is starting a meals-by-mail service.

Its most recent mail-snacks were a breakfast package consisting of a box of Cookie Heaven, Salad Spectacular (containing ingredients for salads), and Sunday Night Supper (Boston baked beans, brown bread, and pickle relish).

The food packages are wrapped in Cellophane to ensure freshness, and each box is wrapped with gay paper and coloured ribbons.

An extension of the enterprise is an eight-months series of young people's packages for boys and girls at school.

## To Help Oil Shortage

A plan for large-scale production of groundnuts in Tanganyika to relieve the world shortage of vegetable and whale oil, estimated at 1,000,000 tons, is being considered by a three-man team of British experts recently arrived in Tanganyika. They are Mr. A. J. Wakefield, former Director of Agriculture in the West Indies, Mr. John Rosa, of the Economic Division of the Colonial Office, and Mr. D. L. Martin, Manager of United African Company Plantations. Mr. Wakefield said a tentative scheme had been prepared, but the team had come to Tanganyika with an open mind, as their job was to find a place which could produce oils "as soon as possible" to relieve the world shortage of oils.

Planting of 500,000 acres in Tanganyika to produce 100,000 tons of groundnuts a year is visualised under the scheme.

August, 1946

# The Manufacture of Synthetic Butter

## LARGE SCALE PRODUCTION PROJECTED IN GERMANY

The manufacture of synthetic butter is described in a report by Mr. M. E. Spaght issued by the Combined Intelligence Objectives Sub-Committee.\*

During the war years an output of 11,000 lb. per day of synthetic butter was being made by the Deutsche Fettsaure Werke in Witten (Ruhr), Germany. The plant was originally used for the production of fatty acids for soap manufacture, and as such produced a variety of fatty acids from which the possibility of manufacturing edible esters received attention a short time before the war.

The process involved the oxidation of wax paraffins to produce fatty acids, and the esterification of these acids with glycerin to yield edible esters.

To produce fatty acids, paraffin wax from low-pressure Fischer-Tropsch synthesis was oxidised by air blowing, the catalyst being potassium permanganate. The oxidised mixture was first washed with water to remove the catalyst, and then treated with sodium carbonate to convert the fatty acids to sodium soaps.

After this sequence of operations the oxidised mixture consisted of two phases, one being unreacted paraffins and the other a soap layer containing some water and some dissolved paraffins. After treatment of the soap phase most of the dissolved paraf-

fin separated out and was withdrawn. The free acids were liberated with sulphuric acid and the fatty acid phase separated and washed.

The fatty acid mixture was then fractionated and four fractions were produced: C<sub>4</sub> to C<sub>10</sub>, C<sub>10</sub> to C<sub>11</sub>, C<sub>11</sub> to C<sub>12</sub>, and higher boiling. The third overhead fraction, C<sub>11</sub> and C<sub>12</sub>, was the one used in the ester synthesis. These fatty acids were chosen because they yielded esters with the desired softening and melting points. The triglycerides of these acids have physical properties very similar to those of the natural esters in butter.

The esterification of glycerin and the C<sub>11</sub> and C<sub>12</sub> fatty acids was effected by catalysis with finely divided tin or zinc. The aqueous soap phase was then separated and the ester phase dehydrated under vacuum. The dried ester was next treated with bleaching earth and activated carbon and filtered. After further purification treatment, the product was emulsified with 20 per cent. water, salt and carotene added, and the mass extruded and moulded in marketable shapes.

The product had all the outward appearances of natural butter, and the same consistency and softening characteristics. Its taste was pleasant but slightly waxy.

The report gives full details of the operations sketched above.

\* Published by H.M. Stationery Office. 6d. net.



Synthetic butter leaving the final machine in a factory at Witten.

## Casein in New Zealand

Casein is to be manufactured at five of the cheese factories of the New Zealand Co-operative Dairy Co. during the new season.

Until 1939 New Zealand had a substantial casein industry. In 1939, however, production was abandoned owing to lack of foreign demand.—*Reuter's Trade Service.*

## Cold Sterilisation Process

Especially developed for cold sterilisation of surgical instruments for the armed forces during the war, a new powerful odourless steriliser and disinfectant wetting agent has been adapted in America and is now available commercially there under the trade name of "Timsol." It has a wide field of usefulness, particularly in dairies and in bottling

and food processing plants. The active ingredients are identical with those used with success by the medical profession now identified as "quaternary ammonium compounds."

In the recommended solution (1 oz. of "Timsol" to 5 gal. of water), it is claimed that the customary disadvantages of chlorine, such as skin irritation and odour, are absent, thus removing the disagreeable factors which cause operators to avoid sterilising precautions required by public health regulations. The solution is non-toxic and non-irritating to human beings.

