

FOOD MANUFACTURE

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THE minds of men are sorely perplexed by the potentialities of the era ushered in by this year of grace. Strikes, bitter political wrangles, international suspicion, the menace of the atomic bomb (the most intricate and exacting problem ever posed to any government) are but a few of the manifestations of the canker poisoning this war-shocked world.

The vision of a Utopia lies deeply in the hearts of every one of us, but for the moment we must cherish a less ecstatic one of more clothing, more houses, more goods, more rations, more winter warmth—things that not so long ago were taken as matters of course.

Many of the best minds of the world are occupied in seeking a panacea for world sickness, and let us hope that Solomon was right when he said: "In the multitude of counsellors there is safety."

With speed, determination, and faith may the New Year see the beginning of a sane synthesis with, for mankind, peace and abundance on the horizon.

Standardisation of Food Containers

The British, Canadian, and American Standards Associations are now forming a United Nations Standards Co-ordination Committee with offices in London and New York for unification of International Standards. At an International Conference held in Washington most nations expressed their intention of supporting the Committee.

Before the war the British and Australian Standards Association had done a good deal of preparatory work with regard to the standardisation of food containers. Their findings, together with those of the Anglo-American Packaging Committee, will form the basis for the United Nations Committee's discussion on food containers.

The aim is to simplify the production and distribution and eliminate waste of time and material involved in the production of an unnecessary variety of patterns and sizes of articles for one and the same purpose, and to set up standards of quality and dimensions. This applies particularly to paper, board, tinplate, timber, and glass.

This matter is of considerable interest to British manufacturers, especially those who are contemplating exporting goods, and to manufacturers placing orders for new packaging machinery. In pre-war days some manufacturers reported that, to comply with the new standards being set down, it would mean extensive alteration to plant and, in some cases, the complete scrapping of machines.

Future of Milk Manufacture

Allocations of milk to creameries for manufacture into cheese, butter, and processed milk are expected to be permanently controlled by the Government as a result of the decision to make the Ministry of Food a permanent department.

During the year ended September 30 last the quantity of milk sold off farms in England and Wales was 1,205 million gallons, of which little more than 100 million gallons were used for manufacture.

Production of manufactured milk products is still only about one-third of the pre-war quantity, and it is considered unlikely that any material progress towards recovery can be made until the milk supply is able to keep pace with the liquid demand—a position that is not expected to be reached before the end of 1947.

Creameries are expected to continue to function largely as liquid milk depots for the next few years, and the quantity of milk passing through them *en route* to the liquid market has increased by many millions of gallons during the past two years.

A problem that is causing concern is the future

THE EDITOR SENDS SEASONAL GREETINGS TO ALL READERS

of the creameries that have been closed down as redundant during the war. It is feared that in view of the shortage of milk it will not be economic to re-open them for a few years. It is hoped, however, that the food and agricultural policy issued by the Government will enable the milk manufacturing industry to avoid a return to the unsatisfactory position that existed in the past.

Up to 1939 low-priced imports of dairy products prevented milk manufacturers in this country from being able to pay dairy farmers a remunerative price for milk used in manufacture; consequently the Milk Marketing Board aimed at expanding the liquid market and reducing the manufacturing supplies, particularly for cheese and butter making.

The food policy now announced by the Government embraces imports as well as home production, and the Minister of Agriculture has stated that the Government will, where appropriate, consider using the levy-subsidy principle of the Wheat Act to deal with marketing problems.

Creamery proprietors are hopeful that the Government will introduce such a scheme for milk products so as to enable the cheese, butter, and milk-processing industries in this country to meet overseas competition, pay a fair price for the milk they use, and thus obtain the raw material essential to expansion.

Beet Sugar

The output of sugar from home-grown beet promises to be substantially greater this season than last; in fact, the output is expected to be one of the best on record. Production during the 1944-45 season amounted to some 27 per cent. of the nation's total sugar consumption; this season's output may exceed 30 per cent. of the total.

As in recent years, the area under sugar beet during 1945 has exceeded 400,000 acres, and the limited capacity of the existing eighteen beet sugar factories at present precludes any possibility of increasing that acreage.

So far, both the tonnage per acre and the sugar content of the beets are above the average, and the total output of home-grown sugar is expected to exceed 500,000 tons. The total national sugar requirements at present are 1,600,000 tons.

Factories are slicing beet at a speed well above normal, but even if this rate of slicing be maintained the season will be one of the longest on record and will not finish until February.

Before the war the quantity of sugar that Britain could produce was limited by international agreement. There is now a strong desire in many quarters to increase the home production of sugar, which the war has shown to be a vital crop. At present shortages of labour and materials prevent the construction of further beet sugar factories, but the matter will receive full consideration in

due course. Meanwhile, Sussex farmers have given an undertaking that they will be prepared to grow sufficient beet to warrant the erection of a factory in their county. Similar proposals have been made in regard to another new factory in the West of England, Somerset or Cornwall being suggested as the site. Beet from both these areas is at present transported more than a hundred miles to the nearest factory. The manufactured sugar and also the resultant beet pulp have then to be transported back to the beet-growing areas.

Science and Industry

That the success of the social programme and the speed with which we complete it will be determined by the parallel programme of industrial recovery was stressed by the Rt. Hon. Herbert Morrison, M.P., Lord President of the Council, at a luncheon to the Conference of Industrial Research Associations.

Scientists and industrialists will be encouraged to note the Government's intention to do all in its power to support the essential scientific partnership which would increase industrial strength both at home and in the markets of the world. In war our armed forces looked to our scientists for new weapons; in peace industries will look to scientists for developments which will speed production, new processes, and materials.

There were many problems to be overcome—problems of manpower, accommodation, equipment, and the training of research workers. The shortage of teachers for this last need was holding up rapid progress, and it would be some time before a sufficient number of trained scientists would be available for this purpose. These problems, continued Mr. Morrison, would have the Government's sympathetic attention, but he stressed that no definite promises could be given that the necessary licences, material, and labour would be immediately forthcoming for repairing and extending laboratories.

Mr. Morrison's assurances of the encouragement and assistance to be expected from the Government were confirmed by Sir Edward Appleton, K.C.B., Secretary of the Department of Scientific and Industrial Research.

The war that has just ended has prompted an even greater realisation of the importance of scientific research both to industry and the community generally. It must be remembered, however, that in spite of elaborate organisation and laboratories, the success of a research organisation depends primarily on men. A young scientist does not thrive if he lives a monastic life, and if men are to retain their originality and freshness they must not work in isolation. This means that there must be the closest contact between one Research Association and another, with the universities, and with other research establishments. In this connexion

the full support of the Department of Scientific and Industrial Research was promised.

Pointing out that some people tended to put the cart before the horse, Sir Edward said that unfortunately to those who had written on the subject of research in recent years, planning seemed to mean thinking of a sum of money, doubling it, and then trying to devise ways of spending it. This is the wrong method, the right one being to select problems on the grounds of their importance, obtain the greatest possible support of the industry for their investigation, *after which* the Department would be ready to make its contribution.

The Post-War Loaf

Convened in January, 1945, by the Ministry of Food, in collaboration with the Health and other Departments concerned to assist Departments in advising Ministers on post-war bread and flour policy and in particular on any regulations which might have to be made with regard to flour and bread when war-time control ended, the conference on the post-war loaf has issued its report as a White Paper (Stationery Office, Cmd. 6701, 4d. net).

The conference proceeded on the assumption that the Government will decide to regulate the character and quality of flour and bread after the present emergency control comes to an end. It accepts the view that it would be practicable for regulations to provide that flour should contain not less than certain minimum quantities of the three "token" nutrients, vitamin B₁, nicotinic acid, and iron, these minima being able to be supplied by the present flour of 80 per cent. extraction.

A further recommendation was that during the remaining period of control the practical difficulties should be vigorously studied with a view to finding a means of overcoming them before control ends.

The Government will have the difficult task of deciding in the light of the results obtained and all other relevant considerations, including the attitude of the public towards bread made from 80 per cent. flour, whether it will be both practicable and in the national interest to prohibit or alternatively to permit the manufacture and sale of low-extraction flour which has been reinforced by added vitamins.

Dealing with future policy it is stated that "the conference is advised that there is no difficulty in producing synthetically the three constituents in question and incorporating them in flour in whatever proportion may be desired. In the course of the discussion of these two alternatives it has become clear that it is a matter of balancing nutritional considerations against question of administrative practicability." However, it is further stated that the official scientific and medical mem-

bers of the conference considered that the retention of the natural constituents of the wheat grain are so incomparably preferred to reinforcement that they were not prepared to contemplate the adoption of the latter procedure.

Discussing consumer preference the trade members of the conference held the view that if now given freedom of choice most people would quickly revert to white bread. On the other hand, it is pointed out that many children of three to four years of age have never seen any other type of loaf than the war-time national loaf.

Gas Produced by Anaerobes

A study of the composition of the gas evolved during some anaerobic fermentations has been made by A. J. Overby (*Yearbook of the Royal Veterinary Agric. Coll., Copenhagen, 1944*, pp. 1-32; in Danish, with English summary). Analyses included determination of carbon dioxide, oxygen, hydrogen, and methane by micro-methods, and of hydrogen sulphide by a macro-method. The rest of the gas was mainly nitrogen. The bacteria were studied partly in pure culture and partly in spoiled canned foods. As the various gases differ in their absorbability by the culture medium, it is suggested that gases developed through fermentation should be boiled out before analysis. Addition of very small amounts of sodium and calcium ions was found to promote fermentation by *Cl. butyricum*, and calcium ions altered the course of the fermentation. Addition of 1 per cent. of sodium chloride to meat brought about a fall in the amount of carbon dioxide produced and an increase in the amount of hydrogen; the same effect was produced by addition of 0.5 per cent. of sodium nitrate and 0.05 per cent. of sodium nitrite, provided the bacteria were not able to reduce those substances. When reduction was possible, relatively large amounts of nitrogen were produced. Studies on blown cans, made partly by withdrawing the unabsorbed gas and partly by boiling out all the gases, suggested that it should be possible to apply gas analysis to spoiled canned food to establish with a fair degree of certainty which kind of fermentation (if any) has caused the spoilage and whether the spoilage is due to bacterial or chemical activity. Studies on the bursting strength of cans are included.

Special Finance Corporations for Post-War Trade

The formation of two companies the object of which is the making of advances in the direction of assisting production is of interest. One (a) The Finance Corporation for Industry, Limited, has capital of £25 millions with power to borrow up to £100 millions; the other (b) The Industrial

and Commercial Finance Corporation, Limited, has capital available of £45 millions, made up of £15 millions capital and £30 millions borrowing powers. The subscribers to capital of (a) are consortiums of insurance companies, investment companies, and the Bank of England, roughly in equal proportions, the loan capital being provided by the clearing banks and the Scottish banks. The subscribers to the capital of (b) are the clearing banks and the Scottish banks with a token subscription from the Bank of England, the loan capital coming from the same direction in the same proportions as are the shareholdings of the respective banks. Company (a) will provide finance for the larger concerns, company (b) operating for medium and smaller concerns, advancing sums of £5,000 to £200,000.

A point of interest in relation to these corporations is that while they are private concerns there is a kind of oversighting by the Treasury and the corporations will necessarily be in touch with the Treasury and the Board of Trade, and there is also the Capital Issues Committee to be considered with relevant information to the companies from this Committee. This Committee really has control over capital issues generally, but it might be useful to note that issues up to £50,000 (formerly £10,000) are permissible without requiring the consent to the Committee; furthermore, there have been issued fresh Treasury directions to this Committee as regards giving permission for issues concerning larger sums, a system being introduced giving priority to certain classes of trades, trading operations, and so forth in front of other issues.

Imported Herring Threat

Proposals to import 500,000 cwt. of fresh herring from Norway in the first three months of 1946 may lead to an official protest by the Scottish Herring Industry. Members claim that as long as there is difficulty in disposing of British catches no foreign herring should be allowed into the country.

The west coast section of the industry is especially affected by the scheme, as it would operate when most of the other fishing grounds are slack.

"This is a serious matter for the home trade. The Ministry of Food's announcement comes at the end of a season when we have often had the greatest difficulty in disposing of our own fresh herring. The number of nets has frequently been restricted, and ports closed for days at a time, to avoid glutting the market. Yet now the Ministry is going to bring in these big quantities of foreign herring," was the opinion of a Stornoway curer.

Provost A. D. M'Nair, Campbeltown, chairman of the Clyde Fishermen's Association, said: "It has always been the Clyde fishermen's view that importation of foreign herring should not be allowed while there is a difficulty of disposing of home catches."

Cannery Town

The question was recently raised in the House of Commons if, since 200 million tins of Portuguese sardines are on the way, the Minister of Food should consider the question of tin-openers or keys "owing to the natural reluctance of the housewives of this country to attack them" (the tins, not the hon. members) "with hatchets."

Yet a further example of sardines as motif comes from fiction, from John Steinbeck's latest creation (*Cannery Row*), with a brevity and robustness rendering it highly entertaining. Near Monterey, California, lies his Cannery Town, a rough, ramshackle place. It is a spot dependent on the harvests of the sardine-fishermen, on purse-seiners which, after a catch, "waddle heavily into the bay, blowing their whistles." The deep-laden boats come into the bay where the Hediendo cannery juts out to engulf the millions of fish. "Cannery whistles scream, and all over the town men and women scramble into their clothes and come running down to the Row to go to work. Shining cars bring the upper classes down: superintendents, accountants, owners."

Though much of the tale concerns the rough, hardly law-abiding people—in particular, a gang of hand-to-mouth ne'er-do-wells—the influence of the cannery is ever in evidence. A good catch, with "silver rivers of fish" pouring from the boats, and the life blood flows into every odd dark corner (including the local brothel) of this odorous town. Sales mount up at Lee Chong's "grocery" which retails not only food, liquor, and tobacco, but clothes and cordage, odd bits of machinery, and junk. There is money to spend even among the down-and-outs who sleep in the discarded rusty boiler and remnants of plant dumped on waste ground from the cannery. One man alone, a lovable character, seems unaffected by the fluctuating catches of the sardine men. For "Doc" has catches of his own to see to: starfish, young octopi, young sharks, snails, frogs, and many other species collected in the Great Tide Pool for Western Biological Station. But for the others the tide of workers periodically flows to deal with the harvest: "from the town pour Wops and Chinamen and Polacks, men and women in rubber coats and oilcloth aprons. They come running to clean and cut and pack and cook and can the fish." And when the catch is disposed of, the ebb flows, the whistle screams again, and "the dripping, smelly, tired . . . men and women straggle out and droop their way uphill into the town." The new picture painted by Steinbeck reeks with the atmosphere of verisimilitude, cleverly portraying rough communities depending on the canning of the ubiquitous sardine, communities contrasting so strongly with a more fortunate society which will pick daintily at silver fish at cosy afternoon teas in drawing-room and café.

Problems in the Bacteriological Grading of Milk

This is the first of a series of articles which will examine this important matter in detail. Which tests should be used and which standards required in the bacteriological grading of milk is still one of the most vexed questions in the dairy industry, notwithstanding that it has been studied by many dairy bacteriologists for some fifty years

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THE outstanding characteristics of the history of bacteriological control of milk are that the first tests were taken practically entirely from medical bacteriology and for many years the plate count and coliform test were used universally. It was gradually realised that although the plate count and coli tests were probably unexcelled as measures of cleanliness in production, they frequently failed to give a reasonably accurate assessment of keeping quality. The last few years in dairy bacteriology have been characterised by a gradual swing of the pendulum away from the plate count to keeping quality aspects. There is a danger that in evaluating tests such as the resazurin and methylene-blue tests in terms of keeping quality, we may come to regard keeping quality as some absolute property of a milk when the fact is that keeping quality is quite as arbitrary a yardstick as any other.

Which properties of milk are desirable from the point of view of the consumer will first be considered. These are set out in Table 1. It is obvious that the non-technical consumer is not aware of all these aspects of milk; the only property which he can detect is the presence of any taint. From the public health point of view, the outstanding property is freedom from pathogenic organisms. Those who are familiar with the bacteriological properties of milk will agree that ideally milk should be free from pathogenic organisms, derived from a disease-free udder, produced by clean methods, and have a low bacterial count. Finally, temperature is important because at any time it largely governs the behaviour of the milk during the subsequent few hours.

Cleanliness in Production

There is no one test which will measure all these aspects. Moreover their effect on keeping quality is very variable (Table 1). The measurement of

This article is a slightly modified version of a paper read at the annual conference of the Society of Applied Bacteriology, 1945.

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cleanliness in production is probably best made by a plate count and coliform test as soon after production as possible. There is still much confusion in the industry between *visible dirt*, as measured by a sediment test, and bacterial contamination, or what is sometimes called *invisible dirt*. The sediment test as applied at the creamery, which is a measure of mechanical dirt—e.g., cow hairs, cow faeces, pus cells, soil, etc.—shows practically no correlation with keeping quality or any of the tests used indirectly to measure keeping quality. Very bad sediment tests may be associated with milk of good keeping quality, and this observation may be related to the fact that often fresh bovine faeces may not only have no effect on keeping quality but may even improve it. Aged faeces invariably produce rapid deterioration in keeping quality.¹

What is Keeping Quality?

Until recently keeping quality was arbitrarily measured by a procedure which involved holding a sample of milk at a temperature of 15.5° C. and testing every six hours by smell, taste, and clot-on-boiling test.² It is evident that there are many factors which can affect a keeping-quality test, some of which have only recently been recognised (Table 2). Obviously the most important point to settle is the determination of the end-point. We have no absolute criterion for this. Smell and taste are highly subjective and it is questionable whether they should be considered as end-points for scien-

TABLE 1

	Factors.	Effect on K.Q.
Hygienic Quality	Pathogenic organisms	Nil or slight
	Mastitis	Variable
	Cleanliness in production:	
	(a) Visible dirt;	Very slight
	(b) Bacterial contamination	Considerable
	Subsequent contamination	Considerable and variable
	Temperature	Considerable



View of one of the Processing Laboratories at Cricklewood.

Courtesy Express Dairy Co., Ltd.

tific tests. There remain two other tests which can both be determined objectively and are accepted in the industry as indicating the end of the life of a milk beyond dispute. They are (1) the clot-on-boiling test and (2) a measure of acidity. The clot-on-boiling test has the big advantage that there is an indisputable end-point, while the measurement of acidity involves an arbitrarily decided end-point. In practice these end-points give rather similar results, and since the deterioration of milk is largely a question of souring in warm weather, there is a considerable case for adopting an arbitrarily decided increase in acidity as an end-point in the keeping-quality test. For example, milk usually has an initial acidity of 0.14 per cent. lactic acid and usually clots on boiling at an acidity in the region of 0.24 per cent. lactic acid. A very convenient increase to adopt as a measure of keeping quality therefore would be one of 0.1 per cent. lactic acid. An acidity basis, however, completely ignores sweet curdling. This fault, like undulant fever, probably occurs much more often than is recognised. With the general increase in the cleanliness of the milk supply and the trend towards universal pasteurisation, it is likely that the importance of sweet curdling as an economic fault will increase. It is therefore probably unwise to adopt an

end-point which ignores a fault which may have very large economic proportions.

The clot-on-boiling test has two very great advantages: (1) an indisputable end-point, and (2) the fact that it includes not only the end of the life of milk due to souring but also the end of the life of milk when it is due to sweet curdling. Other tests which may be regarded as variants to the clot-on-boiling test are the clot-at-room-temperature test, which involves holding the milk at room temperature or at a defined temperature—*e.g.*, 18° C.—until it clots,³ and the alcohol test, in which equal volumes of the milk and a known strength of alcohol—*e.g.*, 68 per cent. V/V—are mixed together.

Temperature Test

The second most important factor in measuring keeping quality is the temperature of the test. It may be noted that these tests were formerly carried out at 15.5° C., but, largely as the result of experiencing difficulty in maintaining water baths at this temperature in hot weather, a temperature of 18° C. was suggested a few years ago⁴ and this is now finding general favour. There is a further trend in some quarters to adopt 22° C. as a standard temperature for the obvious reason that it is more easy to maintain thermostatically, as water supplies may rise above 18° C. in hot weather, and it gives a quicker result and a sharper end-point, especially in dye reduction tests. But from the economic angle we have to recognise the fact that, with the increase in the efficiency of our methods of handling milk and the gradual trend towards refrigeration not only in the dairy industry but in

TABLE 2

FACTORS AFFECTING DETERMINATION OF KEEPING QUALITY

1. Frequency of testing.
2. End-point (smell, taste, or clot-on-boiling or combination of these).
3. Temperature at which samples held.
4. Agitation (degree and frequency).
5. Oxygen tension of sample.

the home, the temperature at which milk is held tends to become lower instead of higher. We are, therefore, raising the temperature of our keeping-quality tests while at the same time the temperature at which milk is held in practice is tending to fall. Although there is a fairly good correlation between the results of keeping-quality tests carried out at 15.5°, 18°, and 22° C., there is some scatter, and it is evident that the *r* value (correlation coefficient) of any test which is studied as an indirect measure of keeping quality will be affected by the temperature at which the keeping-quality test is carried out. This aspect has received practical confirmation in the work carried out by the mobile laboratory of the N.I.R.D. in South Wales, where it was found that some producers' milks gave good grading results when held at atmospheric temperature but failed badly when held at 18° C.⁵ The choice of temperature then will affect different milks in different ways. If we agree to get as closely to practical conditions as possible we have to consider the fact that monthly mean atmospheric temperatures range from about 4° C. in winter to about 17° C. in summer (Table 3). The best all-the-year-round temperature would thus be about 10° C., but this would not only be difficult to maintain in summer but the results would be quite misleading. If we agree to adopt one temperature throughout the year, 18° C. appears to be justified on the grounds that it is at the upper end of the atmospheric temperature range, and a milk which "stands up" to this temperature will be most unlikely to fail at lower temperatures.

