

TECHNICAL INFORMATION ON FOOD PROCESSING

The preparation of Salad Cream/Mayonnaise

By

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The development of the food industry in Ghana, and indeed anywhere in the world, depends, among other factors, on the production of good quality products. In order to achieve this, the manufacturer should be equipped with technical data as well as an understanding of the principles in the use of each ingredient. .

In this connection, the organisation that immediately comes to mind for consultation in Ghana is the Food Research Institute, whose main concern is to assist local food industries at all levels of organisation to diversify and improve upon their operations and thereby promote agricultural productivity.

The Institute's operations cover applied research into the processing, preservation, storage and marketing of locally produced foodstuffs with the aim of contributing effectively towards the development of the country's food industries. Additionally, the Institute plays an advisory role in assisting the Government in planning and implementing its policy of developing national food industries and increasing agricultural production.

For the benefit of our food manufacturers, the Food Research Institute is happy to offer this "Technical Information on FOOD PROCESSING", which is based on our own experiences as well as those of others.

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THE PREPARATION OF SALAD CREAM/MAYONNAISE

Introduction

'Salad Dressings' is a general name for products such as Mayonnaise, Salad Cream, Mayonnaise dressing, Mayonnaise Salad dressing and a number of other similar products. From the point of view of the consumer, it is usually the yellowish cream made from egg and oil and other ingredients and it is used to give flavour and taste to salad and other dishes. The Mayonnaise Products Manufacturers Association of America Inc. (1928) defines **these products** as the clean, sound emulsified product, composed of edible vegetable oil, egg yolk or whole egg, a vinegar and lemon juice and/or other edible acids with or without salt, other condiments, sugar stabilizing material. This definition applies to products manufactured in our environment as well.

The difference between the specific dressings is usually that of consistency (i.e. thickness and rate of flow) which is basically due to formulation. Clayton (1932) pointed out that salad dressing may be designated as salad cream when it is free flowing and as mayonnaise when it is viscous. From the point of view of composition and standards, Brooks (1927) placed the moisture content of salad creams at 40% maximum whilst that of mayonnaise remained at 15% maximum. These differences are emphasised differently in various countries. For example, Pearson (1962) points out that although mayonnaise only has to conform to the same legal requirements as salad cream, it used to be generally accepted that the former was a superior product containing more oil and less emulsifying agent. This situation is reversed in the United States of America where the law demands a higher minimum oil content in mayonnaise than in salad creams. The Ghana Standards Board adheres to the principle of a mayonnaise having greater viscosity than a salad cream.

Formula

The basic composition of salad dressings can be categorised into:

(a) Essential constituents and (b) Optional constituents.

The essential constituents comprise: oil, egg yolk or whole egg, water and edible acids.

The optional constituents comprise: salt, sugar, colouring, thickeners, emulsifiers and condiments.

The functions of the essential constituents in the manufacture of salad dressings are discussed below. It must be noted that there is the need to combine the ingredients in the ir right proportions. For example, it was shown that with 78% oil, 17% water and 5% egg yolk, a permanent emulsion was formed; but when 76% oil, 19% water and 5% egg yolk was used, the emulsion separated into two phases.

1. OIL

The general characteristics of the type of oil to be used in the preparation of salad dressings are: Melting point--below 15°C (for Ghana); Free fatty acid--below 0.1%; Peroxide value--below 0.1% . The oil should also be odourless other wise its flavour will mask that of the product.

The type of oil used in the manufacture of dressings is essential. Fats (hard oils) or even liquid oils that tend to solidify in air - conditioned rooms or during cool nights, should not be used in the preparation because this will disrupt the stability of the emulsions. For this reason, salad oils or oils used should remain free flowing at the temperature ranges obtainable within the particular environment (e.g. 20°C - 32°C in Ghana).

Apart from the physical state of the oil, the chemical and the organoleptic qualities of the oil are important. The flavour and taste characteristics of salad dressings depend very critically on the properties of the major ingredients. One of these is the oil component which as much as possible should be refined and deodorised. Unrefined oil which may originate from an initially poor quality raw material may have a high level

of free fatty acid with an objectionable flavour and taste. These will be passed on fully to the final dressing.

2. EGG

The second major constituent is egg. This is the principal emulsifying agent with a choice in the use of either the whole egg or the yolk only. The essential properties to look for in the choice of the egg are: (a) Egg Yolk colour, and (b) Egg freshness.

A bright yellow yolk reduces the amount of artificial colouring material that may be required, therefore, egg with yellow yolk are to be preferred.

