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C O N T E N T S.

Issued by

DIVISION OF FOOD PRESERVATION

COMMONWEALTH COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH.

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EDITORIAL

In presenting the first issue of this publication which, as its title implies, is concerned with the preservation of food, we consider that the time is opportune for commencing this project. The decision to begin publication this year was reached after obtaining favourable expressions of opinion from men intimately concerned in the various food industries throughout Australia.

In the past, the translation of the results of the Division's investigational work into commercial practice has been attempted by means of publications such as trade circulars, articles in trade journals and newspapers, and by personal contacts, either directly or through the medium of the personnel of the State Departments of Agriculture and the Commonwealth Department of Commerce. It has been felt that the efficiency of such extension services could be increased by the diffusion of knowledge through a special regular publication containing semi-technical articles which would be circulated directly to those persons responsible for the control of processes in the field of food preservation.

From time immemorial, Man has been confronted with the necessity of providing supplies of food to tide over periods of scarcity, and has developed various methods for prolonging the normal "storage life" of many foods. The earliest methods adopted were storage with ice or by freezing in those parts of the World where the required environment was found, and preservation by such means as heating, drying, salting, smoking, and the addition of sugar, vinegar and spices. During the nineteenth century there were further developments in canning, the use of chemical preservatives, and artificial refrigeration. These agencies, in addition to the more recently developed methods such as the use of controlled gaseous atmospheres and the application of ultra-violet light, form the basis of the majority of commercial methods now used for the preservation of foods.

The outstanding development during the present century has been manifested in the greater application of scientific methods in commercial practice. Until the end of the nineteenth century food processors were dependent almost entirely on empirical knowledge and relied on rule-of-thumb methods for the preparation and storage of each particular product. Since the beginning of the twentieth century, rapid advances have been made in many branches of scientific research including the biological sciences which are of particular importance in their application to the problems of food preservation. A fairly thorough knowledge has now been gained regarding the nature, composition and characteristics of a wide range of foods including their reactions to the various agencies applied in processing and storage, and also of the most efficient means for control of the external conditions during handling of foods. Armed with this knowledge, investigators have been able in many cases to find reasons for the old rule-of-thumb methods, and having defined these, to attempt to standardize procedure, and to improve processes.

There has been, as the result, a growing appreciation amongst food processors of the advantages to be gained from the application of scientific methods in the many phases of processing and storage of foodstuffs.

In order to maintain contact with advances in technique and with the latest developments in the food industries it is important that the personnel be acquainted with the results of investigational work being carried out in various parts of the World. Such information is available in a wide range of overseas and Australian publications. The present periodical, although an additional publication, should prove to be of special value to those who are unable to secure overseas literature, and since it will deal largely with results which are capable of direct application, should be of special interest to those who are responsible for the control of technical processes in food manufacture.

The scope of the publication will include articles in semi-technical language dealing with specific points in handling, processing and storage of foodstuffs, explanations of advances in technique from outside sources, and reviews of progress in specific fields. In addition, there will be accounts of the nature and scope of the work in progress in the laboratories of the Division of Food Preservation together with explanations of results of investigations already published.

Because of the present emergency conditions and the necessity for holding foodstuffs for longer periods than normally, it becomes increasingly important that the most efficient methods are adopted in all stages of processing and storage. It is hoped that this publication may contribute, in some measure, to the solution of the problems with which the food industries are confronted.

THE ACTIVITIES OF THE DIVISION OF FOOD PRESERVATION.

In the first issue of the quarterly, it seems desirable to outline briefly the nature and scope of the Division's activities.

The central laboratory and headquarters of the Division are located in the State Abattoir Grounds, Homebush Bay, Sydney, and comprise about 18 laboratory rooms and offices and 15 cold rooms wherein constant temperatures ranging from -20°F. to 90°F. can be attained. In co-operation with the Victorian Department of Agriculture, investigations into the storage and handling of fresh fruits are being carried out in Melbourne where a laboratory and set of cold rooms are located. A laboratory and several small cold rooms are also maintained at the Brisbane Abattoir where special problems in the handling and storage of meat are investigated.