TABLE 3

Month.	Mean Temp.: 1841-1905	
	° C.	
January ..	..	3.7
February ..	..	4.2
March ..	..	5.5
April ..	..	8.5
May ..	..	11.8
June ..	..	15.2
July ..	..	17.0
August ..	..	16.5
September ..	..	14.0
October ..	..	10.0
November ..	..	6.4
December ..	..	4.4

Correlation between Tests

It has been found that the correlation between the end-point based on smell and on Bulletin 46² (*i.e.*, when first condemned on smell, taste, or clot-on-boiling) is very high. The correlation for taste and Bulletin 46 is also practically identical, but between clot-on-boiling and Bulletin 46 there is a wider scatter. This indicates that the predominating end-points in the Bulletin 46 procedure are taste and smell. We know that milks are often condemned on one of these before reaching the clot-on-boiling point. It has also been found that the correlation between the clot-on-boiling end-points

at 15.5°, 18°, and 22° C. is fairly good, except between the extreme temperatures.⁶ Moreover, when we study the correlation between the various indirect tests of keeping quality such as dye reduction tests, and keeping quality as measured by various end-point techniques, we find the closest relationship between the dye-tests and the clot-on-boiling end-point. This is what might be expected since the predominating factors in both dye tests and the clot-on-boiling test are acid-producing organisms.

A further factor in the keeping-quality test is agitation, and the importance of this was realised in the course of our experiments when we found that the non-disturbance of a sample in a filled bottle could be the cause of an appreciable increase in keeping quality.⁷ The oxygen tension appears also to be a factor since most organisms in milk are facultative anaerobes and their growth will be accelerated by more aerobic conditions.

If we accept the contentions here put forward—namely, that keeping quality is as much an arbitrary property of milk as any of the other bacteriological aspects—it is logical to adopt an arbitrarily decided definition of keeping quality for the purposes of evaluation of tests. The following definitions are therefore tentatively proposed.

(1) *Absolute Keeping Quality*.—This is defined as the time required by the milk to reach the clot-on-boiling stage when it is transferred to a water bath at 18° C. within three hours of production.

It will be obvious that this measure will involve sampling at the farm and will not be comparable with commercial conditions, especially in winter when mean temperatures are very much below 18° C. (Table 3).

Reasons have already been given why no temperature compensation scheme can ever become universally applicable,³ but we have to recognise the fact that, other things being equal, milk has a much better keeping quality in winter than in summer. For grading purposes, therefore, a second definition is produced.

(2) *Grading Keeping Quality*.—This is defined as the time required to reach the clot-on-boiling stage when the milk is transferred to a water bath at 18° C. 25±1 hours after production. This definition is mainly a utilitarian one in that it permits of sampling at the first point of delivery and enables either a.m. or p.m. milks to be treated.

Neither of these procedures will be of use for assessing the actual commercial keeping quality, which is as much a function of season and atmospheric temperature as of conditions of production. We may therefore find a use for a definition of *commercial or retail* keeping quality.

(3) *Commercial or Retail Keeping Quality*.—This is defined as the time required to reach the clot-on-boiling stage when the milk is held at atmospheric temperature from the time of production.

Irrespective of what criteria we agree to adopt

as a measure of keeping quality, it is essential to use a standardised technique for this purpose. It has recently been realised that agitation and aeration can appreciably affect the result. It is therefore necessary to standardise these variables. There are, broadly speaking, two methods of doing this:

(1) To have a large container—*e.g.*, a pint bottle—half full at the beginning of the test, and to shake by a standardised procedure every four hours and withdraw, say, 10 or 20 ml. aseptically. Such a procedure would be sound from the scientific point of view, but it cannot be claimed that such conditions are comparable with those obtaining in commercial practice as milk is not normally violently shaken up every four hours. Moreover, in commercial practice, milk is frequently held in large containers where the degree of aeration must be very small—*e.g.*, in tankers and in churns.

(2) An alternative method would be to fill out the sample after an initial thorough mixing in test tubes or boiling tubes in 10 or 20 ml. quantities, to hold all these tubes in a water bath at the agreed temperature, and then use one entire tube for each test every four hours. The adoption of a four-hour interval for testing is suggested as the best practical compromise for the problem. If these intervals are timed to coincide with 1 a.m. and 5 a.m. it enables one worker to do a night reading and then go to bed, and another worker to get up early for the 5 a.m. reading after having had a night's rest. The adoption of a shorter interval—*e.g.*, three hours—involves workers doing all-night duty which is frequently difficult to arrange, and there is here the important aspect that when workers are tired the results may not always be as good as they would be when the workers are fresh.

(To be continued)

Hospital Diet

IN July, 1943, the King Edward Hospital Fund for London published a Memorandum on Hospital Diet. The large volume of correspondence that the Memorandum produced gave clear indications that the subject was causing many people considerable anxiety. The need for further study of the many problems presented by hospital catering was clearly apparent. Accordingly the Committee on Hospital Diet was formed to carry on the work of the sub-committee on whose investigations the original Memorandum had been based.

Judging from the information gained by the Committee, it is evident that a real effort is being made in spite of considerable difficulties to improve conditions that have not been good in the past. In other directions there are less encouraging signs, and it is primarily with a view to stimulating action in these quarters that the Committee decided to issue a second Memorandum on Hospital Diet.*

* *Second Memorandum on Hospital Diet.* By the Committee on Hospital Diet. King Edward's Hospital Fund for London. Pp. 57. 9d.

It has been presented in the hope that it will help those who are doing the best they can in difficult circumstances to improve catering in hospitals, and that it will also lead those who are reluctant to change the old order of things to appreciate the urgent need for a new outlook on one of the most important aspects of medical science at the present time.

One important item recommended in the Memorandum is unified responsibility. At the present time, responsibility for catering is divided between different members of staff, and this system is rarely efficient, particularly if, as is often the case in hospitals, the officers concerned have little expert knowledge of food, cooking, and the science of nutrition. It has been realised that the purchase of food and the handling of supplies on a large scale is a matter calling for special training and experience which few hospital secretaries and stewards have had the opportunity to acquire. The Housekeeping Sister is rarely competent to advise her cooks and she has to be guided by them on the preparation of dishes, which is, more often than not, the chief cause of the monotony of meals found in many hospitals and of the poor standard of cooking.

The recommendation put forward in the original Memorandum on Hospital Diet with reference to the appointment of a Diet and Catering Committee has now been clarified considerably in the light of information gained during the enquiries of the past eighteen months. It is regarded as of great importance that this Committee should assist rather than restrict the work of the Catering Officer, although her work would be assisted if, at regular intervals, she had the opportunity to discuss general questions with representatives of the Medical Committee, of the House Committee, and with the Matron.

The Memorandum discusses financial control, the special case of the smaller hospital, and the need for radical changes in existing conditions. The warning is given that reorganisation of the catering system in hospitals along the lines recommended by the Fund may in many cases sharply conflict with traditional practice. Perhaps the strongest tradition that will be invoked against radical changes is that which closely associates the feeding of patients with their nursing. It is a link with the days when the sick poor were as much in need of food as of treatment, and when charity gave them both. Thus was established the close association of the nursing staff with the preparation of the patients' meals, which, in one form or another, continues. This association as seen by the writers of the Memorandum to-day has its good and bad features; catering for large numbers to ensure good nutrition has become a highly specialised profession, and training for the nursing profession cannot embrace all that is required.

More than three-quarters of the Memorandum is concerned with details on staffing of kitchens, buying of material, menu charts, etc., and the usual information is given regarding the loss of vitamin C in cooking meals. A number of appendices give some very attractive alternative menus for full diet and some examples of recipes based on the serving of fifty people.

The dissemination of the information and advice given in this Memorandum, if duly absorbed by those concerned, should help to correct the causes of the state of affairs so adversely criticised by the medical profession itself during the last few years.

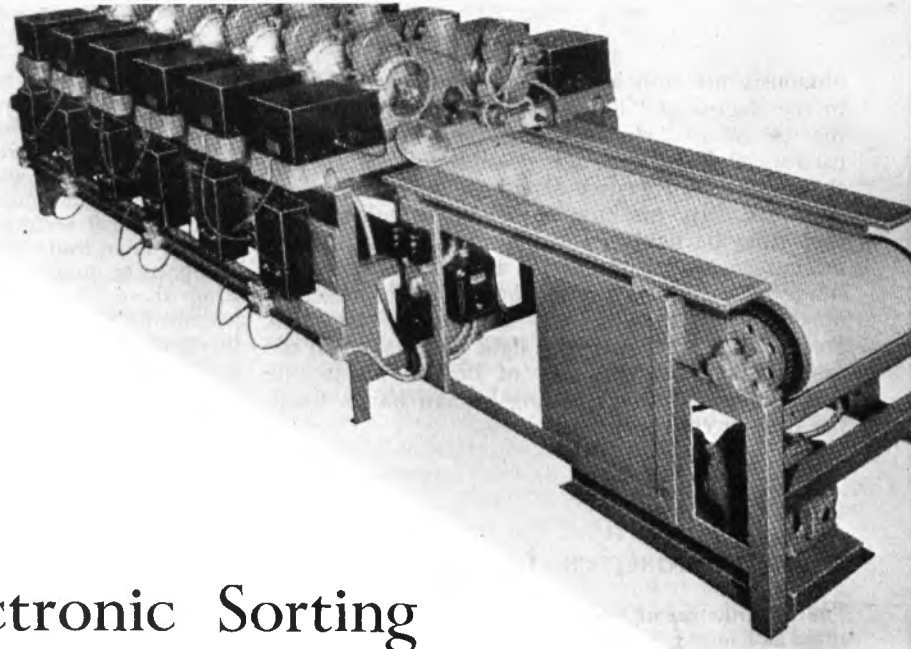


Photo-electric sorting machine eliminating a large proportion of costly hand sorting.

Electronic Sorting

PHOTO-ELECTRIC sorting is no longer something to be written up as a curiosity. It has passed the development stage, and is being used in many of America's most modern and progressive plants, with the result that a large part of the cost of the expensive operation of hand sorting is saved.

Because of the nature of the various materials required to be handled, the creators and manufacturers of these up-to-date machines evolved two different types of sorters: the so-called "dark-trip" machine and the "bichromatic" machine.

The dark-trip type of machine is generally used in sorting peanuts and beans. The separation is accomplished by light, which is reflected from the material itself, striking a photo-electric cell. This

cell—or "tube," as it is popularly called—gives a signal to the amplifying circuit when bad bean, stone, cull pea, or anything else is viewed which actually reflects less light than a good bean does.

The off-colour objects are constantly thrown out by means of a highly sensitive mechanism. A simple setting of a dial arranges whether the device ejects only the extremely undesirable culls or merely any given percentage thereof.

The other type of device—the bichromatic—is sensitive to shades of colour, and can be set to separate any given colour or number of colours from either end of the spectrum.

In sorting lemons, citrus, or coffee, allowance must be made for several shades of colours. It is



There are 32 Units in this installation used for sorting beans electronically.

January, 1946

obviously not sufficient to separate them according to the degree of "lightness" or "darkness." By the use of an "electron gun," similar to the one used in television sets, it is possible to separate any shades of colour desired at either end of the colour spectrum. By masking out all other colours, except the particular spot desired, the tripping mechanism will react only to a particular colour or shade of colour. In other words, under practical operating conditions, it is possible to separate light greens, dark greens, silvers, light yellows, or, in the case of coffee, any shade of brown, all in one handling and without having human hands touch the fruit or coffee in the process.

Food Industries in the B.W.I.

THE manufacture of sugar began in the West Indies in 1650, and in the seventeenth and eighteenth centuries the Caribbean colonies had practically a monopoly of the world's sugar supply. Between 1623 and 1815, by settlement, conquest and treaty, Great Britain acquired the colonies now known as the British West Indies and British Guiana. Slaves from British West Africa, introduced into the West Indies as early as 1503, were used in increasing numbers on the sugar estates until 1838, when slavery was abolished.

During the next hundred years the manufacture of sugar experienced growing competition from cane supply in other parts of the world and the production of beet sugar in Europe, which culminated in a financial crisis in 1847, when there was a loss of sugar preferences in the United Kingdom, and the average price of B.W.I. sugar sharply dropped.

Sugar conditions improved up to 1870, but bountified beet sugar weighed heavily against the West Indian product, a situation, however, which encouraged other food crops. Jamaica planters developed the production of coffee, pimento, ginger and, later, bananas. In Trinidad and Grenada they enlarged the cocoa plantations, St. Vincent planters cultivated arrowroot, and in Dominica and Montserrat citrus fruits, especially limes.

From 1897 to 1903 there was a market for B.W.I. sugar in the United States, when a countervailing duty was in effect against European beet sugar. The market was lost in 1903, with abolition of bounties on sugar exports by the Brussels Convention, which caused the United States countervailing duties to disappear, the admission into the United States of Puerto Rican sugar duty free, and the extension of preferential treatment by the United States to sugar imported from the Philippines and Cuba. B.W.I. sugar producers then began to take advantage of the markets in Canada, where there was a British preference rate and a surtax on beet sugar from Germany.

B.W.I. Economy

British West Indies economy is based on agriculture, of which the chief product is sugar, along with its by-products, molasses and rum. A wide range of food products supplementary to sugar are also pro-

duced, such as bananas in Jamaica, cocoa in Grenada and Trinidad, rice in British Guiana, and citrus products in Trinidad and the Windward Islands. The modern pattern of trade began to unfold early in the twentieth century, when West Indian sugar, shut out of United States markets, began moving to Canada under a tariff preference. Subsequent Canada-British West Indian trade treaties in 1912, 1920 and 1925 were designed to promote reciprocal trade. Canada received from these colonies in 1943 (the latest official figures) shipments of sugar, molasses, rum, citrus products, bananas and other products to the value of £5,000,000.

Trinidad's Food Products

With its petroleum industry supplementing sugar, cocoa and citrus products, Trinidad is now the best market of the group. In addition to petroleum and sugar and rum manufacturing, there are a number of minor industries for the processing of grapefruit juice, lime juice and lime oil, and for the production of coconut oil, margarine, coconut meal, lard compound and soap from copra.

Sugar production continues to give the most employment. Cocoa, once Trinidad's principal export, has gone down considerably on account of blight and adverse market conditions. Other pre-war exports included grapefruit and its juice, molasses, bananas, bitters, raw coffee and coconuts. Lack of shipping space during the war years did not permit exports of bananas and grapefruit, while the home demand for copra has taken care of the coconut. At present Canada supplies almost all of the flour, a large share of the condensed milk, and a large percentage of the butter, beer and canned fish.

Barbados Commercial Dealings

Barbados depends almost entirely on sugar, rum and molasses. The colony has a number of small industries, such as nine bakeries, two unsweetened-biscuit factories, two ice factories, and the manufacture of soap, edible oil and aerated waters. Pre-war exports of sugar accounted for 57.1 per cent. of the total shipments, and molasses for 37.9 per cent. Rum, a comparatively modest pre-war export, increased rapidly in volume and value during the war until in 1942 it had run to £68,382.

Exports to Canada, though substantial, have dropped at times to as little as 41 per cent. That Dominion is the main market for the colony's fancy molasses and usually receives a good percentage of its sugar, although in the years just before the war large quantities were shipped to the United Kingdom.

Approximately 30 per cent. of food imports into Barbados are of a type normally supplied from Canada, whose dealings with all of the B.W.I. include both imports and exports of the natural and processed foods required both in North America and the islands in the Caribbean.

TO AUTHORS

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

The Milling Industry

Progress in 1945

A. J. AMOS, Ph.D., B.Sc., F.R.I.C.

This article is the first of a series published each year on the different branches of the food industry. Written by specialists for the busy executive, they form a record of advances made during the previous year.

THE transition from war to peace, which occurred during the year under review, has not materially affected the position of the milling industry. Millers still have their wheats allocated to them by the Ministry of Food, are obliged to mill to a prescribed extraction from a stated wheat blend, and are required to attain a certain level of vitamin B₁ in their flour. The continuance of a standard grist, and of a prescribed rate of extraction, has meant that the return to peace has not been signalled by a return to the range of variation in quality which characterised the flours of pre-war days. Present-day flours are very much alike in baking quality, and samples which depart significantly from the average standard are very few.

Nature of Wheat Grist

The composition of the wheat grist has been varied from time to time according to the supplies available, but the bulk of the grist has throughout consisted of Manitoba and English wheats. The usage of native-grown wheat has been kept as high as possible, and for a long period the proportion of English wheat in the grist was fixed at 40 per cent. Early in the year the inclusion of a minor proportion of Plate wheat in the blend was optional, but this constituent could not exceed 15 per cent. of the blend, and the corresponding reduction in the proportions of the other wheats had to be spread equally between the Manitoba and the English. Later, Plate wheat became a compulsory constituent of the blend, but it was still used in only minor proportions. Examples of official grists during the latter period of the year are:

	Manitoba. Per Cent.	Home Grown. Per Cent.	Plate. Per Cent.
July, 1945 ..	50	40	10
September, 1945	65	30	5
October, 1945 ..	77½	17½	5

The Manitoba wheat imported into the country has been restricted to grades No. 1 and No. 2. A sample of each cargo has been tested in the author's laboratory and the data thus collected have re-

vealed that throughout the year these arrivals have represented proteinous, strong, and well-balanced wheats and that there has been no falling off in quality.

The arrivals of Plate wheat have in the main represented good "filler" wheats, and they have been suitable for replacing in a minor proportion a mixture of equal parts of Manitoba and English.

English Wheat

The English wheat has, of course, exhibited the usual wide range of protein content and strength. Unfortunately, much of the 1944 crop wheat, which was in use until the late summer of 1945, was badly germinated, and hence yielded flour with excessive diastatic properties. This defect led to very serious and widespread difficulties, and the Ministry of Food were accordingly obliged to permit seriously sprouted wheat to be rejected as "unmillable." The 1945 crop has not, however, suffered in the same manner, and, with very few exceptions, the many samples which the author has examined have been free from sprout and quite satisfactory in diastatic activity. The autumn of 1945, therefore, did not see the baker or the miller faced with the troubles which confronted him at the close of 1944 and which continued well into the succeeding year.

An appreciable number of samples of home-grown wheat examined in the early autumn of 1945 had been subjected to too high a temperature on farm driers, with the result that their glens were unduly stable and badly lacking in stretching power. The inclusion of such wheat in the blend tends to cause the resulting flour to yield a dough which lacks spring and liveliness and which the baker therefore finds unpleasing. A number of commercial flours tested at that time exhibited these characteristics. These flours are capable of furnishing bread of reasonable quality, but they cannot be handled so easily in the bakery as normal well-balanced flours.

Flour Quality

The prescribed level of flour extraction, which was 82½ per cent. for the last three months of 1944, was reduced to 80 per cent. on January 1, 1945. This change was accompanied by some improvement in colour and by a drop in the fibre content, which fell to a figure of 0.1 to 0.15 per cent. The present 80 per cent. flour exhibits a colour and flouriness which are unbelievably good when judged by pre-war standards of milling, but comparison with a flour of 72 per cent. extraction reveals that

it nevertheless falls far short of pre-war flour in brightness and bloom.

The reduction in the rate of extraction was naturally accompanied by a diminution of the B₁ content. The Ministry of Food set as their standard a potency of 0.80 I.U. per gram, and many mills are finding no difficulty in reaching this figure.

Throughout the year the flours milled from sound wheats have possessed good strength and have been well balanced, as would be expected from the nature of the grists. They have naturally varied from time to time in water absorption and strength as the relative proportions of Manitoba and English in the prescribed grist have been altered, but bakers have been advised of such changes in the grist through the trade press.

The mixing-in of imported flour has continued. At the beginning of the year the prescribed addition was 15 per cent., and it could be American, Canadian, or Plate flour. At the end of the summer the level of the admixture was reduced to 5 per cent.

No change was made in the regulation concerning creta when the extraction was reduced, and the 80 per cent. flour has therefore carried 7 oz. creta per sack. It has not been possible to overcome entirely the difficulties which the mixing-in of creta presents, and wide variations from the prescribed 7 oz. per sack are still encountered.