Salad dressings are not heat treated and therefore become a suitable medium for bacterial growth if the necessary precautions are not taken. The freshness of the egg is therefore extremely important. It would be best that unfertilized eggs are used and these are cold stored soon after collection and this condition maintained throughout distribution.

3. WATER

In most forms of salad dressings, water forms a considerable percentage of the product, e.g. 40% in salad cream. It is also a fact that water is a good medium for the growth of moulds and other micro-organisms and therefore this renders the whole product very susceptible to microbiological contamination. The water used is therefore expected to meet the requirements of the National Standards; e.g. the United States Treasury Department states that there should not be more than 1 coliform per 100ml of water sample.

4. EDIBLE ACIDS

Edible acids are considered to be essential ingredients because they are the main preservative constituent especially since heat processing is not applied to salad dressings. Some of the edible acids are Malic Acid, Citric Acid, Acetric Acid, but in salad dressing preparation, Acetic acid is usually used. In some industries, pure acetic acid is used but in others it is used in the form of Vinegar (6-12% acetic acid).

Nevertheless the only difference between the use of vinegar and pure acetic acid (100%) lies in the amount added to meet National Standards and good manufacturing practice.

OPTIONAL

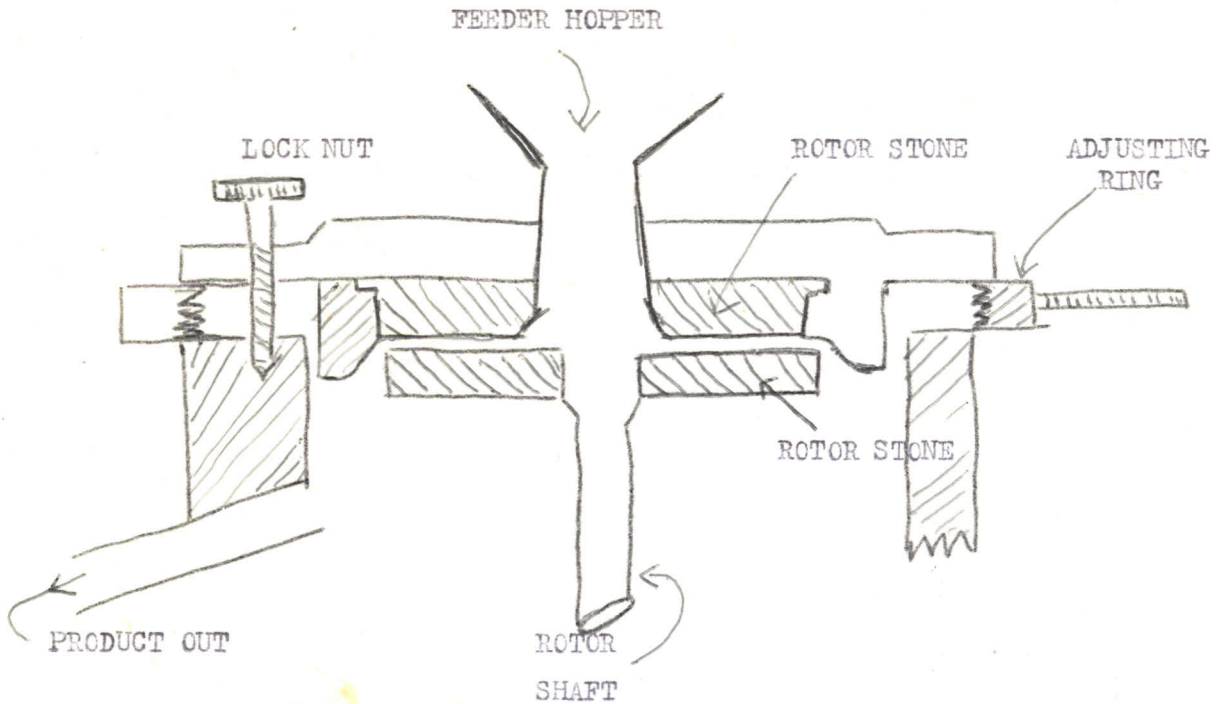
The optional ingredients comprise salt, sugar, colouring, thickeners, emulsifiers, and condiments. The levels of these ingredients are not regulated by the Standard Board in so far as any of them, singly or in combination, is not used to conceal inferior quality.