When the Council's Division of Food Preservation was first established, meat preservation investigations formed the bulk of its work. At Brisbane, detailed studies were made of the factors limiting the storage life of chilled beef, and this work contributed, in no small manner, to the establishment of a large export trade in chilled beef from Australia to Great Britain. While the major part of these studies has been completed, investigations are still proceeding in Brisbane on the intricate problem of the prevention of the loss of "bloom" or appearance from chilled beef during the long voyage to Great Britain. In view, however, of the cessation of chilled beef exports during the War, the Brisbane laboratory is also giving a good deal of attention to other meat storage problems, such as the transport of beef from Queensland to the Southern States and the handling and packaging of boneless cuts of frozen beef. At the central laboratory, Sydney, investigators are studying the effects of ozone on the storage life of meat and also problems in the canning of beef and various meat products.

While problems of the supply of fish outweigh all others in the Australian fishing industry, considerable attention has been given to the problems of handling and storage. With the chief commercial species, investigations are being carried out on the rapid freezing and storage of fillets which may undergo comparatively rapid deterioration even at low temperatures. In conjunction with the Council's Division of Fisheries, a study is being made of the smoke curing of fish and the problems associated with storage of the cured material.

The occurrence of occasional heavy wastage in eggs exported overseas, through the onset of bacterial rotting, has led to extensive bacteriological studies of the nature of this trouble and possible preventive measures. Parallel with this work, semi-commercial scale experiments are being carried out in each mainland State through the Investigation Committee of the Egg Producers' Council, and this Division is responsible for the planning and organization of these experiments. Attention is also being given in the central laboratory to the factors influencing the keeping quality of whole dried egg powder.

Work on the handling and storage of apples, pears, citrus fruit, grapes, plums and peaches has been in progress for some years in co-operation with the Departments of Agriculture of New South Wales and Victoria, and a short account of the investigations is included in this issue.

A Section to deal with fruit products has recently been added, and extensive laboratory accommodation and equipment have been provided to enable the investigators to study methods of preparation and storage of pure fruit juices and general problems in fruit and vegetable canning. Amongst the fruit juices being studied are those from apples, oranges, grapefruit, pineapples, tomatoes, grapes, prunes and passion-fruit. On the canning side, particular attention is being given to the question of corrosion and staining of tinplate containers during processing and storage.

The Physics Section studies the general physical problems arising in the course of investigations into the handling and storage of the various kinds of foods. At present, this Section is engaged in (a) general studies whose aim is to provide engineers with more precise data for the cooling and freezing of meat, (b) studies of packaging materials and loss of water from foods in cold storage, and (c) physical studies in the preparation of dried foodstuffs, such as dried eggs.

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COOL STORAGE INVESTIGATIONS WITH FRUIT.

There are many different kinds of fruit grown in Australia and during 1937-8 approximately a quarter of a million acres were under fruit production yielding 27 million bushel cases of a gross value of £9,000,000. More than half this quantity was grown in New South Wales and Victoria. The principal kinds of fruit grown in New South Wales are citrus fruits, which occupy the leading position, bananas, apples, pears, peaches, plums and cherries, whilst in Victoria apples, pears, citrus, plums, peaches and apricots are the principal fruits grown.

During overseas transport or local storage and marketing, fruit may deteriorate due to the development of wastage or to loss of quality, and the reasons for this can only be ascertained by tracing the life history of the fruit through all the conditions under which it is grown and stored.

Some factors which influence the keeping quality of fruit are orchard and seasonal conditions, size of the crop, time of picking, treatment between picking and storage, temperature and humidity conditions of storage, composition of the storage atmosphere and conditions after storage. The effects of these factors on the storage behaviour of citrus fruits, apples, pears, plums, peaches, grapes and nectarines are being carefully investigated by this Division at Homebush in co-operation with the New South Wales Department of Agriculture and in Melbourne in conjunction with the

Victorian Department of Agriculture. The investigations have included a large number of experiments covering overseas transport as well as local storage.