Self-Raising Flour

There has been throughout the milling industry a general feeling of dissatisfaction with respect to the Self-raising Flour Order (S.R. & O. 1944 No. 44). Self-raising flour may undergo a deterioration in aerating power during a prolonged storage, but the extent to which a miller can allow for this by increasing the proportion of chemical ingredients in the flour is restricted by the upper limit prescribed for bicarbonate content. Furthermore, the technique prescribed for the determination of residual carbon dioxide is not sufficiently detailed, and this has led to the institution of proceedings for non-compliance with the Order, which have had to be subsequently withdrawn because of faulty analysis. It is reported, however, that these criticisms are to be met by the issue of a new Order, which will set out with greater precision the details of the relevant analytical procedure and which will prescribe a lower minimum limit for available carbon dioxide and at the same time dispense with the restriction on the total carbon dioxide. Such an Order should enable the manufacturer to produce a self-raising flour which would be legally unassailable not only at the time of manufacture but also after a protracted storage.

Difficulties under the existing Self-raising Flour Regulations have been encountered by those manufacturers who employ a master-mix when the master-mix has been prepared too far in advance of its use. Such master-mixes, which often con-

sist of the aerating ingredients diluted with an equal weight of flour, tend to decompose rapidly, particularly if the relative humidity of the atmosphere is high. The writer has known instances when a master-mix of this type has lost approaching 50 per cent. of its carbon dioxide content in twelve hours. It follows that a self-raising flour manufactured with a master-mix which has been prepared a day or two earlier may be well below the legal limit in carbon dioxide content when it goes to the packers. If a master-mix has to be employed, this should be prepared in comparatively small batches so that a relatively short time elapses before it is mixed into the flour.

Nutritive Value of Bread

Bread constitutes an appreciable proportion of our diet, and it is only natural, therefore, that it should have attracted the attention of nutritionists. For many years the relative merits of wholemeal and white bread were debated, and often bitterly, but to-day the fight lies between near-white flour of 80 to 85 per cent. extraction and white flour reinforced with synthetic vitamins. This subject was much to the fore during 1945 and, indeed, was actively debated in the House of Lords early in the year. Unfortunately, however, this latter debate was characterised by a surprising ignorance of the true facts on the part of many of the speakers, and it gave rise to a number of inaccurate, and in some instances ridiculous, statements.

The Post-War Loaf

The question has, of course, a direct bearing upon our post-war nutritional policy. It is quite certain that we shall never revert to the position of pre-war days in which all that was demanded of a flour was that it should possess good baking quality and colour. In the future flour will undoubtedly need also to attain a specified level of nutritive value. It is probable that standards will be prescribed for vitamin B₁, riboflavin, nicotinic acid, and iron, but later the list may be extended to include other dietary factors. It is not a difficult matter to decide what level should be prescribed for each of these factors in flour, but there seems little hope of agreement being reached upon the question of how the adopted standards should be attained. The adherents of the flour fortification policy maintain that the public, while being guaranteed an agreed nutritional standard in their flour, should be able to enjoy the type of bread they like best—and it is an unassailable fact that over 90 per cent. of the consumers prefer white bread—while the long-extraction flour supporters suggest, seemingly without established scientific evidence in support of their contention, that white flour enriched with B₁, riboflavin, nicotinic acid, and iron is still significantly inferior in nutritive

(Continued on page 32)

Norway's War-time Canning Industry

OLAV OMLAND



Stavanger Canneries.

BY the outbreak of war in Norway, April 9, 1940, Norway's canned food industry had large supplies of the main articles—canned brisling, small sild, and kippered herring. The bulk of these commodities is usually exported. As a consequence of the war our industry was suddenly cut off from all its foreign markets, and had no outlet for about 90 per cent. of its total turnover.

Early in May a German representative turned up in Stavanger in order to open up preliminary negotiations with the industry. The Germans intended to take over available stocks of canned food, in addition to which they wanted the entire future production.

The industry's representatives replied that they had to bring these questions before Norwegian authorities, who might want to reserve supplies for Norwegian domestic use, after which one would be prepared to discuss matters with the Germans in co-operation with our own authorities.

Centre of Industry

The industry's representatives shortly after held a meeting with the Norwegian Food Supply Department and the Board of Trade, both these departments being under the control of Administrasjonsradet. The industry placed itself at the services of the Norwegian authorities, and ever since a mutually satisfactory co-operation existed between the leaders of the said departments and the industry. Fortunately for everybody concerned there was no change in the leading personnel of the departments throughout the war; persons from N.S. (the Nazi Party) were not appointed to any of these leaderships.

Together with the industry's representatives these Norwegian authorities decided upon a pro-

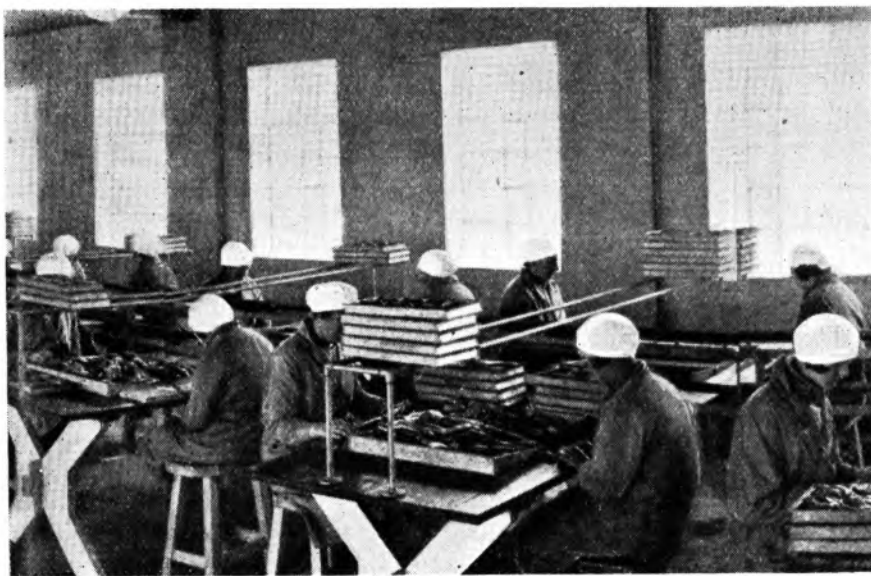
gramme regarding all future negotiations with the Germans. A special committee, called the Norwegian Canners' Export Committee, was formed under the auspices of Administrasjonsradet. It was decided that a certain percentage of spot stocks, and also of future production, would have to be reserved for Norwegian domestic trade and use and, upon the whole, all Norwegian interests were reserved.

Administrasjonsradet formed a resolution according to which the Norwegian Canners' Export Committee was appointed and elected by and from the board of directors of the three existing canned goods centrals—Brislingcentralen, Sildcentralen, and Kipperscentralen. It was prohibited to export from Norway any canned goods but those sold by and through the committee, and even these were subject to special export licences issued by the committee.

Negotiations with Germany

This arrangement for the canned food trade was a paragon for similar arrangements adopted by other Norwegian export trades who were compelled to export goods to Germany during the war.

The Norwegian Canners' Export Committee negotiated with German firms appointed by German authorities. The procedure was to call in Norwegian and German authorities when political questions arose. Mere technical matters were agreed upon between the committee and German buyers' representatives, who met in Oslo for this purpose. But the committee did always keep in touch with Norwegian authorities. No contract was signed by the committee without being criticised by officials of the Norwegian Board of Trade. And all contracts were subject to final approval by Norwegian and also by German authorities.



Interior of a Norwegian Fish Canning Factory.

Courtesy Norwegian Chamber of Commerce.

Our programme regarding goods for Norwegian domestic use formed a part of these negotiations, and the general results were—total stocks of canned brisling in olive oil packed in pre-war seasons, about 450,000 cases, in addition to 120,000 cases kippered herring, were reserved for the Norwegian population exclusively. The remaining kippered herring, in addition to spot stocks of small sild, about 800,000 cases, were sold to the Germans.

Difficulties of various kinds arose during negotiations—if this word may be used when negotiations are on unequal footing, owing to the occupation. One important difficulty was the question of prices, and this was finally solved by a German ultimatum.

Simultaneously an agreement was made regarding Germany's purchase of 1940 season's brisling pack, payment to be made over clearing by letters of credit payable in Norway.

Similar contracts were agreed upon every year prior to each season regarding brisling, small sild, and kippered herring. Out of every season's total pack 20 per cent. of the canned small sild, in addition to a certain part of kippered herring, were reserved for use by the Norwegian population. The Germans had an option of taking any part of the export goods for their troops in Norway. Thus sale to Germans in Norway of canned goods reserved for Norwegians was eliminated. Sales in Norway to civilians could be made against coupons only.

In the first two occupation years payment by letters of credit was maintained, but later it was altered to payment in Germany against documents. A new alteration in 1945 back to payment in Norway against documents saved the industry any

direct loss in the German wreckage.

The industry had great difficulties in getting raw materials. Black plates, also aluminium, were used for cans, and as olive oil was unobtainable sardines had to be packed in a mixture of sild oil and cod liver oil and tomato sauce.

Of these commodities Norway supplied some black plates, some aluminium, and the sild oil, also the cod liver oil. Germany supplied black plates and aluminium and the bulk of the tomato *purée*.

All of these commodities were rationed through the Norwegian Food Supply Department. The daily work in connexion with a fair distribution of the goods was undertaken

by the Norwegian Cannery Export Committee. Thus the committee carried out an essential work on behalf of the Norwegian authorities.

Annual Pack

One-half of a million cases brisling and nearly one million cases small sild are considered to be an average pack in Norway. The total pack did not by far reach these heights in any of the war-time years, for obvious reasons. The pack was handicapped by shortage of raw materials, transport difficulties, whereas there was always shortage of labourers.

The canneries and their centrals were subject to German control, and the Germans tried to assist in order to get the largest possible supplies and to eliminate difficulties. The assistance gave poor results from a German point of view.

In the kipper season German ships were forced upon the industry for transport of herring. The ships were conveyed over perilous coastal parts; the Germans did all they could, regardless of cost, to raise the supplies, and it resulted in an excess of kippered herring over previous years, but not enough to make up for decreases in brisling and sild.

In ordinary years canneries also pack several lines of goods destined for dinner food, such as canned meat, cod roes, fishballs, etc. The pack continued, but none of these goods was exported. They constituted a welcome addition to the Norwegian bill of fare as rationed through the Norwegian Food Supply Department.—“*Tidsskrift for Hermetikindustri*,” through *The Fishing News*.

Food Manufacture

Jam Manufacture

PART VI

GEORGE RAUCH

MOST factory-produced jam and marmalade in this country contains between 66 and 68 per cent. of sugar, the quality of which, the way it is added, and its treatment during the process of boiling being important factors affecting the finished product.

Cane and beet sugar are equally suitable for jam manufacture. The sugar used should be of high purity as indicated by the polarisation figures, ash content, etc.

Invert Sugar

During the process of boiling, sucrose undergoes a partial change into invert sugar, a mixture of equal parts of dextrose and laevulose.

The rate of inversion is influenced by hydrogen-ion concentration (pH) of the mixture, boiling temperature, and boiling time. Invert sugar retards or prevents crystallisation of sucrose in jam, and it is therefore essential for the keeping properties

of the product to maintain a balance between sucrose and invert sugar. Low inversion may result in crystallisation of the sucrose and high or complete inversion into granulation of dextrose. As a rule the amount of inverted sugar in jam should be less than the amount of sucrose present.

The optimum percentage of invert sugar is between 35 and 40 per cent. of the total sugar. As fruits differ in acidity, and boiling conditions vary, the maintenance of constant invert sugar figures imposes difficult problems on production control.

The acidity of fruit can be controlled and kept at an optimum range of approximately pH 3. Low acidity is made up by the addition of acid or pre-inverted sugar, while high acidity is checked by the use of buffer salts. Stable steam pressure, the immediate discharge of jam from the units after it has been boiled, and cooling are important items in the maintenance of quality.

It is not always practicable to obtain the desired percentage of invert sugar from the cane sugar during the process of boiling. In some cases, particularly when fruits of low acidity are used, the boiling must be deliberately prolonged; this also applies when cooking in a vacuum pan where practically no inversion occurs, when it is advisable to replace part of the cane sugar with pre-inverted sugar syrup.

Invert Sugar Syrup

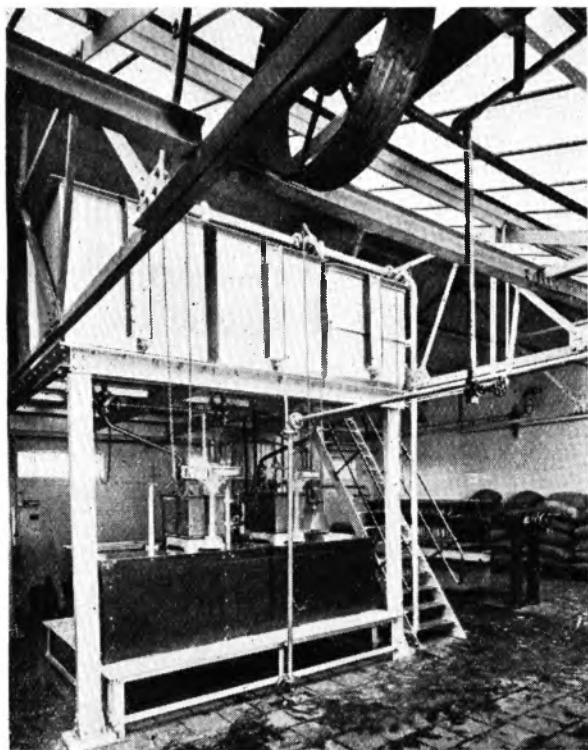
In order to obtain an invert sugar that will not crystallise a proportion between invert sugar and sucrose of approximately 2 to 1 should be maintained. A simple method is to mix 100 lb. sugar, 30 pints water, and $2\frac{1}{2}$ oz. tartaric acid and heat to 200° F. This temperature is maintained for 30 minutes, and after short cooling $2\frac{3}{4}$ oz. bicarbonate of soda is added to neutralise the acid. It should be remembered that the boiling point of totally inverted sugar syrup is 3° F. higher than uninverted sugar of the same concentration.

Determination of Invert Sugar in Jam

Frequent and systematic control of the invert sugar percentage is the only safeguard for a stable quality of jam.

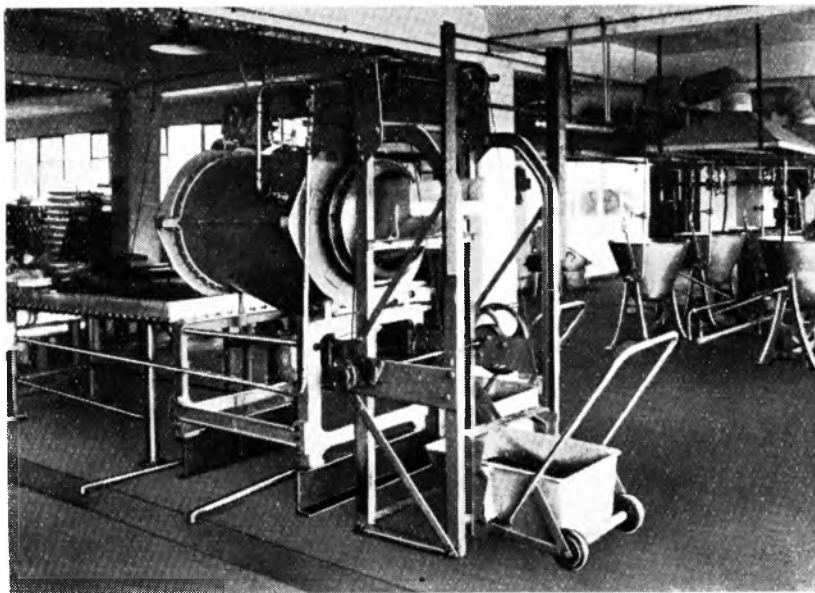
The following laboratory method has been adopted:

5 g. of cold jam is dissolved in hot water and stirred until the jam is in suspension. The suspension is transferred to a flask, made up to 250 ml., and brought to boiling point. It is then cooled to



Small model sugar-dissolving and filtration plant, view showing filter press, weighing and pan-charging unit, and storage tanks.

Courtesy William Brierley, Collier and Hartley, Ltd.



Jam cooler, boiling pans, and complete installation by A.P.V.
Courtesy Redman, Ltd.

15° C., made up to the 250 ml. mark, and filtered.

25 ml. of Fehling's solution are pipetted into a conical flask and brought to the boil. While boiling, the jam solution is added from a burette until the blue colour changes to a muddy red. Two or three drops of a 1 per cent. solution of methylene-blue added to the Fehling's solution will make the change more distinct.

Addition of Sugar to Jam

Sugar may be added to the fruit or pulp either in solid form or dissolved in water or sugar syrup. There is still a good deal of controversy as to which way is preferable, but from the purely technical point of view every conceivable advantage lies with the syrup method. There is, however, a case to be argued for the addition of solid sugar.

Addition of solid sugar frequently causes a slight burning of the sugar, particularly on the surface of the boiling pans, resulting in the caramel flavour which is so characteristic of home-made jam. Many people prefer this flavour, and since taste for jam is acquired and highly individual, it is idle to argue that the taste of caramel masks the subtler flavour of the fruit.

On the other hand the addition of sugar syrup has many advantages. The syrup plant effects a

saving of time and labour, the weighing is of far higher accuracy, and the filtration process removes such impurities as fibres from sugar bags, insects, etc. Finally the colour and stability of the jam are greatly improved.

Syrup Plant

Syrup plants are still comparatively expensive, particularly for small factories, but eventually the expenditure is usually well justified. Most systems work on similar principles as shown in Fig. 1. The plant consists of a melter (A), filter presses (B), an air compressor (C), pumps (D), an automatic weighing machine (E), and storage tanks for water and syrup (F).

To prevent crystallisation the syrup is kept at a concentration of 66 per cent. A measured amount of sugar and water is introduced into the "melter" where the sugar is dissolved. The syrup now flows through a tank and the filter presses to the storage tanks, which are thermostatically controlled to keep the syrup at a constant temperature. From there it is discharged through an automatic weighing machine into the boiling pans (G). Compressed air is used for the filtration process and occasionally for the charging of pans.

Stainless steel sugar syrup plant by A.P.V.
Courtesy Redman, Ltd.



SYRUP PLANT

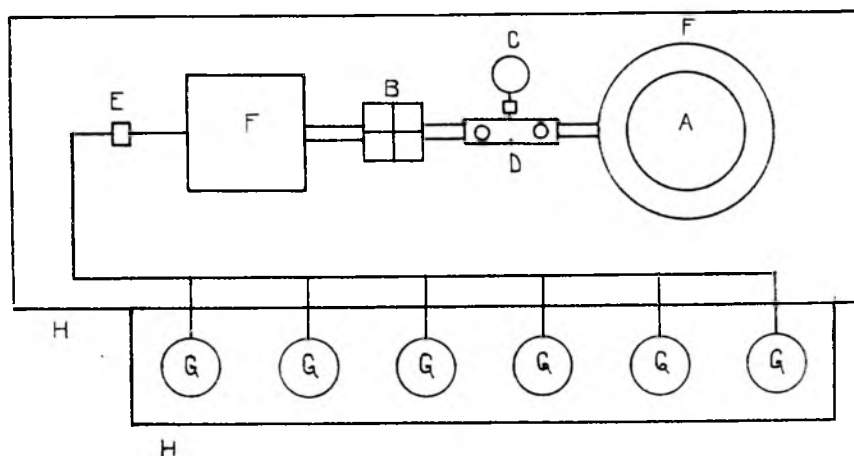


Fig. 1.

- A. Melter.
- B. Filter.
- C. Compressor.
- D. Pump.
- E. Weighing machine.
- F. Storage tanks.
- G. Boiling pans.
- H. Platforms.

In the absence of an elaborate syrup plant it is possible to improvise as shown in Fig. 2. Syrup boiling pans (A) with bottom discharge valves are placed above every jam boiling unit; either an elevated platform or preferably the floor above the jam pans will suit the purpose. The boiled syrup flows from the bottom discharge valves into a strainer (B), and from there through funnel-shaped pipes (C) to the jam boiling units below (D). The sugar for every single boil has to be weighed, and the syrup boiler releases his charge when signalled by the jam boiler. This process has the advantage of shortening the boiling time of jam, and the strainer will retain such coarse impurities as fibres, insects, etc.

sugar by glucose, otherwise known as crystal or corn syrup. Glucose is a slightly sweet, colourless substance of high viscosity and is derived by hydrolysis from highly refined potato or maize starch. The addition of glucose gives jam a brighter appearance, retards crystallisation of sucrose, and prevents the exudation of syrup known as "weeping" in jellies. Furthermore, glucose reduces the sweetness in jam, which is particularly important for export, since one of the principal objections against English jams is their excessive sweetness. Glucose should be added to the boilings shortly before they are finished to accelerate cooling.

Acidity

In previous articles the influence of acids on gel-formation and the inversion of sugar has been discussed. It is now proposed to deal with the more general aspects of acidity in jams and fruits.