Laboratory and field tests have demonstrated that its efficiency extends beyond all American public health requirements. In these tests the action of "Timsol" has been proved to be bactericidal rather than bacteriostatic. The phenol coefficient is 22½ to 25 against *E. Typhi* and 45 to 50 against *Staph. Aureus*.

## Chilean Whale Oil Production

The single Chilean whaling company anticipates a substantial increase over the present output of oil next year, with an exportable surplus available.

Production of whale oil in Chile during 1945 totalled 3,809 short tons, of which 77 per cent. was sperm oil and 23 per cent. baleen whale oil; the whole being consumed domestically.

## New Butter-Making Machine

A continuous butter-making machine, produced by the *Roth Moolkeri Maschinenfabrik*, dairy equipment manufacturers in Stuttgart, is believed to be more efficient than churns at present in use.

The machine, said to produce 1,500 lb. butter an hour, has been taken to Washington for tests and will not be publicly exhibited until they have been completed.—*Reuter's Trade Service.*

# Ministry Announcements

## Appointments and Resignations

Mr. St. J. P. W. Mallalieu, M.P., has been appointed Parliamentary Private Secretary to the Minister of Food.

\*

Mr. C. A. Loombe, M.C., Director of Cereal Products, has resigned as from June 30, 1946.

Mr. T. F. Skilton (Assistant Secretary) will succeed Mr. Loombe as Director of Cereal Products.

\*

Mr. R. E. Hewat has been appointed to succeed Mr. W. Bankes Amery as representative of the Ministry of Food in Australia. Mr. Hewat, who has been in the United Kingdom for consultations, arrived in Australia at the end of July.

## Walnuts in Brine

The Board of Trade have granted an Open General Licence for walnuts in brine consigned from the Netherlands and Italy. As a consequence, separate licences to import them will not be required.

## Imports of Norwegian Prawns

From now until the end of September limited supplies of Norwegian prawns—up to 25 tons per week—will be available for import by importers who previously engaged in this trade. Those importers who wish to obtain supplies should communicate with their former suppliers.

## Distribution and Admixture of Imported Flour

By a Direction issued under the Flour Order, the arrangements for the separate distribution of imported white flour were withdrawn from June 16 until further notice. The distribution to trade users of imported flour in the proportion of one to nine of National Flour, "M" flour, or Canadian Springs flour will therefore be discontinued.

As from the same date, the rate of admixture of imported flour in Scotland will be increased to 15 per cent. The rate of admixture in Northern Ireland will remain at 15 per cent., and in England and Wales at 10 per cent.

## Price of Raw Cocoa

The Raw Cocoa (Control and Maximum Prices) Order, 1946, which came into operation on July 15, 1946, revokes the previous Order fixing the maximum price for sales of Western African raw cocoa in the United Kingdom at 45s. per cwt. and provides for a new maximum price of 51s. per cwt. The increase has been made necessary because the Ministry of Food has had to pay more to the West African Produce Control Board.

## Offal from Eire

The list of offals that may be consigned from Eire to the Wholesale Meat Supply Associations has been extended, and the complete list of such offals is as follows:

Livers	} All categories	
Hearts		
Tongues		
Skirts		
Kidneys		
Melts and Lights		
Heads		
Brains		
Sweetbreads		Ox, calves, and sheep
Tails		Ox
Cheeks	Ox	

# Information and Advice

## Rope Spore Content of Flour

B.1104. *Particulars of a method for determining the rope spore content of flour.* (Yorks.)

Amos and Kent-Jones published a method for the determination of the rope spore content of flour in 1931. The full reference is "The Rope Spore Content of Flour and its Significance," Amos and Kent-Jones, *The Analyst*, 1931.

In 1943, however, Barton-Wright pointed out that the series of dilutions used in this method did not permit the results to be computed statistically and therefore modified the design of the experiment while retaining the actual general technique. The Barton-Wright modification of the original method is now used, and it is suggested that this should be the method to be recommended. The full reference is "The Estimation of Rope Spores in Wheat Flour and Other Products," Barton-Wright, *Journal of the Society of Chemical Industry*, 1943.

## Vanillic Acid

B.1145. *Information on the use of esters of vanillic acid for food preservation.* (Suffolk.)

Articles have been published recently in the U.S.A. on the use of esters of vanillic acid for food preservation.

Data regarding the inhibition of bacteria and moulds are given and experiments in fish preservation are described. In one experiment fish was stored in saturated brine and brine +0.1 per cent. ethyl vanillate. In others different treatments were tried and successful results were obtained. The use of these esters would of course be prohibited by the Food Regulations in this country.

They appear, however, not to be very toxic, and it is not impossible that if preservatives of this type were found to be useful a case could be made out for permitting their use in prescribed amounts for particular foods.