The fruit is carefully selected from a number of orchards representative of the growing conditions in the main fruit growing districts, and stored in well insulated rooms in which temperature is accurately controlled. The total capacity of the experimental storage rooms in each centre is over 2,000 bushel cases and the temperature range is from 30° to 70°F., the higher temperatures being used for ripening and sweating treatments. At Homebush there are two gas-tight rooms in which gas storage trials can be carried out on a semi-commercial scale, and in Melbourne there are a number of gas-tight cabinets, each of which holds several bushels of fruit.

After fruit is picked it is still living material and continues to respire, taking up oxygen and liberating carbon dioxide. The carbon dioxide liberated by different kinds of fruit over a range of temperatures is collected and measured, and in addition some of the more important constituents of the fruits are chemically estimated.

Special attention is given to the ripening of pears, peaches and plums, which do not usually ripen in cool store, and the optimum conditions for the ripening of these fruits have now been determined.

The fruit is examined one to two weeks after its removal from cool store to atmospheric temperatures so that the conditions of treatment may be similar to those of commercial practice, and a photographic record in colour is kept of the various types of wastage.

Attention is chiefly concentrated now on determining the optimum picking and storage conditions for the main varieties of apples and pears and in extending their storage life by gas storage or by treating the fruit with some protective skin coating. These consist of mixtures of waxes and oils and are generally applied as emulsions in which the fruit is dipped. After drying, a protective film is left on the fruit. Owing to the present emergency, fairly large quantities of apples will have to be kept in common or unrefrigerated storage, and skin coatings may be of considerable value in reducing wilting and also in prolonging storage life. A technique has been developed for testing the effect of a skin coating by analysing the internal atmosphere of a fruit after treatment. Promising results have been obtained with some varieties of apples and considerable attention is now being given to this method of fruit storage.

Experiments demonstrating the value of cool storage in extending the canning season of peaches and pears are also being carried out in conjunction with various canning companies.

The effect of district, orchard conditions and stock on quality is also being tested.

The control of mould wastage in grapes has been studied and very good results have been obtained by impregnating the cork packing with certain chemicals or by placing metabisulphite pills with the wrapped bunches.

The storage qualities of new varieties of fruits are being tested and the effect on subsequent storage life of acid washes to remove spray residues from apples is being studied. The application of boron, as a soil dressing or as a spray, has been effective in controlling internal cork, and the effect of this treatment on the subsequent keeping quality of fruit is being studied.

Prompt cooling of fruit after picking is frequently advocated and the effect of delaying the storage of various kinds of fruit has been investigated. Whether fruit should be promptly cooled depends on the kind of fruit and its maturity at the time of picking.

The value of ethylene for colouring tomatoes and citrus fruits has been demonstrated, and ethylene has also proved effective in controlling bitter pit in early picked Granny Smith apples.

This article merely indicates the nature of the investigations but in subsequent issues various aspects of fruit storage will be reviewed. The results of some experiments with oranges, pears, apples, peaches, plums have already been published in the Journal of the Victorian Department of Agriculture and in publications of the Council for Scientific and Industrial Research.

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HUMIDITY IN COLD STORES: PART 1.

1. WHAT IS MEANT BY HUMIDITY?

Ordinary air is never completely dry, i.e. it always contains some water vapour. The phrase "humidity in a cold store" may be somewhat loosely defined as the amount of water vapour in the air inside the store. Unfortunately, humidities are commonly expressed in several different ways, and a clear understanding of these is necessary to prevent misconceptions. One common way of expressing the humidity is the direct form, i.e. weight of water vapour in a certain quantity of air. The units most commonly used are

1. pounds of water vapour per cubic foot of air.
2. " " " " " pound of air.
3. grains " " " " " " "
4. " " " " " cubic foot of air.

Humidities expressed in this way are generally called absolute humidities.

Air at 50°F. which had an absolute humidity of 4 grains per cubic foot is very humid but air at 100°F. with the same absolute humidity is very dry. Consequently, the knowledge of the absolute humidity of air tells us very little about its condition unless its temperature is also known. Pressure changes may also be important, but, in cold storage work, air pressures are almost always close enough to atmospheric to neglect the effect of pressure differences in humidity calculations.