When discussing acidity it is necessary to distinguish between quantity and intensity. The quantity or total acidity is measured by the amount of

Glucose

The quality of jam and jelly is improved by substituting approximately 5 to 15 per cent. of the

IMPROVED SYRUP PLANT

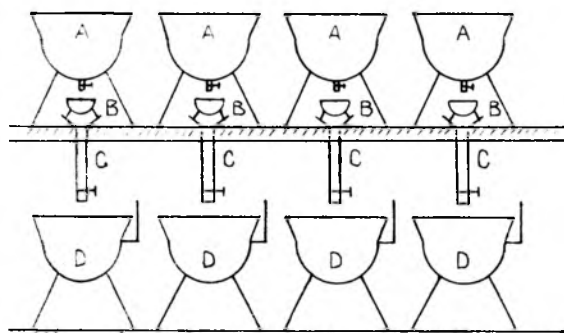


Fig. 2.—A. Boiling pans with bottom discharge valves.
B. Strainers. C. Pipes. D. Boiling pans.

TABLE 1

	Acid Content Per Cent.	pH Values Per Cent.
Apples ..	1.11	2.9-3.8
Apricots ..	—	3.4-3.2
Blackberries ..	0.85	3.2-3.6
Black currants ..	3.48	—
Damsons ..	2.48	3.3
Gooseberries ..	2.22	2.8-3.2
Cherries ..	0.88	2.6-4.0
Loganberries ..	—	3.3
Greengages ..	1.20	—
Oranges ..	—	3.1
Peaches ..	—	3.4-3.6
Red currants ..	2.54	—
Red plums ..	1.74	3.3
Raspberries ..	1.73	3.4
Strawberries ..	0.93	3.4



For practical purposes in works, pH meters based on electronic principles are available. The picture shows a pH meter operated from internal dry batteries.

Courtesy Marconi Instruments, Ltd.

alkali required to neutralise it. The intensity is determined by the pH value.

Fruits vary in pH value between pH 2.6 and pH 4.1. Table 1 shows average figures for English fruits (Macara) expressed as citric acid, and an indication of approximate pH values of fruit.

Total acidity is determined by titration, and the pH value by colorimetric or electrometric methods. For practical purposes in works pH metres based on electronic principles are available, colorimetric tests requiring considerable skill.

Low acidity of fruit is made up by the addition of acids, the most popular of these being citric, tartaric, and lactic acid. The amount used varies between 0.1 and 0.2 per cent of the total weight of jam. In case of excessive acidity buffer salts such as calcium carbonate, sodium sulphate, sodium citrate, etc., can be used. Buffers must be used with great discretion since they are liable to affect the setting properties of pectins and invariably destroy ascorbic acid.

Colours

A good preserve should appeal to the eye as well as to the palate.

For this reason the colour of jam is a factor of considerable importance. No colouring is required for jams produced from fresh fruit providing the boiling time is short and the heat not excessive. According to the Jam and Marmalade Order, 1942, fresh fruit standard jam must bear a declaration stating that it contains no added colouring matters.

The natural colour of fruit is, however, always affected by preservation with SO_2 , and in some cases by the process of boiling, necessitating the addition of colour.

In colouring preserves the aim should be to restore the original natural appearance as closely as possible; regulations permit the addition of all colours except those listed as harmful in the Ministry of Health Schedule.

Coal tar colours are most frequently used (anilin colours), and to a lesser extent those of vegetable origin. It is essential that the colours should be intensive, readily soluble, and stand high concentration in solution. As a rule acid colours are of higher stability than basic ones. Colours should be acid proof; many are affected by acids, and particularly by sulphur dioxide present in glucose and fruit pulp. Ponceau 2R and Erythrosine are satisfactory. They must also be lightproof, and have a certain stability to heat. All colours suffer from prolonged and excessive heat, and should therefore be added at the last stage of the boiling.

The following tests are suitable for laboratory practice:

Intensity.—0.1 g. of colour is dissolved in 100 ml. of distilled water, then take 1 ml. of this solution and add 9 ml. of water. This should be repeated by diluting again in proportion of 1:10. The same operation is continued until the colouring still shows in one dilution but ceases to be visible in the next one. The number of dilution will indicate the intensity.

Effect of Acid on Colours.—200 ml. of colour

solution (1 g. in 500 ml. of distilled water) is prepared, divided into equal parts, and to one is added 0.5 g. of citric acid. Both samples are left for 3 days in a dark place, after which the acid solution is boiled for 1 hour, replacing the evaporated water, and comparing any fading which may have occurred.

Effect of Light on Colours.—A solution of colour (1 g. in 500 ml. of distilled water) is exposed to intensive light for a period of 4 weeks, and then compared with a sample which has been kept for the same period in a dark place.

Dissolving of Colours

Colours for the manufacture of jam are purchased in powdered form. No more should be dissolved than is usually used in a day, since many colours have a tendency to precipitate on standing. Instead of using graduated volume measures, weighing of the required amount will greatly increase precision.

When dissolving, the colour is mixed to a paste with a little cold water, adding the required amount of boiling water, and stirring well.

A standard set of jam samples showing the approved range of colours should be kept in the boiling house to enable the jam boiler to check any variations in shade.

(To be continued)

Food Consumption in 1945

THE Combined Food Board, reviewing the war-time food experiences of the civilian populations of the United States, Canada, and the United Kingdom, say that, regarded solely from the nutritional standpoint, food supplies available to civilians in all three countries show certain improvements since 1939. Furthermore, rationing, larger earnings, and controlled prices have led to more uniform distribution among the population than before the war. All three countries have maintained a standard of diet sufficient to ensure health and morale, though there have been important differences between them.

In the U.K. there was an abrupt change in the character of the diet in 1940 and 1941: meat, fish, eggs, fats, sugar, and fruit were reduced by 20-40 per cent., and the gap was filled by gradual increase in the consumption of grain products, potatoes, vegetables, and milk. In this way the nutritional value of Britain's food was largely restored, but the diet became much plainer and less attractive. After 1941 there was a partial restoration of supplies of meat, fish, cheese, and eggs, while the fall in fats and sugar was arrested, and by 1944 some degree of recovery in the overall British food situation had been attained.

By that year civilian consumption of fats and sugars in the two North American countries had declined to a level 10-15 per cent. below 1941, and supplies of fish, cheese, and evaporated milk in the U.S.A. had also been reduced. Supplies of most other foods were, however, larger in 1944 than in 1941. Since 1941 represented a recovery from the low consumption of 1935-39, civilian consumption in 1944 of all major foods except fats and sugar was at levels higher than in 1935-39.

Early in 1945 reduction in world production and available supplies, together with the increased requirements of the Forces and of countries formerly held by the enemy, resulted in world-wide deficits in such important foods as meat, sugar, fats, and rice. At a series of discussions held in Washington last March agreement was reached whereby civilian consumption was scaled down in all three countries. As a result supplies of fats and sugar in all of them fell still further below the levels of 1935-39. Meat consumption declined in North America, largely because less pork was produced; but the 1945 level is still higher than before the war in Canada, and is once again at 1935-39 levels in the U.S.A., though with a higher proportion of offals such as liver and kidneys. Meat consumption in the U.K. in 1945 fell to about 21 per cent. below the pre-war level. Against these reductions there is expectation of some increase over 1944 in supplies of fresh milk in all three countries, of eggs in the United States and Canada, and of fish and fruit in the U.K. In all three countries grain products and vegetables will be adequate.

In 1945 consumption is lower in the U.K. than in the two North American countries by about 5 per cent. for fats, 15 per cent. for sugar, 25 per cent. for meat and milk, 40 per cent. for eggs, 40-60 per cent. for fruit, and 90 per cent. for poultry. On the other hand, consumption in the U.K. exceeds that of the U.S.A. and Canada by about 20 per cent. for grain products, 50-100 per cent. for potatoes, and about three times for fish. Consumption of vegetables is lowest in Canada and highest in the U.S.A. So far as milk, eggs, poultry, fish, and fruit are concerned the differences reflect differences already evident before the war.

After allowing for different methods of evaluation, supplies in terms of Calories do not vary widely between the three countries, those in the U.S.A. being about 7 per cent. higher than in the U.K. and 3 per cent. higher than in Canada. U.K. supplies of fats are 10 per cent. lower than those of the North American countries. The U.K. is also about 25 per cent. lower than the U.S.A. and Canada in animal protein but about 25 per cent. higher in vegetable protein. There is no material difference as regards carbohydrates.

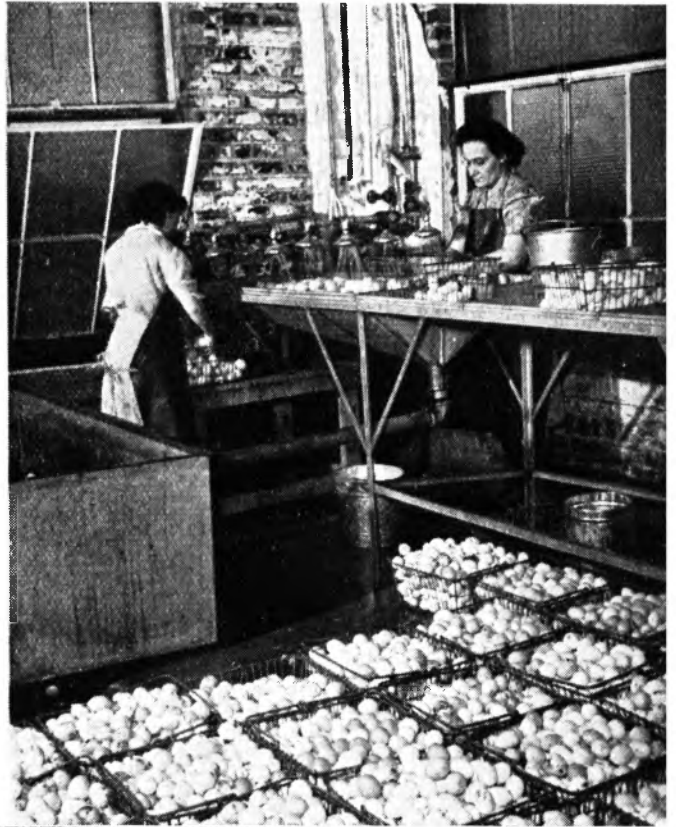
All three countries show improvement in the mineral content of the diet since 1935-39, and the vitamin content of *per capita* food supplies in 1945 is for the most part higher. Canadian supplies of ascorbic acid (vitamin C) are improved, but are still only about 60 per cent. of those in the other countries. Similarly, the vitamin A content of the U.K. diet is only about 60 per cent. of those of the U.S.A. and Canada, even allowing for different methods of assessment.

"It may still be said," in the opinion of the Combined Food Board, "that, assuming equitable distribution, in all three countries requirements are exceeded by supplies."

Eggs—From



At the egg-drying plant the eggs are unpacked, and put into buckets. This year in the U.S.A. there are approximately 85 egg-drying plants with a capacity of 300,000,000 pounds compared to 18 plants in 1940, with an output of 7,400,000 pounds.



The first step in the egg-drying process is a thorough washing of the eggs brought into the drying plant. This is necessary for a clean and wholesome finished product.



Each egg gets an individual scrubbing. No imperfect eggs are allowed to pass the inspectors.

Shell to Powder

In the breaking room operators quickly crack the eggs on a breaking bar or wire and drop the contents into a cup. When there are three eggs in a cup the operator smells them to determine whether or not any bad ones have been broken into the cup. If the smell test reveals the presence of bad ones, she dumps the contents of the cup into a waste container. Women in the plant wear clinical white uniforms and caps. They are not allowed to use perfume, which might be absorbed in the eggs, nor are they allowed to use cosmetics and nail polish. Extreme cleanliness is emphasised.



Some egg-drying plants are equipped with a "sucker" machine that recovers all the egg albumen. The operator places each half shell on the suction device, waits a moment for the machine to operate, then presses a lever, whereupon the dry shell falls into a receptacle, while the albumen goes into a glass container suspended from the bottom of the machine.



The operator dumps the egg meats from the cans into churns, which thoroughly mix (homogenise) whites and yokes before the eggs are made into powder.





The homogenised liquid egg is run into large cans to be frozen and held for future use. This is necessary sometimes when the eggs are coming into the drying plant so fast that the breaking and homogenising processes get ahead of the drying operations.

Picture on right below.

A bacteriologist prepares a sample of dried eggs for examination. A bacterial count will be made on the sample she is pipetting from the bottle. Each batch of powder is carefully tested before shipment.

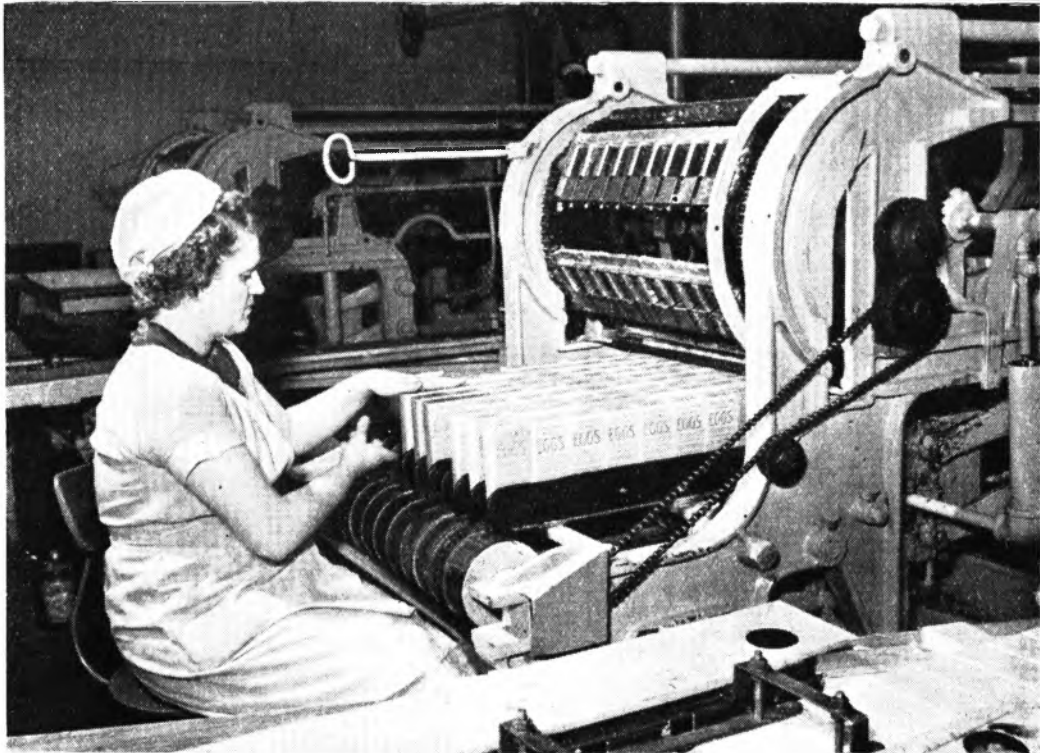


Picture on left at bottom of opposite page.

Drying eggs is a simple process. The homogenised liquid egg is strained and piped through a machine which pumps it under high pressure through tiny nozzles in a mist-like spray into a large, heated drying chamber. As the sprayed liquid strikes the heated air (180° F.) it is quickly transformed into a dry yellow flaky powder. The powder is here shown on its way up a conveyor into a hopper and then into a machine that loosens up the powder so that it will pack well for shipment into barrels.



Some of the dried egg made in the United States for the United Nations is put up in consumer-size packages. Here an operator runs the dried egg that has been delivered from the drying plant in big barrels through a funnel into 5-ounce packages.



After check-weighing, the 5-ounce packages of dried egg are put through a machine which wraps each one in waxed paper and dips it to seal and protect the contents from moisture. Each 5-ounce package contains egg powder equivalent to a dozen fresh eggs.

Ministry of Food

Latest Statutory Rules and Orders

The list given below is the continuation of the list of Orders published in *Food Manufacture*, December 1, 1945, page 440.

No.	Date. 1945.	PRICE FIXATION ORDERS
544	May 12.	Order amending the Imported Apples (Maximum Prices) Order, 1944, and the Home-Grown Apples (Maximum Prices) Order, 1944.
555	" 15.	Order amending the Dried Fruits (Control and Maximum Prices) Order, 1943.
556	" 14.	Hay (Control and Maximum Prices) (Great Britain) Order. Revokes S.R. & O. 1944 No. 601.
557	" 14.	Hay (Maximum Prices) (Northern Ireland) Order. Revokes S.R. & O. 1944 No. 602.
570	" 17.	Potatoes (1944 Crop) (Charges) (Revocation) Order. (Emergency Powers (Defence) Act, 1939. S.2.) Revokes S.R. & O. 1944 Nos. 1202 and 1231.
578	" 18.	Order amending the Meat (Maximum Retail Prices) Order, 1942. (1939 No. 927. Reg. 55.)
584	" 23.	Order amending the Fish (Maximum Prices) (No. 2) Order, 1944.
598	" 24.	Order amending the Chocolate, Sugar Confectionery, and Cocoa Products (Control and Maximum Prices) Order, 1944.
626	" 28.	Order amending the Bread (Control and Maximum Prices) (No. 2) Order, 1943.
629	" 20.	Order amending the Meat Products, Canned Soup, and Canned Meat (Control and Maximum Prices) Order, 1944.
645	June 1.	Order amending the Eggs (Control and Prices) (Great Britain) Order, 1944.
646	" 1.	Order amending the Eggs (Control and Prices) (Northern Ireland) Order, 1944.
688	" 7.	Order amending the Salmon (Maximum Prices and Distribution) Order, 1944.

FRUIT

644	June 1.	Order amending the Soft Fruit Order, 1945.
712	" 13.	Order amending the Soft Fruit Order, 1945, and appoint a Day thereunder in respect of Raspberries.
785	" 26.	Plums Order. Revokes S.R. & O. 1944 No. 730.
821	July 5.	Pears Order. Revokes S.R. & O. 1942 No. 1000; and as regards pears only, 1943 No. 5; 1944 No. 1201.
911	" 24.	Fruit Pulp Order. Revokes S.R. & O. 1944 Nos. 798, 1160.

No.	Date. 1945.	INFESTATION
847	July 11.	Order amending the Infestation Order, 1943.

MANUFACTURED AND PRE-PACKED FOODS

758	June 20.	Order amending the General Licence dated September 11, 1943, under the Manufactured and Pre-Packed Foods (Control) Order, 1942.
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NUTS

757	June 19.	Order. Revokes S.R. & O. 1942 Nos. 558, 645,* and 917; 1944 No. 308; 1945 No. 100.*
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(* In respect of Nuts only.)

POINTS RATIONING

864	July 16.	Rationing (Personal Points) Order.
801	" 20.	Rationing (Points Rationing) Order.

POTATOES

790	June 23.	Order amending the New Potatoes (1945 Crop) Order, 1945.
802	July 20.	Potatoes (1945) Crop (No. 1) Order. Revokes S.R. & O. 1945 Nos. 391, 716, 779.
987	Aug. 13.	Potatoes (1945 Crop) (Restriction on Sales) Order.
1187	Sept. 25.	Potatoes (1945 Crop) (No. 2) Order. Revokes S.R. & O. 1945 Nos. 892, 987.

RATIONING

581	May 22.	Sugar. General Licence under the Food Rationing Order, 1945. (1944 Nos. 843, 1355, and 1409.)
588	" 23.	Order amending the Fats, Cheese, and Tea (Rationing) Order, 1944.
580	" 24.	Order amending the Bacon (Rationing) Order, 1944.
861	July 16.	General Provisions Order. Revokes S.R. & O. 1944 Nos. 843, 844, 845, 846, 848, 849, 968, 969, 1065, 1115, 1164, 1355, 1356, 1409; 1945 Nos. 7, 227, 333, 355, 436, 582, 588, 589.
863	" 16.	Sugar and Preserves Order.
805	" 16.	Meat Order.
866	" 16.	Bacon Order.
874	" 17.	Fats, Cheese, and Tea Order.

SOAP

862	July 16.	Soap (Licensing of Manufacturers and Rationing) Order. Revokes S.R. & O. 1944 No. 850; 1945 No. 600.
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The Story of FAO

The second and concluding instalment of an article analysing the scope of the Food and Agriculture Organisation

F. LE GROS CLARK, M.A.

ONE of the movements of the human mind that has helped to mould the Food and Agriculture Organisation is that usually identified with the modern science of nutrition. The last quarter of the nineteenth century had been dominated by the bacteriological discoveries of Pasteur and his colleagues; and there was a tendency in medical circles to forget the earlier speculations about the cause of scurvy, rickets, and other deficiency diseases. It was only when workers in Japan and Indonesia began to appreciate the true nature of beriberi, and when Hopkins and others revived and confirmed the experimental conclusions of Lunin, that the need of "accessory food factors" in the body's economy was finally demonstrated. The experience of post-war relief in 1919 accelerated the search for these accessory factors, to which the convenient label *vitamins* had meanwhile been attached. The investigations accorded very well with the mood of medical science, which had been turning since the early century from a mere study of the micro-organisms of disease to an interest in such powers as the body possesses to resist them. The number of recruits rejected by some of the armed forces, for no reason but that they were below standard in physique and capacity, forced the realisation that there is a mid-way state of health, below the level of full vigour and yet characterised by no specific disease. What could this subnormal condition be, if it were not the result of years of malnourishment? The bodies of these men lacked *stamina*; they were not underfed in the strict sense of the term, but they had been ill-provided with the accessory factors in the diet that ensure the smooth flow of chemical interchanges within the tissues. They might, it was later thought, be described as suffering from states of sub-clinical deficiency. Whether or not the explanation was in all cases as simple as this, they were certainly subject in many instances to minor infections that could have been prevented by recourse to a proper diet.