## Information Supplied

B.971. *Manufacturers of pork pie equipment.* (Somerset.)

B.980. *Suppliers of granulated cork.* (Canada.)

B.981. *Names and addresses of rennet suppliers.* (Lancs.)

B.985. *Information on the smoking of lake fish.* (East Africa.)

B.991. *Methods of handling rennet.* (London.)

B.992. *Manufacturers of pea vining machinery.* (South Africa.)

B.994. *Manufacturers of lactose.* (Scotland.)

B.1009. *Particulars of the manufacture of fat extenders as used in the baking trade.* (Scotland.)

B.1026. *Suppliers of electric lifts.* (Glos.)

B.1027. *The use of saccharin as a sweetening agent in making jelly for trifles.* (Durham.)

B.1028. *Names and addresses of manufacturers of packing machinery.* (Suffolk.)

B.1034. *Suppliers of machinery for the rapid filling of chocolate moulds.* (Leics.)

B.1038. *Manufacturers of (1) mixing machines; (2) coffee mills and spice mills; (3) slicing machines; and (4) scales.* (Norway.)

B.1044. *Recipes for ice cream manufacture.* (Singapore.)

B.1051. *Names and addresses of makers of sugar piping tubes.* (Worcs.)

B.1055. *Suppliers of round-headed brush for brushing piccalilli liquor through hair sieve.* (Lincs.)

B.1061. *Manufacturers of machinery for peeling onions and topping and tailing gooseberries.* (Derby.)

B.1063. *Names and addresses of suppliers of fruit juices and gelatine capsules.* (Eire.)

B.1064. *Suppliers of aluminium foils suitable for wrapping chocolate, ice cream, and cheese.* (Denmark.)

B.1065. *Manufacturers of machinery for peeling onions.* (Lancs.)

B.1066. *Names and addresses of firms manufacturing bread-slicing machinery.* (Eire.)

B.1068. *Information regarding the manufacture of potato crisps.* (Lancs.)

B.1077. *Suppliers of vacuum sealing metal top fruit jars.* (Warwicks.)

B.1078. *Information regarding the canning of dried peas.* (Malta.)

B.1079. *Names and addresses of suppliers of malt extract and meat extract.* (Sussex.)

B.1081. *Manufacturers of machinery for dressing and peeling pickling onions and also information regarding sauce and chutney.* (Northumberland.)

B.1082. *Suppliers of metal clips for attaching labels to packages.* (Lancs.)

B.1094. *Firms supplying machinery for boiled sweet manufacture.* (Hereford.)

B.1095. *Names and addresses of manufacturers of a dispersion mill.* (London.)

B.1096. *Information regarding bananas as a remedial food.* (Essex.)

B.1097. *Suppliers of canned meat and fish pastes, vegetables, jams, pickles, sauces, and industrial chemicals.* (Egypt.)

B.1099. *Manufacturers of deglutinised malt flour.* (Scotland.)

B.1100. *Names and addresses of manufacturers of chain link conveyors for 1 lb. and 2 lb. jam jars.* (N. Ireland.)

B.1103. *Names and addresses of firms manufacturing ice cream powder.* (Glam.)

B.1105. *Suppliers of automatic powder filling machines.* (Hereford.)

B.1106. *Literature dealing with the manufacture of custard and pudding powders.* (Eire.)

# Recent Patents

*These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents," and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).*

## Abstracts of Recent Specifications

### Method of Treating Cheese

This invention relates to a method of treating cheese, with particular reference to dehydration of cheese containing natural or added fats. Its objects are to provide a method of dehydrating cheese containing fats without loss of the fats or the volatile flavours contained in the cheese, and such other objects as will be apparent from the following description and claims.

In a method of treating cheese to improve the texture, it has been proposed to grind the cheese, and, with or without a preliminary heating below melting point, to force the cheese through a disintegrating machine, and subsequently to pasteurise the cheese without causing the fat to separate. Such pasteurising step however is not intended to nor capable of dehydrating the cheese by removing a major portion of its moisture content, with formation of a cheese product that can be subsequently reconstituted by the addition of water.

The invention consists in the process of dehydrating cheese, containing fat, comprising the steps of comminuting the cheese; subjecting the comminuted particles to preliminary drying by a current of air without preliminary heat treatment and at a temperature below the melting point of the contained fat for a sufficient time to form dried and hardened surfaces on the particles and thereby entrap the fat contained therein; and then subjecting the partially dried particles to further drying at a higher temperature for sufficient time to remove most of the remaining moisture without forming a pasty mass.

During the preliminary drying, only an insignificant trace of fat exudes from the cheese particles, and the result is a formation of dried, hardened layers of cheese on the surfaces of the particles which entrap the fats and volatile flavours within the particles. Substantially the only fat present on the surfaces is that which is normally contained in the surfaces themselves. The cheese can thereafter be agitated without the particles adhering and can be further dehydrated without loss of fat from the particles at any temperature incidental to efficient drying.