The amount of water vapour which air can hold varies with the temperature. For example, air at 50°F. can hold up to 4.113 grains per cubic foot of water vapour but no more, whereas at 100°F. it can hold up to 19.98 grains per cubic foot. Air which contains the greatest quantity of water vapour which it can hold is said to be saturated. Air feels moist when it is almost saturated and for this and other reasons, humidities are often expressed as relative humidity or percentage saturation. Thus relative humidity =

$$\frac{\text{water vapour content of air}}{\text{water vapour content of saturated air at same temperature}} \times 100$$

The water vapour content of the air can be expressed in any convenient unit in arriving at relative humidity so long as the water vapour content of saturated air is expressed in the same unit. The unit generally used is the rather indirect one, 1 mm. mercury (or one inch mercury) partial pressure of water vapour. The reason for this choice is that the total pressure of air can be resolved into "partial pressures" due to each of the components, oxygen, nitrogen, water vapour etc. Normal atmospheric pressure as measured by a barometer is about 760 mm. (or 30 in.) and one mm. Mercury or $\frac{1}{760}$ of normal atmospheric pressure is a convenient unit for expressing the partial pressure of water vapour in air. The phrase partial pressure of water vapour is often abbreviated to "vapour pressure". The vapour pressure of saturated air at a given temperature is called the saturation vapour pressure at that temperature. Consequently if we use vapour pressures to express the water vapour content of air we can write

$$\text{Relative humidity} = \frac{\text{vapour pressure in sample of air}}{\text{saturation vapour pressure at the temperature of the sample}} \times 100$$

Tables or charts giving saturation vapour pressures for various temperatures are printed in most textbooks on refrigeration.

If air is cooled without removing or adding water vapour or changing the total pressure, its vapour pressure remains constant, but as the temperature falls, the saturation vapour pressure decreases. Consequently, as the air is cooled, its relative humidity rises steadily until it reaches 100%, i.e. the air becomes saturated. The temperature at which this occurs is called the dew point. When air is cooled below the dew point, water vapour must come out in the form of liquid water or ice, either as dew or frost on solid surfaces, or sometimes as fog or droplets of liquid water or ice suspended in air.

We have, therefore, the following main ways of expressing the moisture content of air directly or indirectly:

Absolute humidity
Vapour pressure
Relative humidity
Dew point

but no one of these alone gives a complete specification of the condition of the air. Any one of these, together with the temperature, will give a complete specification and enable any of the others to be calculated with the aid of a table of saturation vapour pressures.

2. WHY IS HUMIDITY IMPORTANT IN COOL STORES?

With most cold stored food products of high water content there are two main effects of humidity, namely:-

1. The higher the relative humidity the lower the rate of loss of water by evaporation.

2. With many products a very high humidity is harmful because it favours the growth of moulds and bacteria on the goods in store. For example, many authorities state that with eggs at 31 to 34°F. it is necessary to keep the relative humidity at about 85% or lower to eliminate the risk of mould attack. Microbial growth does not occur at temperatures below about 20°F.

It will be noticed that these two effects work in opposite directions, so that the best humidity for most products is some sort of compromise between the need to restrict water loss and the need to control microbial attack.

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THE UTILISATION OF SURPLUS APPLES: PART 1.

The cessation of the export trade in apples to Great Britain has created the serious problem of how to dispose of a surplus of approximately five million bushels. This Division has been investigating, for some time, new outlets for apples and it is proposed to describe, in a series of articles in this Quarterly, some of the possible new products.

Among those suggested are pure apple juice, apple juice concentrate, apple treacle, apple honey, apple jelly (concentrated), spray-dried apple juice powder, apple butter, apple crisps (as a breakfast food), apple pectin (for jam and confectionery manufacture) and canned apple in various forms, as solid pack, pulp, apple sauce and baked apple.

CONCENTRATED APPLE JUICE.