Vitamins and Proteins

The work of the last thirty years both on vitamins and on the nature and composition of the proteins has made the position tolerably clear. There are a large number of complex substances required in the economy of the human body that the

body itself is totally unable to synthesise from simpler compounds; it must absorb them more or less in their original complex forms, as they have been elaborated by other modes of organic life. Such substances must, therefore, be supplied in the food; and the obvious conclusion is that the diet must be sufficiently diversified to ensure that all the essential substances are provided in the amounts needed by the tissues. Yet it is demonstrable from surveys that the diets of many communities are not sufficiently diversified. Members of such communities not only must be, but are medically shown to be malnourished to a greater or lesser degree.

That summarises briefly the medical case for an ample supply of animal and vegetable foods. But of course the direction taken by research workers over the last thirty years has been affected and in a sense charted for them by the profound social changes that have been influencing them in common with their fellows.

Care of Child Life

The mood of disquiet in the early century about the supposed symptoms of "national deterioration" was associated with movements for the more systematic care of child life and health. The high rates of infant mortality and of maternal mortality were beginning to trouble the conscience of the western countries. In most of these countries a few schemes were promoted for the provision of meals to malnourished school children. The war of 1914 revealed the problems and complexities of rationing, and the biochemist and the physiologist had to be called into consultation. This gave them both the publicity they may not have desired and the chance they needed. When the armistice showed many of the European cities to be perfect laboratories for the study of rickets and other deficiency states, they had their opportunity; and their opportunity gave the public its own opportunity of grasping the fact that a large proportion of it was by all counts ill-nourished. The vitamin became an explosive social force. Whatever attempt some of the research workers may have made to resist the social influences about them, there is no question that men in our own country, such as Hopkins, Orr, McCarrison, and M'Gonigle, were in some measure moved by the condition of the people whose nutritional state they examined or

discussed; and what is true of our own workers in this field is presumably true of their contemporaries abroad.

Political Implications

Now, medical research of this kind does not necessarily reach wrong conclusions, because the research worker is touched by the sense of preventable suffering; on the contrary, he has, like his colleagues in other fields, to attempt the solution of such pressing problems as society at the moment seems to present to him. A few critics in the 'thirties expressed an opinion that malnutrition was becoming something of a political cry; but conviction was by that time so deep-seated in most classes of society that it is doubtful whether the scientific critics were not themselves manifesting their political bias. Reports such as that prepared by Burnet and Aykroyd for the League of Nations, or that concerned with nutrition in our own colonial areas, were providing a mass of evidence that could not be denied. At all events, the mass of evidence upon which McDougall, Bruce, and their friends could rely, when in 1935 they opened their campaign for an expanding farm production, was sufficiently imposing to make it no longer possible to ignore the political implications of the problem. A fair proportion of the world is not only assured on evidence that it has been poorly fed for generations; it is equally certain, though perhaps without evidence, that the underproduction and the maldistribution of food are one of the main causes of war.

Establishment of FAO

The natural outcome has been the establishment by the United Nations of the new Food and Agriculture Organisation. What precisely have we achieved by such a measure? It must be fully realised in the first place that FAO possesses no "super-national" or even "extra-national" attributes. It is not super-national, because it cannot dictate policy to any one of the sixty odd sovereign nations that occupy the land surface of the globe. It is not extra-national, because it has no funds and so no means of operating beyond the funds and the means granted it by the nations that jointly sustain it. By definition some 40 per cent. of its funds for the first five years will be drawn from the U.S.A. and Great Britain together; and it must, therefore, be assumed that its success depends in great part upon the goodwill of these two nations. It is thus a machine through which the nations of the world may work to their own advantage, if they desire so to do. A State may contract into the organisation; but it can as freely contract out, provided, of course, it has given due notice and has met its financial obligations up to date. It is all, as some American writers have noted, like a piece of permissive legislation within a single country, which the organs of local government may carry out or not, as they choose.

If this is to be a thoroughly democratic world, then it is obvious that a reliable fact-publishing body of this nature, even if it does no more in the first instance than publish facts, can yet have a profound influence upon policy. An unbiased analysis of farming conditions and consumption levels in Iraq, say, or Peru will have its effect, if it is supported by public opinion in these countries and among their neighbours. But the published reports will patently have to be beyond suspicion of influence either from political and commercial interests in the countries concerned or from the great nations, who will, of course, have to advance credits for any agrarian reorganisation that is contemplated. FAO will have to establish a sound international reputation; it must, for example, be beyond any suspicion from the more backward countries that it is merely a mouthpiece of American policy; and it must equally convince American opinion that, even if its recommendations do not run along the lines of immediate American interest, it should yet be supported to the limit.

Moral Influence of FAO

In brief, we have in FAO a body that will have to rely upon its moral influence in the world, at any rate during its early years of development. The same principle applies to every part of the structure of the United Nations Organisation into which FAO will have gradually to be integrated. Moral influence means relative independence, in its reports and recommendations, from the political or commercial or agrarian interest of any one country; and this, it must be realised, was never fully possessed by the functional organs of the League of Nations. While FAO can command no funds beyond its operating expenses, it can yet act morally as a true international entity; and it can thus attach to itself a kind of international loyalty that helps us to break slowly through the limitations of outworn nationalism.

Reform Systems

It is assumed that, where a country is prepared for reform in its agrarian or its marketing system, the advice of FAO on the advance of credits will be accepted by any international banking house that is established; but it is also assumed that the country concerned will for its part carry through its reforms in accordance with the recommendations of the international experts. This is probably a necessary safeguard to prevent the credits made available being expended merely in supporting a wasteful farming economy. But once again it will be very desirable to convince the country that the reforms are not being initiated in the interests of some dominant nation, such as Britain, Russia, or the U.S.A. World opinion will have to be mobilised behind the new body. Its functions, too, appear at present to be limited to the problems of reform within the various countries and not to in-

clude the problems of international commodity agreements and transactions among the countries of the world. It was at one time supposed that such instruments as the Wheat Agreement and possible agreements with regard to sugar, cotton, bacon, or coffee would come under the control of the new organisation. FAO may certainly comment upon the terms of commodity agreements of this nature, but it now seems probable that all commodity agreements will be handled through a distinct organ of the United Nations. There is some sense in this. The world market has to be viewed as a whole and includes many commodities beyond those defined as agricultural in the widest sense. Yet it is evident that the satisfactory marketing of foodstuffs will become in the next few years the most complex of all the problems affecting farm prosperity and the dietetic levels of the world's populations; if it is to be a true instrument of world policy, FAO will have to intervene in the international markets.

Marketing and Distribution

The weakest section of the reports issued after the conference at Hot Springs was that dealing with the marketing and distribution of food. When it was concerned with the problems of human nutrition and of farming, the conference clearly felt itself on firm ground; when it came to consider matters of processing and distribution, it seemed to tread more cautiously. More than one American observer commented that the conference had boasted of its essentially scientific character, but that it might have been better had it contained a larger proportion of administrative and "operating" minds. Most of the nations represented were, however, those in which free enterprise still dominates in the commercial and manufacturing field, and it is likely that the delegates were uncertain how far the policy of governments would permit any interference with the existing commercial structure. The interim commission had certain remarks to make about the influence on prices of monopolist tendencies, but it was not clear what might be done about it beyond impressing upon member States the need to control such tendencies. Much will depend upon the powers tacitly granted to FAO over the next few years by the democratic peoples of the world.

Regional Patterns

We can see for ourselves that the world is already assuming a certain regional shape, and this may be inevitable. The influence of the U.S.A. over soil conservation policies in Latin America and over fishing agreements in American waters is already very manifest. Britain is beginning to take measures towards agrarian reform in many of her colonial areas, and it seems probable that agrarian

reforms and policies in Eastern Europe will be profoundly affected by Soviet theory, even if the countries concerned do not adopt the Soviet farming model. India has her own acute problems of reorganisation, and we are still in doubt what influences outside her own borders will most deeply affect the changing Chinese economy. This regional pattern will do no harm provided only its implications are observed and admitted by FAO. It may be unavoidable in the present state of the world, and the business of FAO is not to aim at an ideal world economy, but to take matters as it finds them and attempt to guide the emerging trends towards a more and more integrated international market for food and other agricultural products. Many of the schemes it should promote will be such as may themselves break through national frontiers and fuse together the economies of several neighbouring countries; obviously such schemes as those of locust and pest control and those concerned with the development of large waterways tend to move in this direction. So far as they do so they are a wholesome stage towards internationalism, which implies ultimately the advantageous economic interdependence of countries whose cultural, scientific, and educational genius can then be released for the common benefit of all.

Food Calculations

DR. MARGARET WRIGHT has written a handy little book* of 33 pages mainly directed to its reading by laymen, her purpose being to show by simple methods how the necessary quantities of the different components can be obtained in the diet. This is done largely by means of charts.

The suggestion is that if the reader will tabulate his or her own diet and determine by the same method as that employed in the book how far it satisfies the standard suggested, a practical insight will have been gained which might otherwise take months of abstract study to obtain. Blank charts are given in order to facilitate this.

The author refers to those rationed foods the constituents of which, especially the protective factors, are not likely to provide sufficient for the day, and the best supplementary sources are indicated.

A chart giving figures largely from Orr's book *Food, Health and Income*, headed "Our food in and before 1934," again calls our attention to the gruesome picture of $4\frac{1}{2}$ million people each spending 4s. weekly, 9 million people spending 6s. weekly, and 9 million people spending 8s. weekly on food.

The effect of destructive cooking on the vitamin C of vegetables is plainly indicated by a chart.

The method is to be recommended as an introduction to the teaching of dietetics for those who wish to teach themselves, or as rapid reference notes for the professional dietitian.

* *Food Calculations—A New Method*. By Margaret Wright, M.B., B.S. Pp. 33. London. 2s. 6d.

Dairy Refrigeration

TRACING the development of milk treatment from its early days to the present time, Mr. A. Graham Enock, in a paper read at a recent meeting of the Institute of Refrigeration, made some suggestions as to how future improvements in the efficiency of the heat treatment process could be realised.

Milk Cooling Methods

Describing an early application of refrigeration to milk cooling by means of the open-surface double-stage capillary-type milk cooler, the lecturer passed on to the different improvements which had taken place, such as the plate-heat exchanger and the "Stannaniser." He considered that the entirely different method of the pasteurisation and cooling of the milk in the bottle was one which had not received the popularity that many people thought it deserved. It was unquestionably an ideal method of treating milk, because it eliminated all sources of post-pasteurisation contamination, which in other methods may occur in the cooling and bottling process or through inefficient cleansing and sterilising of the bottles or the plant.

Mr. Enock enlarged upon the details of the different types of H.T.S.T. pasteurising and cooling plant and also summarised the developments that had taken place.

Cream and ice cream mix requires very much the same equipment as for milk, although usually on a smaller scale.

Future Developments

Referring to possible lines of future development, Mr. Enock thought that refrigeration as installed in dairies should require less of the operator's attention. More attention should be given to the economical side of its application. Tremendous wastage of power and water takes place due to plants not always operating efficiently.

Research might also be made into the possibilities of rapid chilling of milk in the bottle. If means could be found for cooling milk in, say, eight to ten minutes, and the H.T.S.T. system or some equivalent formula for effectively heat treating the milk were employed, the present accepted ideas of bulk cooling might undergo a radical change. The dairy industry might well look more to the refrigerating engineer than the dairy engineer to find a solution to this problem.

The Carton System

A number of cases, continued Mr. Enock, require special consideration, such as where milk is distributed in factories and shops, where the heavy

losses in bottles make the supply of milk in single-service containers a commercial proposition.

The use of the carton system for large-scale distribution would make it necessary to produce about twenty cartons for a penny to make it competitive; nevertheless, the possibility of an increase in this system cannot be dismissed. In the event of cartons becoming an economical proposition the possibility of quick-freezing milk in the cartons should be borne in mind. This is an important potential change from present milk-cooling practice which might be brought to the dairy industry through refrigeration, but it is dependent also on the production of very much cheaper single-service containers than is possible to-day.

Speaking of education in the industry, Mr. Enock mentioned a recent report of the Society of Dairy Technology which contained the suggestion of the establishment of a Dairy Technological Institute. He thought that this would provide the opportunity, never before available, of developing dairy refrigeration along the best, most acceptable, and soundest lines in the future.

The Discussion

During the discussion which followed Mr. Enock's paper Mr. KENNETH LIGHTFOOT (the President) said that in the entire process of the production and treatment of milk something must be done with regard to the cooling of milk at the actual dairy farm. So far as he knew there did not exist any rules or regulations about it, and the farmer was left to do such amount of cooling as he thought fit. It would be a very great improvement if something much more definite could be laid down on the matter.

Mr. F. J. CLARKE mentioned having recently seen in America direct expansion coolers of the cabinet type cooling ice cream mix to 34-36° prior to freezing. He thought the problem of ageing ice cream mix in vats was not one of cooling the mix further in the vat but of maintaining the temperature at which the ice cream was cooled. It was therefore necessary to take care of any heat loss during the ageing period, although this had been cut down considerably in many cases. He added that in the latest type of ice cream hardening room—and the trend was very much that way now—the coils were excluded from the room altogether, and this gave the opportunity of rapid de-frosting by recirculating air at atmospheric temperature over the coils. In some cases calcium chloride brine was used and the temperatures were run down to -20° F. and below. Most of the rooms he had seen recently, especially in the larger factories, were of that type.

Direct Expansion Cooling

The question of direct expansion cooling *versus* brine cooling was touched upon by Mr. J. C. TAYLOR. He had often wondered why a greater use was not made of direct expansion in the dairy. The present position in this respect was due to the inherent fear of what might go wrong if the sterilisation process was not carried out properly and the consequences that might ensue if certain joints in the ammonia system broke down. Most designers spent a good deal of time trying to dodge glands, and particularly ammonia glands. It would be interesting to know if Mr. Enock had at last solved the problem and whether these glands were, in practice, quite satisfactory.

The statement had been made by the lecturer that these plants should be made simpler, and mention had also been made of the desirability of having some means of automatically varying the capacity of the plant. There were already a number of well-known methods of varying the capacity of ammonia compressors by hand which were not capable of taking care of the difference between the winter and the summer load, but when that sort of job was tried to be done automatically to make provision not only for wide variations but also, perhaps, small variations in the plant, it was not so simple, and in his view there was a great deal of work yet to be done before the problem was solved and certainly before it was solved simply.

Small Dairy Equipment

MR. A. G. CLAUSEN stressed the importance of cooling at the point of production, referred to by the President, which admittedly was a very difficult matter.

There was the further point as to the processes and apparatus suitable for the small dairy. It was inevitable that there must continue to be a large number of dairies where the large and expensive equipment described in the paper simply could not be afforded. Suggestions as to the solution of that problem would help considerably a large number of people connected with the industry.

Heat Treatment of Ice Cream Mix

MR. P. V. MCKENZIE, referring to ice cream mix, said that a change was rapidly coming about in Government policy which he believed in the very near future would make it compulsory to have all ice cream mix heat treated. This would bring an additional problem to the refrigeration engineer, particularly in the case of the smaller installations. Many of the smaller dairies were using a combined freezer-conservator, but the time would probably come when it would be necessary to have apparatus of the mixer-pasteuriser type on comparatively small lines and a large number of these installations would be required. Sanitary Inspectors and Medical Officers in almost every borough up and down

the country were now exerting perfect control and applying the 1938 Food and Drugs Act from the point of view of purity and bacteriological content. He mentioned this point as one of the new developments which the Institute and refrigeration engineers would have to watch very closely, because as soon as the necessary materials were available there would undoubtedly be very big developments.

Ice Cream Storage

MR. J. W. SMITH, expressing his interest in the last remarks of Mr. Clarke, said the suggestion seemed to be that the ice cream storage room should be cooled by cold air circulation, but it was impossible for a man to work in a room in a temperature of -20° F. Men could not be expected to work in a room with that temperature.

A point mentioned by the lecturer was the difficulties in dairies of trying to meet the winter load with summer plant, but it was not to be expected that automatic control would enable this to be done. The obvious thing was to put in a number of smaller machines rather than one or two of large capacity. In going around the country he thought the mistake in this country had been in putting in one or two large units instead of a multiplicity of smaller machines. Therefore he suggested that this matter be given more consideration in the future.

The Digestibility of Milk

CONSIDERABLE research has been carried out with a view to ascertaining the effects of treatments such as pasteurisation, evaporation, and drying on the quality of milk, particularly its digestibility. A recent report by A. W. Turner (*Food Res.*, 10, 52-59, 1945) records experiments on the digestibility of the milk of human beings, goats, mares, and cows after various treatments. The rate of digestion was measured under laboratory conditions approximating to the type of digestion in the human stomach and intestines.

According to Turner's findings :

(1) Pasteurisation, homogenisation, desiccation, zeolite treatment, and skimming did not appreciably alter the relative digestibility of cow's milk.

(2) Enzyme-treated and hyper-heated milks digested relatively faster than pasteurised whole cow's milk.

(3) The fact that human milk is more satisfactory for infant feeding than cow's milk has been substantiated.

(4) Barium sulphate prevented the normal digestion of milk protein and weakened the gel structure of milk curds under the conditions of this investigation.

(5) Mare's milk digested more readily than cow's milk and goat's milk.

(6) The relative digestibility of goat's milk was found to be inferior to that of pasteurised whole cow's milk.

Dried Soup Powders

II. COMPOUNDED

J. C. FIDLER and R. DAVIES

Low Temperature Research Station.

THE pre-cooked soup powders described previously* are useful foods, rich in protein, fat, carbohydrate, and vitamins A, B, and C, and have the great advantage of being easily prepared for the table. Where this feature is not of very great importance, soups of similar composition may be prepared by simpler means, the machinery needed consisting only of a mill and a mixer.

There is, of course, nothing new in the preparation of soup powders by compounding dry ingredients. Such soups have been well known to the public for a very long time. But the advances which have recently been made in the dehydration industry and in the preparation of new forms of pulse flours open up new possibilities. It is now much easier to prepare compounded soups of good nutritive value, practically free from the objectionable flavour of poor quality dried vegetables and from the bitterness normally associated with pulse flours.

From the very large number of dried soup mixtures which may be prepared by compounding dried ingredients two main types have been selected for study:

- A. Soups with high protein and calorific value, and rich in vitamins A, B, and C.
- B. Soups in which high vitamin content is not the primary objective, but which are rich in good quality protein and have high calorific value.

The experimental work which has been done is described separately below for each type.

Type A

These soups have similar composition to the vegetable or meat and vegetable pre-cooked soups described in the previous article, but contain dried instead of fresh ingredients. The preparation of the plain vegetable soup powders is straightforward, the dried vegetable strips merely being ground in a hammer mill, and the powders subsequently blended in the correct proportions. To incorporate meat is less easy. Most dried meat contains much fat, and all attempts to grind it result in a sticky paste. Defatted meat could be used, but none is available. We have therefore been compelled to use a form of dried meat prepared (in Australia) by a special process, details of which are not yet available for general publication. This

product is characterised by the absence of gristle or other fibrous material, and, although rich in fat, may be ground to a powder by means of a mechanical pestle and mortar. The meat may either be ground separately, or, preferably, the correct proportions of all the different ingredients, including the meat, may be ground together.

Fat in Soups

The need for fat in a high-grade soup, because of its high calorific value, has been mentioned in Part I. The percentage of fat in most dried meat is rather too low to give a value in the final mixture as high as that aimed at in the pre-cooked soup powders—namely, 15 to 17 per cent. When necessary, the fat content can be augmented by incorporating a potato-fat powder prepared by roller-drying a mixture of 5 parts of mashed potato and 1 part of dripping. This gives a friable powder containing 46 to 47 per cent. of fat.

A formula which gives a meat and vegetable soup powder similar in composition with the pre-cooked product is given in Table 1.

TABLE 1.
COMPOSITION OF MEAT AND VEGETABLE SOUP POWDER.

<i>Ingredient.</i>	<i>Parts by Weight.</i>
Dried meat (35 per cent.) fat	35
Potato: fat powder (46-47 per cent. fat) ..	2
Dried potato	34
Dried carrot	10
Dried cabbage	4
Full fat soya flour	9
Dried yeast extract	1.6
Salt	4
Onion powder	1
Pepper	0.1

Other ingredients may be added. Small additions of dried milk, for instance, would be advantageous in a vegetable soup, the casein increasing the biological value of the vegetable proteins.

The soup powder may be flavoured by the addition of essential oils, as described previously. The aim has been, however, to make soup powders which do not require the addition of strong flavouring agents to mask objectionable taints. This has been possible through the use of the high-grade dried vegetables now available. Generally speaking, the vegetables used should be of the highest quality, unscorched, properly blanched, and of low moisture content. The use of scorched cabbage and carrot in particular is objectionable. The best

* See *Food Manufacture*, August, 1945.

types of potato are fully cooked strip or riced potato, but a mixture of about equal parts of roller-dried potato flour and fully scalded and dried strip is satisfactory.