In effecting the preliminary drying,

it is desirable that the surfaces be at least partially dried before the particles have an opportunity to contact each other and coalesce. This may be accomplished by allowing the comminuted particles to fall through a current of drying air directly as they leave the grater.

575,932. *George Patrick Sanders.*

## Specifications Published

*Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.*

576,771. BRITISH SUGAR CORPORATION, LTD., and WITHAM, W. A.: Apparatus for washing sugar and like materials.

576,811. LOW, A. M.: Apparatus for the preparation of coffee or the like.

576,895. MAGUIRE INDUSTRIES, INC.: Method of processing fruits and vegetables.

576,896. WINGFOOT CORPORATION: Curing of cheddar cheese.

576,912. BARKER, J., and BURTON, W. G.: Processing of potatoes.

576,915. CHIVERS AND SONS, LTD., HORLICKS, LTD., RENDLE, T., SEVERN, G. W. C., and WICKENS, R. L.: Preparation in powdered form of milk-containing mashed potatoes.

576,923. STILES, LE C.: Machines for the manufacture of confectioners' goods.

576,924. BRITISH THOMSON-HOUSTON Co., LTD.: Ice-making apparatus.

576,939. AKTIESELSKABET DANSK GAERINGS-INDUSTRI.: Cheese and process of producing the same.

576,940. AKTIESELSKABET DANSK GAERINGS-INDUSTRI.: Preserves and process of producing the same.

576,945. MARSHALL, JUN., J. W.: Bags or cartons of paper or the like material.

576,953. KRONBERG, N. M.: Production of durable yeast preparations.

576,978. STILES, LE C.: Apparatus for icing bakery goods.

577,087. KINGSTON, J. A., and GASCOIGNES (READING), LTD.: Milk cooling devices.

577,156. ALFA-LAVAL Co., LTD., and CLARK, T. L.: Sterilising chests.

577,172. SLADE, R. E., BRANSCOMBE, D. J., GAUNT, W. E., and IMPERIAL CHEMICAL INDUSTRIES, LTD.: Production of food from plant leaves.

## Trade Marks

*The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).*

**FORBIDDEN.**—636,343. Biscuits (other than biscuits for animals), cereals prepared for food for human use, cakes, chutney, spices, condiments, confectionery (not medicated), cooking essences (other than essential oils), flavourings (other than essential oils), honey, ketchup, pastry, and tarts. **John Carr Doughty, Ltd.**, 31, Cank Street, Leicester; Manufacturers.

**VILLITEE.**—636,728. Tea, coffee, and cocoa. **Sidney John Claridge**, trading as **The Ceylon Pekoe Tea Co.**, 26, Hinkler Road, Thornhill, Southampton; Manufacturer and Merchant.

**KREMOLAT.**—636,759. Edible oils and edible fats. **Stephen G. Stevens, Ltd.**, 2, Shirley Street, Hove, 3, Sussex; Manufacturers and Merchants.

**THANKSGIVING.**—636,933. Chocolate and confectionery (not medicated). **Chantry Trading Supplies, Ltd.**, Penton Hook, Staines, Middlesex; Merchants.

## New Companies

**Morfoods, Limited.** (402253.) 65, Quayside, Newcastle-on-Tyne. To carry on bus. of selling agents for packers of and dealers in foodstuffs, etc. Nom. cap.: £2,000 in £1 shares. Dirs.: B. R. Wilkinson, 11, Kingsway Avenue, Gosforth, Newcastle-on-Tyne (permt.).

**Wylie's (Surbiton), Limited.** (402800.) To carry on bus. of biscuit manufacturers, bakers, etc. Nom. cap.: £5,000 in £1 shares. Dirs.: not named. Subs.: A. G. Elliot, 58, Fasset Road, Kingston, Surrey; A. Kerr, 19, Liverpool Road, Kingston, Surrey.

**Conroy, Limited.** (403257.) 37, Eastcheap, E.C.3. To carry on bus. of importers and exporters of Empire and Continental comestibles, etc. Nom. cap.: £500 in £1 shares. Permt. dirs.: M. Sofer, 14, Ridgmount Gardens, W.C.1; R. A. Paul, 5, London Road, Luton (chairman).

**Goliwog Ices, Limited.** (403348.) 16, Percy Street, W.1. Nom. cap.: £5,000 in 4,000 ord. and 1,000 management shares of £1 each. Dirs.: V. Archari, 35, Tottenham Court Road, W.C.2; E. Ezzie, 50, Pepys Road, Raynes Park, S.W.

*Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C. 2.*