In this article the preparation of concentrated apple juice will be discussed. Concentrated apple juice of good quality would be of considerable value to cordial manufacturers, milk bars and even to householders, because of convenience, the reduced costs of packaging and transport and the less perishable nature of the product as compared with pure apple juice. It is usual to employ about 6 to 6½ gallons of fresh juice to obtain about 1 gallon of concentrate. If the concentrate can be prepared soon after pressing the fruit, the procedure can be greatly simplified, but this may not always be feasible, particularly where large outputs are aimed at. If the concentrate is to be prepared immediately, the juice is first depectinized, filtered and pumped directly into the concentrator. If the juice has to be stored before subsequent concentration, then the usual procedure for the preparation of the pure juice has to be followed and this involved, in addition, deaeration and pasteurization followed by storage in special casks or vats or in Boehi pressure tanks.

CONCENTRATION METHODS.

The following methods have been used commercially and appear to give satisfactory products when carefully applied.

(a) Removal of Water by Freezing (Krause Process). There are actually two Krause processes - a batch and a continuous method. In the batch process, the juice, contained in a special cell is immersed in a refrigerating mixture and frozen. The cell is then removed to a centrifuge and "whizzed" until the concentrated product ceases to flow away from the matrix of ice. In a recent improvement of the process, the juice is frozen in the form of a "ribbon" and the concentrate is continuously removed. While this method undoubtedly gives an almost perfect concentrate, the costs are more than double those of heat processes and unless very expertly controlled, serious losses of concentrate may occur owing to difficulties of separation from the mass of ice crystals.

(b) Vacuum-Heat Concentration. A complication is introduced into methods involving concentration by heat in that many delicate flavour constituents distil over in the early stages of evaporation and these must be recovered and added finally to the concentrated liquor to ensure good flavour in the product. The adequate recovery of the volatile flavouring fraction (esters) is a rather difficult procedure and seems to have been solved in only a few commercial plants. Another difficulty in concentration by heat is to prevent the onset of a cooked flavour. There are two types of commercial equipment in which juices may be concentrated with apparently good results, the vacuum pan process and the climbing film evaporator. The vacuum pan process, incorporating a device for re-impregnating the concentrate with esters, cannot be made continuous. In the climbing film evaporator the juice is drawn up three evacuated steam-jacketed stainless steel tubes in succession, in the form of a film, thus ensuring rapid evaporation. In this case the ester recovery and re-impregnation operations can be made continuous.

(c) Concentration by the Heat-Pump Principle. This process is a modification of the vacuum-heat process, using the refrigeration cycle for the evaporation and condensation of water. It is possible to use rather lower juice temperatures in this method but so far it has not been used commercially.

This Division is carrying out experiments at the present time using a pilot plant of 3 gallons capacity operating on the heat-pump principle.

In considering the commercial concentration of fruit juices in Australia, it should be pointed out that the design of the equipment calls for considerable skill and experience. In particular, a high vacuum is called for andthe juice must not be subjected to a temperature above 125°F. while considerably lower temperatures are desirable. Reduction of juice film temperatures is necessary through the use of adequate, turbulent juice flow. All equipment with which the juice may come in contact must be made of non-corroding material such as stainless steel.

If interested persons or organisations require further details on fruit-juice concentration or advance information on any of the apple products mentioned above, such will be made available on application to the Division of Food Preservation.

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THE PREVENTION OF BLACK STAIN IN FOOD CANS.

Some foodstuffs, notably meat and fish products, certain vegetables, and dairy products, when packed in plain cans produce a black stain on the interior of the can, due to the formation of tin and iron sulphides. This staining is objectionable from the consumer's point of view, especially when, as in some cases, the food product is stained on its removal from the can.

Several methods have been proposed for the prevention of black staining in food cans. The common practice, at present, is to lacquer the cans internally with one of the so-called "sulphur-resisting" lacquers. Recently, patents have been granted for certain methods of forming, on the internal surface of cans, protective films which, although quite invisible, completely inhibit black staining. These protective films may be deposited either electrolytically or chemically by heat treatment in an alkaline, oxidising, phosphate bath. The chemical process, originated by the International Tin Research and Development Council, is the subject of British patent applications but it can be applied by interested parties without royalty or fee.