Reconstitution and Storage

The ease of reconstitution and degree of smoothness of the reconstituted soup are dependent on the fineness of the powder. It is not easy to prepare dried meat of sufficiently small particle size to avoid a slightly gritty texture.

The soup is readily prepared by mixing together 1 part of the powder with 8 parts of water and bringing to the boil, or by adding the powder to hot water and boiling for 5 minutes.

Small-scale tests have been made at several restaurants, and the soup has been generally well received.

The storage properties of the type A powders are similar to those of the pre-cooked soup powder—i.e., they do not store well in air, because of off-flavours produced by the oxidation of carotene and because of the loss of the vitamins through oxidation. Their storage life in nitrogen is good, however, there being no appreciable change in flavour, no loss of carotene, and only a 5 per cent. loss of ascorbic acid in samples stored at 37° C. (approximately 100° F.) for 5 months. This is roughly equivalent to a year and a half at ordinary temperatures.

Type B

The standard chosen for a good type B soup has been that it should be rich in protein, palatable, and of high calorific value. It should also be readily compounded from materials in good supply; such are skim milk powder (roller process), pea flour, soya flour (full-fat and fat-free), and dehydrated potato (roller dried or ground kiln-dried cosettes).

To produce a soup powder with about 30 per cent. protein and a calorific value of about 350 Cals. per 100 g., the quantity of either skim milk powder or soya flour to be included must be high; only these ingredients have a sufficiently high protein content.

It is not necessary to use more than a small proportion of skim milk powder, however, since the biological value of vegetable protein is greatly increased by the addition of small amounts of animal protein.

The formula of a typical type B soup mixture is given in Table 2.

TABLE 2
COMPOSITION OF A TYPICAL TYPE B POWDER

<i>Ingredient.</i>	<i>Parts by Weight.</i>
Skim milk powder (roller process)	.. 10
Pea flour	.. 30
Soya flour (full fat)	.. 10
Soya flour (extracted)	.. 15
Oatmeal	.. 10
Potato (roller dried or kiln dried)	.. 10
Dried yeast (<i>Torula utilis</i>)	.. 10
Onion powder	.. 1
Salt	.. 4
Pepper	.. 0.1

The dried yeast serves a threefold purpose—namely, to increase the protein content, to add vitamins of the B group, and to give a slightly meaty flavour.

A more definite meaty flavour is given by additions of from $\frac{1}{2}$ to 1 per cent. of monosodium glutamate. It is current practice in the U.S.A. to use larger amounts of sodium glutamate than this (up to 6 per cent.), but tasting panels in this country have considered additions on the U.S.A. scale to be excessive. If the soup is intended for emergency feeding purposes, useful amounts of iron and calcium may be added by the incorporation of 0.2 part of ferri. carb. sacch. and 2.14 parts of calcium carbonate.

The above mixture has a protein content of approximately 28 per cent. and yields 340 Calories per 100 g. of dry matter. It is relatively rich in vitamins of the B complex, but does not contain appreciable amounts of the other vitamins.

Reconstitution and Storage

For use, 1 part of powder is mixed with 7 parts of water, and cooked for about 25 minutes. The

TABLE 3.
STORAGE OF TYPE B POWDER.

Mixture.	Storage Period (Months).						Estimated Mean Storage Life, at 15° C.
	To First Sign of "Off" Flavour.			To "Inedibility."			
	15° C.	28° C.	37° C.	15° C.	28° C.	37° C.	
1. Formula as given in Table 2	4½	2	1	15	6	4½	8
2. As above, but with the yeast replaced by defatted maize germ	6	2½	1½	>12	6½	5	10
3. 35 per cent. skim milk in mix- ture, low in soya, containing no yeast	—	1¼	1¼	—	5	3½	4
4. As 3, but contains yeast ..	—	1¼	1¼	—	7	4½	8

product is thick and palatable and has a smooth, creamy texture.

Large inclusions (30 per cent.) of full-fat soya flour lead to the development of bitter flavours on storage. This is prevented by the use of extracted soya flour or debittered full-fat flour. Similarly, the use of the pre-cooked (debittered) pea flours, now being produced commercially in the U.S.A., removes the bitterness associated with raw pea flours.

Storage tests have been carried out on the mixture, stored in blackplate slip-lid tins, the closure being bound with cellulose tape at 15° C. (approximately 60° F.), 28° C. (approximately 80° F.), and 37° C. (approximately 100° F.). The results are summarised in Table 3.

In Table 3 the "estimated mean storage life" is a compromise between the time when the first sign of "off" flavour was detected and the time to reach complete inedibility. If the soup were used for other than emergency feeding purpose—i.e., if it were offered to well-nourished people—these values for estimated storage life might need to be halved. The storage life (as defined above) could, of course, be greatly extended if, as is often done, strong flavouring agents were added to mask "off" flavours.

One of the most interesting points emerging from Table 3 is the well-marked effect of yeast on prolonging the storage life. Thus soup 4 (with yeast) has a "life" twice that of soup 3. This effect was noted in all tests in which mixtures, comparable in all respects except the presence or absence of yeast, were stored under the same conditions. No explanation of this can be offered. The same effect was observed in one mixture (No. 2) where yeast was omitted, but in which a commercial preparation of defatted maize germ was present. The water content of the soups changed during storage. On this account, nothing very definite can be said about the effect of humidity on storage. An indication of what may be expected is given by the results of storage tests on a sample of soup powder (No. 2). The soup used to obtain the results given in Table 3 had a water content of about 8 to 10 per cent. initially, falling to 6 to 7 per cent. after 200 days at 28° C. Under these conditions it became inedible after 6½ months. However, part of the original mixture, dried down to 3.3 per cent. moisture initially, was stored for a year at 28° C. with no deterioration. Its water content had by then risen to 5 per cent.

Summary

1. The preparation of two grades of dried soups, by compounding dried ingredients, is described.

2. Type A is a high-grade soup containing dried vegetables and meat, with the same nutritive properties as the pre-cooked soup previously described; type B is a lower-grade soup consisting mainly of pulse flours.

3. The storage properties of type A soup are similar to those of the pre-cooked soup.

4. The storage "life" of type B soup is governed largely by the presence or absence of dried yeast, being of the order of 4 months in air at ordinary temperatures without yeast, and double that time with yeast.

The work described above was carried out as part of the programme of the Food Investigation Board in collaboration with the Scientific Advisers Division, Ministry of Food, and is published by permission of the Department of Scientific and Industrial Research, and the Ministry of Food.

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The Milling Industry

(Continued from page 12)

value to 80 to 85 per cent. flour. These and other arguments of the opposing schools have been thoroughly examined by a conference which was convened at the beginning of the year by the Ministry of Food for the purpose of advising the Government upon the subject of the post-war loaf. It is anticipated that the report of this conference will have been published by the time this article appears in print.

Control of Insect Pests

It is impossible to keep a flour mill free from insect pests. Although flour mills are fumigated periodically, reinfestation is unavoidable, since various forms of insect are brought in with arrivals of wheat. Considerable interest has accordingly been shown in an American machine, which went into production in this country towards the close of 1945, which promises to solve the miller's major infestation problem. This machine, known as the Entoleter, consists essentially of two horizontal circular steel plates spaced apart by two concentric rings of round steel rods. These plates are rotated at a high speed, and the stock to be treated is fed through the centre of the top plate, whereupon it is impacted by centrifugal force on the steel spacers in passing to the periphery of the system. The force with which the material is flung against the spacers is sufficient to disrupt insects, larvae, and eggs. The data of published experiments on the commoner cereal pests reveal 99 to 100 per cent. kill. These machines can be operated continuously, and it would seem, therefore, that their installation at certain key points in the mill, more particularly on the incoming grain and on the finished product being packed, may eliminate, or at least reduce to insignificant proportions, most of those troubles which have always threatened the miller as a consequence of insect infestation.

Trade News

Goodwill Mission to Egypt

The Secretary of the Department of Overseas Trade Development, after consultation with the Secretary of State for Foreign Affairs and the President of the Board of Trade, recently announced in the House of Commons that Mr. Hanbury - Williams, Managing Director of Courtaulds and a Director of the Bank of England, had agreed to lead a goodwill mission to Egypt. The following have accepted invitations to serve as members of the mission: John Brown, General Secretary, Iron and Steel Trade Federation; C. G. Morley New, Electricity Commissioner; Sir William Arthur Stanier, formerly Chief Mechanical Engineer, L.M.S. Rly.; Harold Whitehead, Industrial Consultant; Dr. W. H. T. Williamson, Director of Agriculture Department, British Council.

Arctic Relics

Some interesting facts about canned foods, which had remained wholesome after 93 years, are contained in 1945 Report of the Royal Canadian Mounted Police, supplied by courtesy of the Tin Research Institute.

The report relates to the two voyages of the R.C.M. Police schooner *St. Roch*, during which the tins were found among the ruins of two old caches deposited on Dealey and Beechey Islands in 1852-53 by Captain Kellet of H.M.S. *Resolute*.

Many of the tins were still intact, although they must have undergone repeated freezings and thawings. Those containing stewed ox cheek were still fit to eat, and labels bearing the name of Henry Gamble, Leadenhall Street, and 2, Royal Exchange, were still decipherable.

Clyde Soyameal Factory

In plans disclosed by the Clyde Navigation Trust for the development of land at Shieldhall, Glasgow, for industrial purposes, it is stated that the Clyde Soyameal Factory, Ltd., who have had a site there for the manufacture of their products for some time, have secured an additional site which will allow for the expansion of their existing undertaking.

In the Trust's plans for the development of their ground at Renfrew for industrial purposes, an area of ground extending to eight acres has been reserved by the Scottish Co-operative Wholesale Society for a flour mill. The only requirement for the conclusion of arrangements between the firm and the Trustees is Government approval and a grant for the construction of the proposed Renfrew riverside quay, which is designed to promote industrial development in the area.

Federation of British Industries

SURVEY OF INDUSTRIAL RESEARCH

The F.B.I. Industrial Research Committee and Secretariat have sent out questionnaires to establish the facts of Britain's industrial research. In the opinion of the Committee British industry's research effort has been greatly underestimated because it is largely unknown.

One questionnaire is addressed to all manufacturing concerns in the country that are carrying out research and development, and the second to all firms and organisations offering facilities to industry of an analytical, testing, consultant, research, or development nature.

Those firms and organisations concerned that have not already received copies are invited to apply to the F.B.I. Industrial Research Secretariat, 21, Tothill Street, S.W.1.

The first questionnaire seeks detailed information on the staffing and scope of a firm's research department. It asks, among other things, if the firm's laboratories

cater also for other British companies; what contacts exist with universities and technical colleges; if the research department concerned wishes to be put in touch with others working in the same field, or to exchange scientific and technical information with others at home or abroad. The questionnaire embraces firms that carry out research but have no separate research laboratory. Firms are also asked to outline any plans for development or expansion of research activities during the next two years.

The second questionnaire, which has been prepared on similar lines to the first, asks the nature of the services offered, the particular field covered by the firm or organisation, and what specialist work is undertaken and equipment possessed.

Information gathered by the questionnaire should provide valuable material for a detailed reference book and for overseas publicity for British exports.

G. and J. Weir, Ltd.

The London office of G. and J. Weir, Ltd., Glasgow, has now returned from its war-time address at Cambridge to Royal Mail House, Leadenhall Street, where full facilities for sales and service are again available. New branch offices have also been opened at Cardiff, Birmingham, and Birkenhead.

We have received Publication No. 135 giving details of the "A" size Weir Refrigerator Condensing Unit which will be of interest to the food industry.

Mr. J. K. Murdoch

Mr. J. K. Murdoch, who has been Marketing Officer to the Scottish Milk Marketing Board since its inception in 1933, resigned from his post on October 31 on health grounds.

The Board has arranged with Mr. Murdoch to act in an advisory capacity for the ensuing year. For the same period Mr. A. M. Farquharson, Assistant Marketing Officer, will act as interim Marketing Officer to the Board.

Extensions to Keiller Factory

James Keiller and Son, Ltd.'s, decision to extend their manufacturing capacity in Dundee is of great importance to both company and the city. The scheme, which has just been announced by the Board of Trade, will, immediately on completion, provide additional employment for some 200 persons, and when supplies of raw materials become plentiful it is expected that the figure will rise to about 600.

The development includes the enlargement and modernisation of the present Albert Square factory and the building of a new preserve factory in the Maryfield area of Dundee, while the existing bakery at Maryfield is to be extended.

This will provide an increase in the traditional Keiller's products of "Dundee" marmalade, "Dundee" cakes, shortbread, and butterscotch, while the manufacture of Swiss "Toblerone" chocolate is now to be transferred to Dundee. Most of the special machinery to be installed by the company will be of Scottish design and manufacture.

Tribute to Henry Edward Armstrong

The part taken by Henry Edward Armstrong in the development of technical education in this country and in the establishment of the City and Guilds Central College as a centre of scientific activity was described by Sir Harold Hartley, F.R.S., in the first Armstrong Memorial Lecture before the Society of Chemical Industry on November 21.

Sir Harold Hartley spoke of Dr. Armstrong's great gifts as a teacher, and stressed that perhaps his greatest contribution was the stimulus he gave to his colleagues, students, and friends.

His utterances on such subjects as the place of science in education and agriculture, teaching methods, the effect of diet on health, the value of fresh food, especially milk, and the need for surveys of natural resources indicated his powers of seeing things ahead of his time, and having seen them he lost no opportunity of passing on his knowledge in trenchant phrases.

Chemists' Social Function

On November 17 the Royal Institute of Chemistry held its first social function for over six years with a dance. All available tickets, numbering 350, were sold and there were applications for many more. The function was a great success.

Kiwis Lunch with the Minister of Food



The Kiwis, New Zealand Army Rugby team, who met England at Twickenham recently, toured the East End of London as guests of the Ministry of Food. After visiting the blitzed areas of the East End, they lunched at the Isle of Dogs British Restaurant with the Food Minister. The picture shows Sir Ben Smith getting his lunch in the St. John's British Restaurant, Isle of Dogs.

Commerce in Holland

A bureau which promotes business relations with all countries, supplying them with addresses in Holland of manufacturers, dealers, exporters, importers, agents, etc., and placing offers and demands before interested parties, is the function of the Commercial Intelligence Office, Amsterdam, Holland.

The sole conditions of this service are that postage expenses which are incurred on the interested firms' behalf are refunded, and that one bank and two trade references are supplied.

Re-conditioned Plant and Equipment

Reed Brothers (Engineering), Ltd., a new company, operating as engineers and machinery traders, has been formed to trade in modern re-conditioned plant and machinery of all types. A further service will be provided by the Valuations Department.

Trade with Czechoslovakia

A trade delegation from Czechoslovakia, headed by Dr. Rudolf Kuraz, has recently visited the United Kingdom in order to discuss financial matters and matters relating to the resumption of trade between the two countries. As a result of these discussions a Monetary Agreement has been negotiated and the Trading with the Enemy Restrictions on trade with Czechoslovakia have been lifted so that normal commercial relations can now be resumed with Czechoslovakia. A Property Agreement has also been negotiated between the two countries.

Dehydration in the Shetlands

The Herring Industry Board are to erect a plant for the processing of fish in Lerwick. The plant, which it is hoped will be ready next June, will kipper, freeze, dehydrate, and also produce fish meal and oil. The bulk of the catch will eventually be sent to London and a special refrigerated steamer will be used regularly. Sixteen ton of herring will be frozen daily and stored in cold chambers, while 2 ton will be kippered daily, and 5 ton dehydrated, giving 1 ton of herring flesh. The Board in the initial stages will require from 160 to 480 crans per day according to the shifts worked.

Copper Development Association

The Copper Development Association, which during the war operated principally from a temporary office in Rugby, has now acquired premises at Kendals Hall, Radlett, Herts. Telephone: Radlett 5616.

The Association will continue to maintain its registered address at Grand Buildings, Trafalgar Square, London, W.C.2.

Trading with the Enemy

A new Order has been made, with effect on November 27, which contains the complete Statutory List of all persons abroad who are specified as enemy under Section 2 (2) of the Trading with the Enemy Act, 1939, and with whom it is unlawful to have dealings of any kind.

The revised List now published comprises:

- (i) Persons whose retention on the List is required in connexion with Allied control over enemy commercial, industrial, and financial enterprises, and other enemy assets located outside enemy territory;
- (ii) Persons who have assisted in the concealment of enemy property and in the disposal of property looted from territory formerly occupied by the enemy;
- (iii) Persons who during hostilities went out of their way to assist the enemy.

The new Order supersedes the Trading with the Enemy (Specified Persons) Amendment Orders Nos. 8, 9, 10, 11, and 12 (S.R. & O. 1945 Nos. 830, 936, 1156, 1338, and 1447), and does not make any additions to the names included in the Orders which it supersedes.

The title of the new Order is the Trading with the Enemy (Specified Persons) (Amendment) (No. 13) Order, 1945 (S.R. & O. 1945 No. 1461). Copies, price 1s. 8d., may be obtained from any bookseller or newsagent, or direct from H.M. Stationery Office, Kingsway, London, W.C.2.

Persons owing money to, or holding or managing property of persons included in the Statutory List are reminded that they are under statutory obligation to report particulars to the Custodians of Enemy Property.

Lobsters from Scotland

The possibilities of a lobster fishing industry being developed around the Monach Islands to the west of North Uist advanced a further stage recently when an air survey of the district was made by Scottish Airways, Ltd. Mr. George Nicholson, resident director at Renfrew for Scottish Airways, piloted by Captain David Barclay, carried out a thorough examination of Heisker to examine

whether a lobster freighter service might be set up. It is understood that their report is favourable, as an east-west runway could be laid on one island, and a north-south landing ground on an adjoining one. If the present tenant of Heisker can develop lobster fishing around the Monachs—it is said to possess the finest lobster beds in the country—Scottish Airways will willingly co-operate by flying the catches to the nearest markets. It may be possible also to supply the cannery at Lochboisdale.

New Appointment

Squadron Leader H. Clements has now been released from the Royal Air Force to take up his appointment with Silentbloc, Ltd., and their subsidiary, the Andre Rubber Co., Ltd.

Inter-communication Telegraph System

Efficient inter-departmental telephone systems have been developed by the Automatic Telephone and Electric Co., Ltd., to meet every business requirement.

The A.T.M. loud-speaking key-controlled intercommunication telephone system is a simple inter-departmental telephone system suitable for business premises requiring five or ten lines. The equipment comprises a loud-

Change of Address

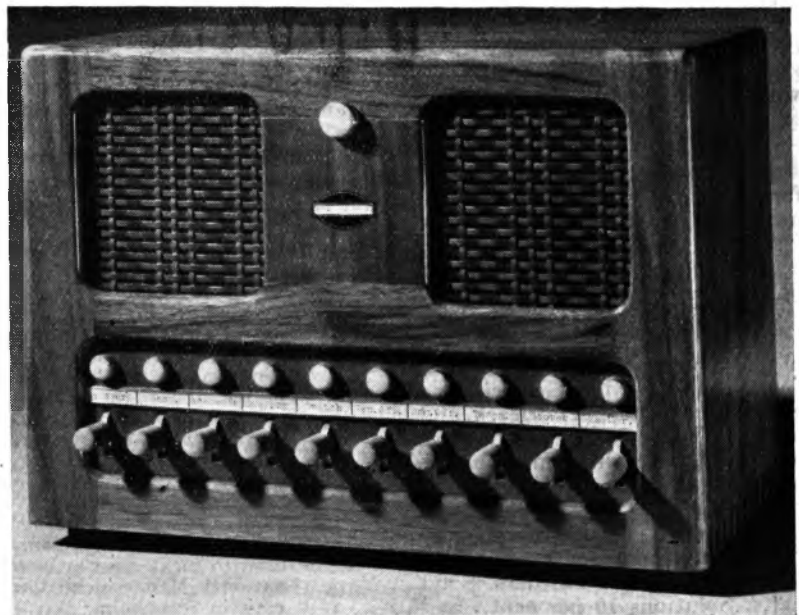
The Department of Overseas Trade is removing from Hawkins House, Dolphin Square, London, S.W.1, to 35, Old Queen Street, Westminster, S.W.1. On and after November 20, 1945, all communications should be addressed as follows: The Comptroller-General, Department of Overseas Trade, 35, Old Queen Street, Westminster, London, S.W.1. (Telegraphic Address: Advantage, Parl, London. Telephone Number: Victoria 9040.)

Health Congress, 1946

The Health Congress, which is organised by the Royal Sanitary Institute, will be held at Blackpool from June 3-7, 1946, at the invitation of the Corporation.

speaker master-station instrument for executives, and desk- or wall-pattern sub-station telephones for the general staff.

The Strowger Private Automatic Exchange is designed to cater for large organisations requiring from ten to several hundred lines. The telephones are of the "dial" type, and the switching equipment identical with that standardised by the British Post Office for public telephone exchanges.



Booklets and Pamphlets

The Summarised Catalogue of the Drayton Regulator and Instrument Co., Ltd., is their first post-war publication, and contains the present manufacturing range of temperature regulators complete with some additions and some omissions. The equipment described includes self-operating regulators in which the energy required to operate the valve is developed and applied directly without the aid of any external source of power, relay regulators which employ compressed air or water for their operation, and electrically operated regulators consisting of automatic switches actuating such mechanism as may be required by the application.