All these methods have recently been tested at this laboratory and data are available on their efficiency in preventing black staining under the action of the following products:- corned beef, beef and pork sausages, tuna, crayfish, Australian salmon, green peas, asparagus, onions, sweet corn and fresh cream. In addition, tests are now being carried out on these vegetables:- beetroot, stringless beans, cabbage, spinach, celery, pumpkin, carrots and parsnips.

As regards the applicability of the processes to the commercial manufacture of food cans in this country, the following conclusions may be drawn from the experimental results.

1. The "sulphur-resisting" lacquers in current use are chiefly imported but the present work shows that lacquers of comparable resistance to black staining are manufactured locally.

2. The electrolytic methods of applying protective films are not considered to be commercially important at the present time because of the expensive plant which would be required to treat cans at the usual rates of production.

3. The chemical process for the formation of protective films is capable of immediate commercial application. The economics of the large scale production of treated cans have not been investigated, but the costs of the treatment should add little to the total costs. The plant required is an enamelled iron tank provided with heating coils and two rinsing tanks. The consumption of chemicals in the bath is very small. The process can either be applied to the tinplate sheet or to the can bodies as they leave the body-forming machine and to the ends after stamping. The protective film is, however, sensitive to abrasion and treated plate must be handled at least as carefully as lacquered plate. Properly treated cans were resistant to black staining by all the products tested. The treatment is not recommended for cans to be used for fruit products since the protective film breaks down under the action of fruit acids.

Some food canners prefer lacquered cans for higher-priced packs because of the pleasing golden appearance of the lacquer. In this connection, cans chemically treated and then coated with a gold-stoving lacquer were superior in appearance to cans coated with the semi-opaque "sulphur-resisting" lacquers.

The readily-applied and extremely effective chemical method of treating food cans to prevent black staining is already being investigated in its commercial application by canners and can manufacturers. This laboratory will supply full instructions and any technical guidance to other interested parties.

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DRIED EGG PRODUCTS.

The recent need for conserving shipping space has directed increased attention to methods for exporting eggs in a form requiring less space than eggs in the shell. A simple modification is the export of frozen egg pulp which reduces the required space by about 60 per cent. Frozen pulp, however, has three definite disadvantages:-

(1) It requires refrigerated shipping space.
(2) It cannot readily be distributed to householders.
(3) About 75 per cent. of its bulk is water.

These three objections can be met by the export of dried egg products. Another product, canned poached eggs, meets the first two objections but its uses are very limited compared with the dried egg products.

TYPES OF DRIED EGG PRODUCTS.

Three products are manufactured commercially; dried whole egg, dried yolk, and dried white. While dried whole egg has not been an important commodity in peace time when eggs in shell are readily available, a product of suitable quality is a convenient form in which to supply householders with the nutritional equivalent of fresh eggs. Dried whole egg may be used for any domestic purpose where fresh eggs are used, except of course for such obvious dishes as boiled or fried eggs. In industry there is frequently a preferential demand for yolk or white. For instance, dried yolk is used largely in the manufacture of prepared flours and mayonnaise, and dried white is used in the confectionery and bakery trades.

The yield of these dried egg products from fresh egg material is a matter of some interest, and the following approximate figures will serve as a guide. Fresh eggs are composed of 11 per cent. shell, 31 per cent. yolk and 58 per cent. white by weight. The edible portion contains 75 per cent. water while the respective figures for yolk and white are 50 and 88 per cent. (approx.). In other words a case (30 dozen) of eggs of 15 lb. grade is equivalent to 40 lb. of pulp (14 lb. yolk and 26 lb. white) which in turn will yield approximately 10 lb. dried whole egg (7 lb. dried yolk and 3 lb. dried white). One pound of dried whole egg is therefore the equivalent of 3 dozen 2 oz. eggs.

METHODS OF MANUFACTURE.

The evaporation of water from eggs may be accomplished in three general ways:-

1. "Instantaneous" evaporation at high temperature. e.g. spray drying processes.