In addition to temperature regulators there are described draft gauges, "area" type flow indicators and meters, steam traps, strainers, and sight glasses.

*

The *Sunvic Electronic Ray*, which is a 2 kW relay operated by a few micro-watts, has been designed to meet the demand for very accurate control by the use of instruments having light contacts. When a large number of operations are performed with relatively high voltages and current on such contacts, erosion and oxidation of the contact surfaces tend to cause failure. Primarily developed for use with light contacts of the type described—e.g., toluene regulators—this relay can be adapted to operate with a photo-electric cell, and thus has a wide range of usefulness.

*

Ratio Quantitative Substances for quantitative spectro-chemical analysis have been advocated by Dr. S. Judd Lewis in *Chemistry and Industry*, 51, 271-274, 1932, and are equally applicable to the quantitative spectroscopic methods advocated by Hartley, de Gramont, Pollok and Leonard, Hitchen, Lundegårdh, Gerlach and Schweitzer, Ramage, Porlezza, and others. Adam Hilger, Ltd., have issued a booklet describing the use of the substances marketed by them under the Trade Mark "Specpure." Spectroscopically pure, the products are offered in four forms: Ratio Powders, Solid Salts, Solutions 10 per cent., and

Ratio Solutions standardised to contain precisely 1 gram of the element in 100 c.c.

*

Common Sense Costs is a booklet published by McGowan, Perry and Partners which outlines a method of costing free from the disadvantages of the older type of costs, but offering absolute control over every phase of the business in time for that control to be effective.

Committee on Management

The President of the Board of Trade has appointed a Committee under the chairmanship of Sir Clive Baillieu to frame detailed proposals for the formation of a British Institute of Management. This follows the work of enquiry undertaken last year by a Board of Trade Committee under Sir Cecil Weir's chairmanship, when the idea of a British Institute of Management was discussed with representatives of industry and of existing institutions and associations interested in various aspects of management.

The Government are contemplating financial assistance in establishing an Institute of Management, and in this event Parliament will be asked to approve the necessary expenditure.

The terms of reference are:

To advise the President of the Board of Trade upon the steps which should now be taken to form a central institution for all questions connected with management, and upon its form of organisation, functions, constitution, and relationship to government, industry, existing institutions and interested organisations, and the public.

In approaching its task the Committee should take into account:

- (a) The work of enquiry carried out by the Weir Committee.
- (b) The information which will be communicated to the Committee about the scale of support which may be expected from the Government.
- (c) The need for the institution to become self-supporting.
- (d) The necessity of appointing a strong British representation to next year's International Management Congress in Stockholm.

Standard Synthetics, Ltd.

After three months' work in London, Mr. J. L. Hindle, Managing Director of Standard Synthetics, Ltd., Essential Oil Distillers, of Barnes, West London, has left for New York.

Mr. Hindle will spend some time with the American company, Standard Synthetics Inc., New York, arranging for export and import business in essential oils and aromatics. As soon as restrictions and controls on business are released Standard Synthetics will offer a full range of raw materials and aromatics.

Jersey and Guernsey Purchasing Commissions

The functions of the Jersey and Guernsey Purchasing Commissions in London were transferred to the States authorities in the Islands as from November 30, 1945. Any enquiries to the Purchasing Commissions after that date should be addressed to the Food Control Office, Halkett Place, St. Helier, Jersey (Telephone: Jersey Central 910), or the Essential Commodities Committee, Beau Sejour House, St. Peter Port, Guernsey (Telephone: Guernsey 1533).

Ex-Servicemen's Association

The work of the Soldiers', Sailors' and Airmen's Families Association (SSAFA) is connected with the domestic and personal problems confronting ex-Service men and women returning to civilian life. In order to provide a comprehensive welfare service the Association requires financial assistance and has launched an appeal to the general public and industrial undertakings for £1,000,000. All donations and enquiries should be addressed to SSAFA Appeal Department, 90, Regent Street, W.1.

Society of Chemical Industry

At the third annual general meeting of the Agriculture Group of the Society of Chemical Industry the following were elected to the committee: Dr. H. H. Green, Dr. G. F. New, and Prof. T. Wallace. The Hon. Officers were re-elected, and Mr. W. L. Hill was re-elected Hon. Recorder and Auditor.

Company News

National Canning Company

At the fourteenth ordinary general meeting of National Canning Company, Ltd., Mr. S. W. Smedley (the chairman and managing director) announced in his statement circulated with the report and accounts that the company and its subsidiaries have made large contributions to the nation's food supplies during the war.

The directors recommended the payment of a dividend on the Ordinary shares of 10 per cent., less tax—that is, at the same rate as that paid for the past five years—and the transfer to reserve of £15,000, leaving £82,379 to be carried forward as compared with £80,386 brought in. Stocks and debtors have been reduced and the cash increased. The increase of approximately £15,000 in plant and machinery only represents a small part of the additions and extensions which it is proposed to make to the plant and equipment of the operating companies.

Very large orders have been filled to meet the requirements of the Forces, and, in addition, a very high output of soups, jams, pulp, dehydrated vegetables, dried peas, and special packs to meet emergency war requirements was achieved despite a heavily depleted staff.

During the war the company pursued a conservative policy in the distribution of the profits remaining after taxation. At May 31, 1939, the surplus reserves and undistributed profit and loss balances shown in the consolidated balance-sheet amounted to £147,665, and at May 31, 1945, the surplus was £359,818.

In view of the Chancellor's statement in his recent Budget speech, it seems that it may be possible to recover during the coming years repayments in respect of the post-war E.P.T. refund of 20 per cent., less income tax. These refunds, which amount in the aggregate to a substantial sum, will be put to good use, because the operating subsidiaries have embarked on a large-scale overhaul and renewal of their plants. Furthermore, as it is now permitted to resume the packing of frozen foods, arrangements are

being made to extend the existing plants and to erect new ones for quick freezing, which will also absorb a considerable sum of money in the near future.

It is to be expected that there will be competition in this particular field, but it is a specialised trade and the experience gained in the preliminary work done before the war has given a good insight into the problems which have to be considered. The possibility of developing export trade in canned and frozen goods is being explored, and it is hoped in time to build up a substantial business abroad.

Speaking of the future, Mr. Smedley said that the company intended to restore their practice of marketing a wide variety of standard high-grade packs of canned and frozen fruits and vegetables and of jam. It is not possible to achieve all these aims in the coming season, partly because many restrictions are in force, but also because the new machinery ordered may not be delivered in time.

Lever Brothers and Unilever, Ltd.

At the annual general meeting of the members of Lever Brothers and Unilever, Ltd., Mr. Geoffrey Heyworth, the chairman, gave some interesting details as to the international character of the company.

Its beginnings trace from the early days of each of the main constituents of the present English and Dutch companies. The first factory across an international frontier was established by the Dutch side of the business in 1890, and in 1895 the Lever business built its first overseas unit in Australia. The process has gone on steadily ever since and it still continues. It was helped by the soap and edible fat industries being natural secondary industries. Almost everywhere some at least of the raw materials are indigenous or obtainable locally, and a sound basis for manufacture usually exists without tariff protection. By 1939 the two companies had manufacturing establishments in thirty-nine different countries.

In the early stages of this development it was usual to manufacture abroad products identical with those of the mother company, and to transplant manufacturing and marketing methods with them. Gradually manufacturing techniques were modified to meet differences in the raw materials available. Before these overseas businesses could widen their markets to reach the masses production and selling methods had to be adapted to different standards of living and different racial, religious, and social habits, and new products had to be invented.

It was not long before the experience gained in solving these local problems began to have a benefit for the mother companies. Some of the methods that had to be improvised overseas were found to be capable of application at home. An important contribution to the interchangeability of raw materials for soap and margarine has been brought about in this way, and it is equally certain that the marketing techniques at home have been improved in the most unexpected ways by the application of experience gained abroad. So much so that today it is difficult indeed to say how much of our experience is derived from home sources and how much from abroad. The lessons thus learnt are the more pointed because they are the result of first-hand contact with actual conditions and difficulties. To visit industries abroad as a mere observer, even under the most cordial auspices, can never be as fruitful in result.

Although the value of having units in all the great industrial countries is obvious, the benefits of experience gained are not necessarily determined by the size of the country or the degree of its industrialisation. For instance, Holland and Denmark have made the greatest contribution to margarine technology. Norway and Belgium have made important contributions to the processing of edible fats, while the oil milling and cattle foods industry has been developed chiefly in England, Holland, Germany, France, and Denmark. In soap the contributions

of England, America, Germany, and Czechoslovakia are outstanding. In marketing we have profited from the mass-selling methods of America and the preference for branded quality lines which is so marked a feature of marketing in England, and, at the other extreme, from the exceedingly economical techniques of the Chinese and the Indian, without which products could not be made available to people of low income standards.

The benefits that derive from our international operations spread beyond our own organisation. Much of the experience gained has come and continues to come from competitors in these various countries, and it is equally true to say that competitors in these countries have learned and continue to learn from us. This competitive activity has been effective in raising consumption levels of both soap and edible fats, though even in the most advanced countries they are still below the desirable minimum. Consumption is largely a matter of patient education of the consumer over a long period; a high degree of competitive salesmanship, which under modern conditions is largely devoted to consumer education of this nature, is the best assurance of expansion.

The value of interchange of experience and ideas is not confined to this company. It is of importance to almost every kind of industry everywhere, but particularly so in England with her great need of output for export. The essence of the matter is personal contact across the frontiers. Opposite numbers must be able to meet and work together—often for long periods—in each other's factories and offices. During the war this traffic has necessarily fallen to a mere trickle, and technicians and business men all over the world have been starved of this vital mental food. There is a big void to be filled and now is the time to fill it. Let this country make certain that she supplies the maximum amount of that skill and experience. It is one commodity which, among all the difficulties that beset the world at this time, can and must be unrationed and decontrolled.

The proposed dividend of 5 per cent., less tax, on the Ordinary stock, payable on November 2, 1945, was approved.

OBITER DICTA

● I should say that Scotland has at least two liquid assets—and the other one is water.—*Colonel Thornton-Kemsley.*

● If a lean diet promotes high thinking and longevity this should be a nation of philosophers and centenarians.—*"The Western Mail."*

● The alternatives facing the nations today are co-operation for their mutual benefit, or war for their mutual destruction.—*Sir John Boyd Orr.*

● The Russian rationing system is based on a utilitarian basis; the more valuable you are to the state, the more food you get.—*Mr. J. B. Priestley.*

● To my mind the combination of the growing of food and the saving of money represents the best form of national thrift.—*The Minister of Agriculture.*

● I do not seek absolute and rigid planning, but one which will give the broad lines of industrial development without the extremes of compulsion.—*Sir Stafford Cripps.*

● Empire trade was, even before the war, worth more to us than the trade of the rest of the world put together.—*In a statement by the Empire Industries Association.*

● The stakes are the human race. We cannot fail. . . . We cannot delay. . . . The awe-inspiring responsibility is ours for only a short time.—*Mr. H. A. Wallace, U.S. Secretary of Commerce, speaking on the atomic bomb.*

● I never do the poor brother stuff. I got into trouble over that in America. I said we had done as much to help them as they had to help us. We assert our equality.—*Sir Ben Smith.*

● I feel that so long as shortages exist controls are necessary; but directly shortages go, nobody will be more pleased than myself to be able to buy what I like, where I like, and from whom I like.—*Lord Jowitt.*

● You get so far in the Whitehall twilight and then something happens and you go back to where you started. The Government has a vast armoury of power to prevent industry doing things. Its powers are entirely negative—powers to prevent not to promote. "Thou shalt not" is at the top of every form.—*Mr. Oliver Lyttelton.*

Batchelor & Co. (I.), Ltd.

Mr. J. E. Lalor (chairman), presiding at the fifth annual general meeting of Batchelor and Co. (I.), Ltd., held in Dublin, said that while issue capital at £65,200 remains as last year, sundry creditors in the sum of £13,644 compare with £21,550.

The profit and loss account includes a provision of £1,031 5s. 0d. for Preference dividends paid for the year ended June 30, 1945, and after providing for this item there is a balance available for allocation of £6,809 16s. 5d., which the directors recommend be disposed of by payment of a dividend of 10 per cent. (less income tax) on the Ordinary shares for the year under review and carrying forward a balance of £4,609 16s. 5d. to the next account. This latter figure compares with a carry forward last year of £3,651 6s. 11d.

Imported supplies of cans for home trade were not available during the year, with the result that the production of a quantity of canned fruits and peas was only possible by utilising the balance of containers held in stock for a number of years. Future prospects in this branch have been brightened somewhat by the withdrawal of restrictions on the export of cans from Great Britain.

Fillerys Toffees, Ltd.

At the eleventh annual general meeting of Fillerys Toffees, Ltd., Sir Herbert Morgan, K.B.E., the chairman, in recommending the payment not only of the usual dividend but of a cash bonus of 2½ per cent., stressed the problems to be faced in the years to come. He said it was almost impossible to see through the maze of threatened legislation embracing restrictions, control, and direction, but he was satisfied with the capacity of British business to survive.

The essentials for the maintenance and progress of most businesses lie in sound direction, high quality products, and ample finance, and they had all three.

Due to the national zoning scheme it has only been possible to supply goods in certain areas. This regulation is being withdrawn and permission will be obtained to supply Fillerys Toffees to all parts of the United Kingdom.

Overseas Items

Exploration of the Sea

At a meeting held in Copenhagen on October 15-19, 1945, attended by delegates and experts from Great Britain, France, Norway, Denmark, Sweden, Finland, Holland, and Iceland, the International Council for the Exploration of the Sea was formally reconstituted for a five-year period as from July 22, 1945.

At this meeting Dr. Hjort (Norway) was re-elected President, and the following four Vice-Presidents were appointed to constitute, with the President, the Bureau or Executive Committee: Mr. A. T. A. Dobson (Great Britain), Prof. Martin Knudsen (Denmark), Dr. K. A. Andersson (Sweden), and M. Pierre Tissier (France). Dr. H. Blegvad (Denmark) was appointed General Secretary in succession to the late Capt. Nellemose, who fell a victim to the Nazis.

The Council, which was formally founded in 1902 and, through the courtesy of the Danish Government, has its headquarters near Copenhagen, has now survived two wars and has proved itself one of the most successful organisations set up to co-ordinate scientific research on an international basis. It concerns itself primarily with the investigation of fishery problems, together with the cognate problems of marine biology and hydrography. It has published a long series of scientific reports and valuable annual summaries of fishery statistics and hydrographical data. Its Journal, suspended during the war, will, it is hoped, reappear shortly.

Food Expert for Australia

Sir Henry French, former permanent secretary to the Ministry of Food, is in Australia on a British Government mission to examine and report on the food situation. Sir Henry French, who is making the visit at the request of Sir Ben Smith, will go to New Zealand in the middle of February.—*Reuter*.

January, 1946

Plastic Packaging Material for Fish

Tests made with pliofilm used as a packaging material for shipments of fish have proved completely successful, according to Dr. Spenser A. Larsen, director of air cargo research of Wayne University, Detroit. The use of this synthetic packaging agent promises to revolutionise the entire shipping industry by cutting shipping costs to a minimum and expanding heretofore limited markets.

Fish may be wrapped and packaged in light-weight, pliofilmed insulated cardboard containers and successfully shipped without either ice or dry ice.—*Reuter's Trade Service*.

Coffee Capital Chosen

Guatemala was selected as the seat of the Mexican-Centro-American Coffee Federation at a conference which has been in session in San Salvador.

The conference determined that if quotas continue all countries must conform, but if free trading is resumed they will act as a single group through the federation. They plan to work against ceiling prices and to classify coffees as to type and quality. Coffee produced in Antigua, Guatemala, Coatepec in Mexico, and Diriamba in Nicaragua have been classified as the highest quality.—*Reuter's Trade Service*.

Australian Produce Outlook

Although butter production last year was better than the previous two years and the meat position is improving, there will be no relaxation of rationing in Australia. All surplus butter and meat will be shipped to Britain if shipping can be provided.

As a result of the recent beneficial rains, the wheat crop is now expected to produce 135 million bushels, while barley production should total six million bushels. Millions of sheep have been saved from starvation.—*Reuter's Trade Service*.

Czechoslovak Sugar Production

The sugar factory at Mělník, Czechoslovakia, the biggest in Europe, is equipped with the most modern machinery and is highly mechanised. Before the war it produced high-quality sugar mainly for export. At present, however, only the home market is supplied. During the war cane sugar was also produced.

In this year's campaign the works processed on an average 30,000 cwt. of beet daily. Before the war 1,600,000 cwt. of beet were processed yearly by 1,600 employees, as compared with 800,000 cwt. this year by 1,350 employees. It is estimated that the total Czechoslovak sugar production this year will amount to 56,000,000 cwt., of which Slovakia will contribute 2,400,000, yielding almost 9,000,000 cwt. of refined sugar. In the year 1925-26 166,000,000 tons of beet were used for the production of 30,000,000 cwt. of refined sugar, of which 72 per cent. was exported.

Food Rationing in U.S.A.

The United States Administration has announced the discontinuance of food rationing in the U.S.A., except for sugar. The Administration has given an assurance that the system of allocation of food of which there is a world scarcity will be maintained, as well as existing measures of import and export control in the U.S.A., in order that the obligations of that country for supplying food to U.N.R.R.A. and to foreign countries are fulfilled. Food rationing has been abandoned in the United States because, with the exception of sugar, supplies of food in that country are now ample, while the ability of foreign countries to make additional purchases is limited on financial grounds. Nevertheless, the assurances given by the United States Administration should ensure that the supplies which foreign countries are in a position to purchase will be forthcoming.

Food-for-Britain Drive

The organisation is well under way for a national campaign which the British Fund Organisation will launch early this year to send more food to Britain from South Africa.

Major Robin Stratford, Union rubber controller, and national chairman of the organisation, said that he was confident it would be able to follow up South Africa's recent gift of food to Britain with every pound of food for which shipping space was available.

The new organisation will incorporate the Capetown "Thank you, Britain" Fund which has already sent food to Britain.

In addition to the larger centres, between 300 and 400 committees are being formed in the country districts.—*Reuter*.

Man-Made Cyclone

A new and revolutionary invention is now being used in the U.S. to help farmers and ranchers combat the bugs and insects which attack their crops.

The machine, known as the "Cyclone Duster," produced by the American Food Machinery Corporation's subsidiary, the Niagara Sprayer and Chemical Co., creates a controlled wind velocity of 185 miles per hour at point of discharge on a single outlet unit. This is greater than the average speed of a hurricane or cyclone, which is rated at 150 miles an hour.

While Nature's cyclone wind is destructive, the man-made cyclone wind, loaded with insect death-dealing chemicals for use on

plants, is extremely beneficial to mankind. An even-feed principle, unique in design, permits an equal and constant flow of dust at a given setting of the feed lever.

Loaded with 150 to 200 lb. of chemical dust, the machine has an even-feed flow, assuring the farmer that his plants, vines, or trees will be evenly covered. On the engine-drive unit the four-cylinder motor revolves a steel-bladed fan at 3,600 revolutions per minute, creating sufficient air velocity to dust thoroughly large fruit trees or crops with heavy foliage.

The "Cyclone Dusters" come in various combinations, each equipped with the type of dust-discharge hose best suited to the crop to be dusted. The hoses on the crop type duster coil about the rear of the machine in such a manner that the crops receive the dust from all possible angles.

The crop-type machine contains a 24-nozzle boom, covering eight rows with three nozzles per row. It is capable of 100 acres per day coverage with feed control, operated from the driver's seat, from 10 to 50 lb. per acre.

Construction is of welded heavy gauge metal with plate steel ends. The drive is direct from tractor power take-off shaft through spur gears in the duster gearbox.

This crop-type duster is mounted on an axle-type cart with adjustable tread and equipped with wheels for rubber tyres. The length of the boom is 27 feet, but folds forward, permitting the machine to pass through a 9-foot gate. The entire boom is adjustable for a height from the ground to accommodate different crops to be dusted.

Food from Canada

Ten thousand tons of bacon and other meat products were shipped from Canada for the British market during November.

Freighters have already sailed with 7,974 tons of meat.—*Reuter*.

Private Cocoa Trading

The British Cocoa Control Board is reported to be willing to sell West African cocoa direct to American importers instead of through the United States Government.

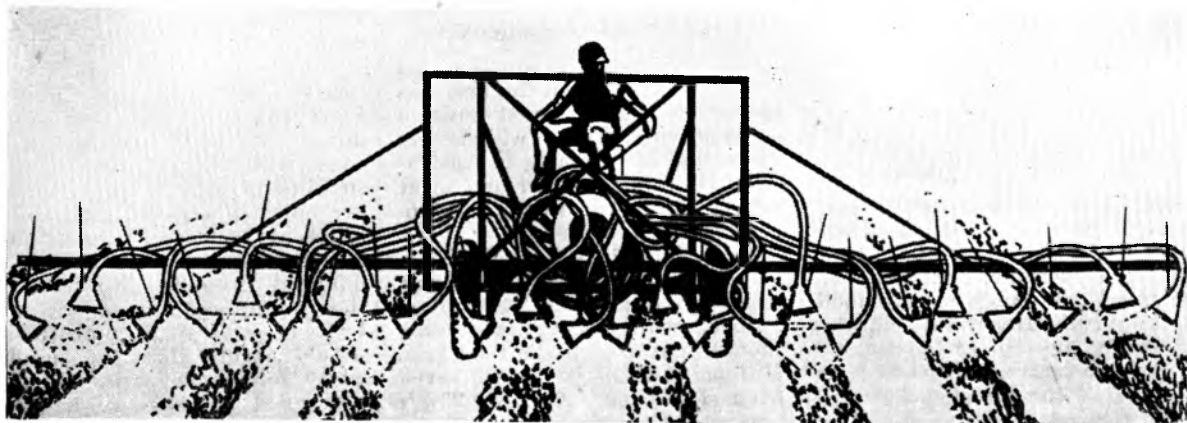
The return of business to the private trade awaits consultations with Washington officials. If successful, the talks are expected to result in importers submitting bids to the Control Board for an additional 1,000,000 bags of cocoa for shipment in the first half of 1946.

The British Control Board recently allocated 800,000 bags of cocoa to the United States.

Rice Smuggling Prospers

Smuggling rice from Italy to Switzerland has become so profitable and widespread that Italian villages along the border are enjoying a prosperity that surpasses even their wildest dreams. In the Arogne Valley, for instance, money has become so abundant that youngsters playing cards have been known to stake as much as 20,000 lire on an ace.

The official price of rice in Northern Italy is between seven and nine lire a kilogram. In the smuggling trade it rises to forty, and is finally sold on the Swiss black market for the equivalent of up to 600 lire (about 5s.).



News from the Ministries

Manufacture of Table Jellies

The manufacture of table jellies is to be resumed. Allocations of sugar on the basis of 60 per cent. of the usage in the twelve months ended June 30, 1939, will be issued in respect of the period commencing January 6, 1946. Manufacturers who have an established datum usage of raw material for the production of table jellies are invited to apply for licences to manufacture.

Applications in the first instance should be addressed to Ministry of Food, Preserves Branch, T.O.B2., Marston Road, Oxford.

It is unlikely that table jellies will be available in any substantial quantities before the spring.

Food Infestation

The Infestation Conference, arranged in association with the Emergency Economic Committee for Europe, has concluded its deliberations. Delegates attended from Britain, France, Belgium, Holland, Denmark, Norway, Greece, Yugoslavia, Turkey, and Italy, as well as from the Control Commissions in occupied territory and from U.N.R.R.A. The conference reached unanimous conclusions on the seriousness of infestation in all the countries, the need for dissemination of knowledge of cause and effect, and of the means of preventing and combating infestation. The conference recognised that when the Food and Agricultural Organisation comes into effective operation, provision may be made for the international control of infestation, but pending the availability of such provisions it was decided to recommend to the E.E.C.E. the formation of a committee centred on the Infestation Control Division of the Ministry of Food, an arrangement which has the concurrence of the Minister of Food, Sir Ben Smith.

Millers' Grists

Grist instructions in all areas were temporarily withdrawn on November 1, 1945, and from that date, therefore, the grist has been left to the discretion of the millers.

January, 1946

Canned Puddings

An Order (S.R. & O. 1945 No. 1408) has been made controlling the maximum prices of canned sweet puddings, which are being manufactured in two shapes only—namely, A.1 tall, and 1 lb. flat, their minimum net weight being 14½ oz. The maximum retail selling price is 1s. per can.

By an amendment to the Flour Confectionery (Control and Maximum Prices) Order, 1944, that Order no longer applies to canned sweet puddings.

Apples

An Order has been made prohibiting the export of apples from Northern Ireland to Great Britain or the Isle of Man in order to conserve this year's small crop for consumption in Northern Ireland. The Order is called the Northern Ireland Apples (Transport Restriction) Order, 1945, and came into force on November 11, 1945. An exemption is provided for non-commercial consignments of not more than 14 lb. gross.

The export of apples from Northern Ireland to Eire is already dealt with by the Export of Goods (Control) (No. 7) Order, 1945.

Bread Subsidy

Officers of the Ministry of Food met representatives of the Bakery Trade of England and Wales on November 7, 1945, to consider the result of the investigation by the Ministry's accountants of the costs of baking and distributing bread.

The rate of bread subsidy at present payable in England and Wales is 6s. 9d. per sack of flour, together with an additional 1s. 3d. per sack on the first ten sacks used in each week. The Ministry announced that, as a result of the costings investigation, the rate of subsidy will be increased in England and Wales to 9s. per sack with effect from June 25, 1945. The special payment of 1s. 3d. per sack on the first ten sacks weekly will be discontinued as from the same date.

The change in the rate of subsidy will not affect the price of bread.

Defence (Sale of Food) Regulations, 1943

An Order-in-Council (S.R. & O. 1945 No. 1454) has been made amending Regulation 3 of the Defence (Sale of Food) Regulations, 1943, to enable proceedings in respect of any article sampled to be brought before the court having jurisdiction where the sample has been taken, even though the only sale has taken place elsewhere.

Prices for Dried Yeast

An amendment to the Feeding Stuffs (Maximum Prices) Order, 1943, which came into force on November 26, 1945, altered the maximum prices prescribed for dried yeast.

The maximum prices per ton net weight are respectively £17 10s. 0d. for extracted dried yeast and £22 10s. 0d. for unextracted dried yeast.

The maximum price formerly in force was £20 2s. 6d. per ton net weight for both extracted and unextracted dried yeast.

Import of Boxed Fish

During the winter months wholesale fish traders will be allowed to import a limited quantity of boxed fish from Denmark and Norway. This step has been taken to augment fish supplies during the time when landings from British vessels are likely to be far below public demand. As British landings again go up the quantity of boxed fish from abroad will be reduced. For the present, imports of boxed fish from Denmark will be limited to 400 tons per week and from Norway to 200 tons per week.

The boxed fish can be consigned by the exporting countries to wholesalers' associations in the following markets: Aberdeen, North Shields, Newcastle, Hull, Grimsby, London, Glasgow, Birmingham, Liverpool, and Manchester.

The associations are asked to see that the fish is equitably distributed. If any association is unable to undertake these arrangements individual merchants can receive and distribute the fish.

Mr. H. N. Butler

The Minister of Supply has agreed to the release of Mr. H. N. Butler from his appointment as Director of Supplies (Special).

The continuing functions of the Directorate have been transferred to the Directorate of General Stores.

Appointments

On the retirement of Sir John Bodinnar on November 30 from the post of Commercial Secretary in the Ministry of Food, the Minister, with the approval of the Prime Minister, has appointed Mr. G. R. P. Wall to be head of the Supply Department of the Ministry, with the rank of Deputy Secretary, for the period during which his services continue to be available to the Ministry.

*

Mr. T. A. Noyes, Director of Raw Cocoa, tendered his resignation of that appointment with effect from November 30. The Minister of Food has accepted Mr. Noyes' resignation with regret and expressed his appreciation of his services to the Ministry. He has appointed Mr. E. R. Greene, the present Director of Coffee, to be Director of Cocoa as well as Coffee.

*

At the request of Lloyd's Register of Shipping it has been agreed with regret to release Mr. H. R. Howells from his post of Director of Cold Storage as from December 31, 1945. The Minister desires to take this opportunity of expressing his appreciation of Mr. Howells' services to the Ministry.

As from January 1, 1946, Mr. J. A. Robertson will take over the duties of Director of Cold Storage, and Mr. G. A. May those of Deputy Director.

*

Mr. R. R. Enfield, C.B., has been appointed to a new post of Chief Economic Adviser to the Ministry of Agriculture and Fisheries from December 4, 1945.

Mr. D. A. E. Harkness, Senior Assistant Secretary in the Ministry of Agriculture, Northern Ireland, has been appointed from the same date to succeed Mr. Enfield as Principal Assistant Secretary in charge of the Economics and Statistics Division of the Ministry.

Mr. E. de Stein

Mr. E. de Stein, Director of Finance, Raw Materials Department, Ministry of Supply, has been released from his appointment with effect from October 31, 1945.

Mr. de Stein will remain chairman of the Committee for the Disposal of Ministry of Supply Raw Materials Department Factories.

Improved Beef Sausage

An improved beef sausage is to be placed on the market as announced by an amendment to the Meat Products, Canned Soup, and Canned Meat (Control and Maximum Prices) Order, S.R. & O. 1944 No. 763.

The new Order came into operation on December 2 and provides for an increase from 37½ to 40 per cent. in the meat content of beef sausages and beef sausage meat, including beef slicing sausage, and for the exclusion after an interval of any soya content. The Order also provides for a general increase of 2d. per lb. in prices.

Government Surpluses

Among the goods now becoming surplus to Government requirements there are many which are of use for ordinary civilian purposes, and under present arrangements the policy of the Government is that the disposal of these surplus goods will be effected usually through the normal channels of trade.

It is therefore unnecessary for individual members of the public to approach Government Departments and Service authorities direct with enquiries as to whether they can purchase surplus stores; such enquiries only serve to increase the day-to-day work of the Departments and to handicap them in their work of carrying out disposals through the channels which have been agreed on. Interested purchasers who require goods for their own use should accordingly approach their normal dealers in order to ascertain whether surpluses of the commodity they require are in fact yet available from Government surpluses. Individual traders who are interested in participation in the Government disposal schemes

should ask their Trade Associations for information if they do not already know about the arrangements which have been made for disposal of Government surpluses in their own trade.

Meat for Manufacture

Owing to the very low stocks of manufacturing meat it became necessary as from November 25, 1945, to fill the manufacturing entitlements of general butchers which are delivered direct to their shops with meat of ration quality at the ration meat price instead of manufacturing quality meat at the manufacturing price as hitherto. To compensate for the reduction in weight that the butcher would otherwise receive, the manufacturing entitlements of these shops will be increased from 4 to 5 per cent. of the ration meat authorisations for the datum week.

Specialist Advisory Service

The specialist advisory service in agricultural economics in England and Wales has, in consequence of the forthcoming establishment of a National Agricultural Advisory Service, been reorganised as a separate service which will continue to be attached to the universities.

This new arrangement has operated since October 1, 1945, and the separate service is known as the Provincial Agricultural Economics Service for England and Wales.

The Ministry of Agriculture and Fisheries is concerned with various aspects of the work of the Service, and to advise him on these the Minister has appointed a Committee on the Provincial Agricultural Economics Servicing consisting of:

Mr. Henry Clay, Warden of Nuffield College, Oxford (chairman).

Mr. A. W. Ashby, Director-designate of the Institute for Research in Agricultural Economics, University of Oxford.

Mr. A. H. Brown, Farmer.

Dr. W. G. Ogg, Director, Rothamsted Experimental Station.

Mr. P. Barrett Whale, Professor of Economics, University of Liverpool.

The Committee will be assisted by assessors appointed by the Ministry and by the Development Commission.

Information and Advice

Ice Cream Wafers

B.373. *Information required regarding the manufacture of ice cream wafers.* (London.)

The basis of the batter used for the production of wafers is, of course, flour, but the nature of the flour is an important factor. The actual physical characteristics required in the flour will vary with the technique employed in the factory, but a well-balanced flour of good strength gives the best results. The gluten does not want to be too flowy and distensible, but, on the other hand, it should not go the other way, since some lack of distensibility tends to cause the wafers to stick to the hotplates.

In addition to the flour, the batter usually contains egg or egg substitute, sugar, and sodium bicarbonate. It is usual to make a mixture consisting of egg batter, sugar, water, and often a little flour together with the bicarbonate, and then to add this to the quantity of water used in making a mix. The required quantity of flour is then added in fairly small quantities at a time while the mixing is proceeding.

The egg-sugar-bicarbonate mixture might have a composition something like the following:

28 lb. egg batter
5 gallons water
1½ lb. bicarbonate
7 lb. flour

Sufficient sugar to give the desired degree of sweetness in the final wafer. This may vary considerably with different manufacturers.

In making the actual batter, the following quantities would be reasonable:

52 gallons water
7½ gallons egg-sugar-bicarbonate mixture
1½ sacks (420 lb.) flour

The above quantities must be taken only as a general guide, since an important factor is the consistency of the final mix. The correct consistency is usually determined by the experience and skill of the factory foreman, but it is fairly critical. It may be, therefore, that in a particular factory the relative proportions of flour and water may need to be modified considerably. In any event it will be influenced by the character of the flour.

The best plan, of course, would be to have some trial runs on these lines and, at the same time, arrange for laboratory tests on the viscosity of the batter, etc., in order to arrive at a controllable procedure and thus ensure that the finished wafers are of good quality.

Information Supplied

B.427. *Details regarding a Californian invention whereby soda is mixed with ice in cubes.* (Liverpool.)

B.428. *Suppliers of apple pulp and fruit juices.* (London.)

B.429. *Names and addresses of manufacturers of the following food machinery and equipment: (1) colloid mills; (2) bottle fillers; (3) bottle and can labelling machines; (4) bottle-washing machines; (5) homogenisers.* (London.)

B.430. *Literature on macaroni manufacture, approximate cost of plant, and suppliers of same.* (India.)

B.432. *Formulae for sage and onion stuffing, and for parsley, thyme, and lemon forcemeat, based upon the use of rusks in each case.* (Herts.)

B.433. *Suppliers of machinery for filling self-raising flour packets 2 lb. and 7 lb. sizes, with a minimum output of 20 tons per week.* (Australia.)

B.446. *Information relevant to the manufacture of baking powder or golden raising powder.* (Lancs.)

B.447. *Name and address of the manufacturers of Gammexane.* (British Columbia.)

B.451. *Manufacturers and suppliers of wheat gluten.* (London.)

B.454. *Details required of the following subjects: (1) manufacture of food yeast from starch-bearing material; (2) literature on rice milling engineering and on cereal treatments generally; (3) literature on solvent oil extraction from cereal products.* (Egypt.)

B.462. *Information regarding the packaging of pudding and cake mixtures of various kinds, also pancake flour.* (New Zealand.)

B.463. *Recipe for the manufacture of jelly crystals.* (Cheshire.)

B.464. *Information relevant to the method employed in the canning of Lobster Newburg.* (U.S.A.)

B.465. *Name and address of manufacturers of waxed film for packaging foodstuffs.* (Lancs.)

B.466. *Information regarding possible supplies of "Filtragol" or any similar pectin degradation enzyme on the market in this country.* (Lancs.)

B.468. *Catalogues and quotations required for macaroni and other plant.* (Palestine.)

B.469. *Addresses of various technical publications.* (Belgium.)

B.470. *List of millers in Hampshire, together with the manufacturers of a perforating machine.* (Middlesex.)

B.479. *Information on the manufacture of processed cheese.* (Norway.)

B.480. *Information relevant to the use of powdered milk in the manufacture of horseradish cream.* (Warwick.)

B.481. *Names and addresses of manufacturers of canning and squash-making plant.* (India.)

B.482. *Name of a meat dicer consisting of a series of circular rotary knives and the manufacturers thereof.* (Ireland.)

B.483. *Names and addresses of manufacturers of small composition drums with metal top and bottom (dredger top) for packing sprinkler dressings.* (Glos.)

B.487. *Formula for a household preparation for tenderising meat.* (Egypt.)

Information Required

B.596. *Name and address of the manufacturers of "Siccarom."* (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.).

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.

572,446. BLACKALL, S. W. E.: Dehydration.

572,551. BACH, R. G., and PATON, J. R.: Cans.

572,573. CALDWELL, W. A., and IMPERIAL CHEMICAL INDUSTRIES, LTD.: Canned foods and beverages incorporating exothermic heating devices.

572,608. BRITISH THOMSON-HOUSTON CO., LTD. Butter conditioners or receptacles in refrigerators.

Abstracts of Recent Specifications

Improvements in the Manufacture of Foodstuffs

This invention relates to improvements in the manufacture of foodstuffs in the form of rods or tubes.

A method of manufacturing macaroni, vermicelli or spaghetti consists in extruding the plastic material in the form of tubes or rods and conveying said material on a moving reticulate conveyor across the path of heated high velocity air or gas streams to dry and bake it.

It has already been proposed to extrude potatoes and dry the extruded filaments by hot air, but it is believed to be novel to produce macaroni, vermicelli or spaghetti by the process specified in which both drying and baking are performed.

570,656. William Wycliffe Spooner.

Improvements in the Processing of Foodstuffs

This invention relates to the processing of foodstuffs by treatment with smoke or like particulate medium or with vapour or gas.

The object is to provide improved apparatus for carrying out such processes and the invention consists in apparatus for carrying out processes of the kind referred to comprising two separate tunnels terminating at each end in a common chamber, and an endless conveyor for moving the foodstuffs through the tunnels, the con-

veyor being so arranged that one run passes through one tunnel while the other run returns through the second tunnel, and one of said common chambers being fitted with doors or other closures through the openings controlled by which the foodstuffs may be charged into and removed from the apparatus.

570,871. H. Smethurst (Fish Curers), Ltd., William Wintringham Smethurst, Joseph Byron Ward, and Frank William Ward.

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.).

PALACE. — 635,356. Hams, bacon, canned meats, preserved meats, meat extracts, dead poultry and dead game, sausages, canned fish, eggs, lard, and pickles. **Brown and Knight, Ltd.**, 9/10, Lower Marsh, Lambeth, London, S.E.1; Manufacturers and Merchants.

TERRIER. — 635,651. Tea. **Hilland and Stewart, Ltd.**, 5, Marcus Ward Street, Belfast, Northern Ireland; Merchants.

New Companies

H. W. Hales, Limited. (397742.) Revenue Buildings, Chapel Road, Worthing. To carry on bus. of bakers, etc. Nom. cap.: £2,000 in £1 shares. Dirs.: L. H. Staite, Wychwood, Goodwood Road, Worthing; Florence G. Hales, 21, Rowlands Road, Worthing; Eva E. Muggidge, 54, Lindum Road, Worthing.

G. Waugh, Limited. (397788.) 56, Raby Road, W. Hartlepool. To carry on bus. of bakers, pastrycooks, confectioners, etc. Nom. cap.: £4,000 in £1 shares. Dirs.: G. M. R. Waugh and Annie G. Waugh, both of 56, Raby Road, W. Hartlepool.

Westry Grain Dryers, Limited. (397811.) 4, Regent Avenue, March. Nom. cap.: £2,000 in £1 shares. Dirs.: J. P. Martin and Mary I. Martin, both of 4, Regent Avenue, March.

Electronic Manufacturing and Development Co., Limited. (397893.) Tanners Lane, High Street, Lincoln. Nom. cap.: £5,000 in £1 shares. Dirs.: H. C. Rylatt, 8, Boultham Park Road, Lincoln; H. J. Gledhill, "Glenara," Newark Road, North Hykeham, Lincs.; J. Spencer and Barbara A. A. Rylatt, both of Lincoln.

Chosen Foods, Limited. (397924.) 13, Berwick Street, W. 1. To carry on bus. of manufacturers, merchants, caterers, restaurateurs, suppliers of foods by automatic machines, etc. Nom. cap.: £10,000 in £1 shares. Dirs.: N. Hickmet and Mrs. H. A. Hickmet, both of 11, Wardour Street, W. 1.

Noda Package Machines, Limited. (397937.) 113, Wardour Street, W. 1. Nom. cap.: £1,000 in £1 shares. Dir.: H. C. Nicholls, 40, Lamberhurst Road, S.E. 27.

S. H. Swinchatt, Limited. (398368.) 110, Cannon Street, E.C.4. To take over the bus. of a dried fruit and cereal merchant carried on by S. H. Swinchatt at 110, Cannon Street, E.C.4. Nom. cap.: £10,000 in £1 shares. Dirs.: S. H. Swinchatt, 110, Cannon Street, E.C.4; P. W. Walder, address not stated.

Multifridge, Limited. (398476.) To carry on the bus. of manufacturers of and dealers in refrigerators, cold-storage machinery, etc. Nom. cap.: £5,000 in 2,500 6 per cent. cum. pref. and 2,500 ord. shares of £1. Permanent dirs.: W. Chinn, address not stated; A. S. Cheston, 17, Oakland Avenue, Droitwich; E. M. E. Powell, 24, Raleigh Drive, Tolworth, Surrey.

Arctic Insulation, Limited. (398537.) 290, Finsbury Pavement House, E.C.2. To carry on bus. of manufacturers of and dealers in cold-room service cabinets and refrigerator boxes, etc. Nom. cap.: £500 in £1 shares. Dirs.: W. G. Glander, 115, Montagu Road, E.11; H. J. Lester, 61, Lynwood Grove, Orpington (acct.).

Albert H. Tring, Limited. (389574.) 20, Eastcheap, E.C.3. To carry on the bus. of ice cream manufacturers, caterers, grocers, etc. Nom. cap.: £4,000 in £1 shares. Dirs.: A. H. Tring and Elizabeth Tring, both of 48, Rosehill Avenue, Sutton, Surrey.

Molvita, Limited. (399072.) 65, London Wall, E.C. To carry on bus. of manufacturers of and dealers in foodstuffs, confectionery, proprietary articles, etc. Nom. cap.: £5,000 in 1s. shares. Dir.: T. C. Halford, 22, Buckingham Street, W.C.2.

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