2. Slower drying at temperatures sufficiently low to prevent denaturation, e.g. drying batches in open pans.

3. Evaporation in high vacuum from the frozen state.

The third method gives the least alteration to the proteins and oil emulsions of the egg, but is not yet attempted commercially. The cost of the method is likely to be high. Methods 1 and 2 both endeavour to avoid heat denaturation of the egg materials. In method 1 the aim is to dry the fine particles so rapidly that heat injury is avoided, and in method 2, temperatures are chosen so that, during the period of drying (many hours), heat denaturation will not occur. With both methods a certain amount of heat injury generally occurs. Drying by method 1 may be regarded as a continuous process and uniformity in the final product is somewhat easier to attain than with method 2. From an engineering aspect, overall thermal efficiency increases with increasing temperature and this is in favour of method 1. Labour costs also would be lower for spray-drying processes. On the other hand, spray-drying equipment is more intricate and costly and the power requirements for operation are very much greater than for the batch method. The choice of a drying method is therefore very much dependent on particular conditions.

As with many other products, homogenisation generally precedes drying. The mucilaginous character of the thick white is, however, difficult to deal with and some preliminary amelioration of the product is generally required. There is greatest necessity for this when the whites are dried separately. In the manufacture of Chinese egg white the thick white is liquefied by a bacterial fermentation. Fermentation processes under somewhat greater control are also used elsewhere. In addition, there are numerous patented processes for rendering egg white in a form suitable for drying, but discussion of the pros and cons of these procedures is outside the scope of this article. It is true, however, that only a small number of the processes patented have had any measure of commercial success.

QUALITY IN DRIED EGG PRODUCTS.

Quality requirements depend upon the use for which the product is intended e.g. some industries may use products which would not be acceptable to householders. For domestic use, it is necessary that the products be of good odour and flavour and capable of ready and complete reconstitution by the simple addition of appropriate amounts of water. It is furthermore essential that, after reconstitution, the fat content of the yolk remain in a stable emulsion; in other words "creaming" of the yolk is to be avoided.

Due to the high fat and lipoid content of the yolk, dried yolk and dried whole egg are much more prone to deterioration in storage than is dried white. The effect of storage in various gases at different temperatures is now being investigated in the laboratories of this Division.

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NOTES

ODOUR CONTROL IN FOOD STORES.

It has long been known that certain types of activated carbon possess an affinity for gases and vapours. This property is sometimes made use of in the construction of deodorizers for the air of food stores. A recent report on the use of such equipment in chill rooms and locker storage plants appeared in Ice and Refrigeration, Vol. 99 (1940) page 432. Mention is made of a particular set-up in which the air is drawn through the units by means of a fan and recirculated.

The life of the carbon depends upon its adsorptive capacity, and in practice it is necessary to reactivate the carbon filters after a certain amount of adsorption has taken place.

Supplies of activated carbon are at present available in Australia.

USE OF IRON IN FOOD PROCESSING EQUIPMENT.

The following abstract was taken from an article published in Food Industries, Vol. 12 (1940) page 32:-

> "All other metals except silver and tin caused loss of flavour of essential oils; in some cases the flavour loss was complete during an overnight contact. Iron and copper were particularly active in bringing about such loss of flavour.
>
> The suggestion is put forward that the delicate "homemade" flavour of bread may be lost through contact with bare iron in the mixers.
>
> It is known that minute traces of copper - 1.5 parts per million - in pickles adversely affect the colour and produce a harsh flavour. Ice cream appears to have a similar critical tolerance of 3 parts per million of copper."

INFORMATION SERVICES.

The attention of readers is drawn to the fact that enquiries of a technical or general nature may be submitted to the Council's Information Section, 314 Albert Street, East Melbourne, C.2., Victoria. Written replies to such queries will be furnished in due course.

SUGGESTIONS.

We would be glad if readers would offer comments and suggestions regarding the form of the Quarterly, and also suggest subjects for inclusion in future issues. Correspondence dealing with these matters should be addressed to: The Chief, Division of Food Preservation, Private Bag, Homebush P.O., N.S.Wales.

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