Usually the level of optional ingredients used is dictated by good manufacturing practice, for instance various levels of sugar and/or salt can be used for particular tastes. Thickeners are used mainly in the preparation of mayonnaise type salad dressings; the type of thickeners include food grade starches, pectins and gums. Apart from the egg yolk, manufactured emulsifiers are also used. These emulsifiers are usually esters of fatty acids, e.g. Monoglyceride palmitate, sorbitam monostearate and others. These emulsifiers are however described under trade names such as Mayodan, Homodan, Dimodan etc. Since emulsification is a precise process and varies for various types of products, it is important, that the correct type of emulsifier is used for any particular dressing.

Condiments are of a wide variety and manufacturers have a choice. In Ghana, such items which can be classified as condiments include ginger, mustard, nutmeg, mace and others. These may be used in small proportions (0%-0.5%) to impart a desired flavour to the product.

Equipment and Manufacture

Various types of equipment are available for the commercial production of salad dressings but one of the most popular is the Premier 84 Colloid Mill. The design of the colloid mill is shown below.



CROSS SECTION DRAWING OF THE COLLOID MILL

Essentially the colloid mill comprises two rough high speed rotating stones in between which the cream mixture passes. The components of the cream i.e. egg oil etc, are then reduced to small particle sizes held together in a smooth cream. The setting of the spacing between the stones (which is usually obtained from a dial setting on the machine), which is required to produce the desired consistency and smoothness of the cream is a matter of experience gained on each machine.

In the manufacture of salad cream/mayonnaise, the sequence of adding the various essential ingredients is important in order to avoid coagulation (lumping). For example, acid when added to protein material causes denaturation which in turn affects the physical characteristics of the product. In view of this, pure acetic acid when used is not added straight unto egg yolk. A recommended sequence would be:

1. To beat the egg yolk and mix it with the oil.
2. Mix the Acids or Vinegar with the other ingredients such as water, salt, sugar and other water soluble ingredients.
3. Mix (1) and (2) and any other ingredients such as egg colour and after stirring well pass through the machine once or twice to obtain the desired consistency.

In some industries, a stainless steel mixing bowl fitted with mechanically operated paddles are used for the pre-mixing but in a pioneer industry, a clean galvanised bucket or receptacle and wooden stirrers could be used.

Packaging

In the past, glass bottles have been used extensively for packing salad dressings. In modern times, plastics have become more abundant and cheaper as packaging material. Nevertheless, the manufacturer still had a choice. A brief comparison is therefore made between glass and plastics in relation to this product.

Glass

1. Uncoloured glass is translucent and this enhances the consumer appeal of the product packed in it.
2. Glass containers do not impart any odours to their product.
3. Glass is very delicate to handle and there may be losses during distribution if not handled properly.
4. Glass is fairly heavy and this means higher labour and transportation charges.
5. Glass bottles are returnable under certain circumstances.

Plastics

1. Plastics vary in make and some are recommended for food packaging whilst others may be suitable only for non-food materials. The success of the use of plastics therefore for packaging a food product depends on the choice of the right type.
2. Plastics are not as clearly translucent as glass and therefore the consumer appeal effect is not as enhanced as in the case of glass.
3. Plastics are very light in weight and this means less cost of transportation in terms of weight.
4. Plastics can withstand rough handling during distribution much more than glass.

Irrespective of the type of material used it is general practice to package mayonnaise type products in wide mouthed tubes and salad cream type products in small necked tubes. This is because salad creams flow whilst mayonnaise type products have to be scooped out at times.

Quality Control

Quality control of a product can be defined as the control of the unit processes in an operation so as to ensure that the final product meets the quality demanded by the purchaser. The control of the unit processes involves checking the quality and performance of raw materials, systems and intermediate products at each stage to ensure that a final product of the desired quality is achieved. Usually, the desired quality of the final product is defined in terms of specifications by the National Authority on standards. For example the basic requirements for mayonnaise as indicated by the Ghana Standards Board are:-

1. Moisture content - 15% maximum
2. Egg Yolk Solids - 1.35 minimum
3. Acidity - 0.1% minimum

It will be seen that the limits of other ingredients are not specified. These are generally left to the discretion of the manufacturer and they are described under "Good Manufacturing Practice".

The standards for quality control are based on the following properties.

1. The phosphorus content of the product as an index to the yolk quality
2. Moisture content at 105°C.
3. Acidity of the cream calculated as Acetic Acid
4. Emulsification - Emulsification efficiency using microscope.
A uniform dispersion of the globules is acceptable, while non-uniform globules indicate poor emulsification.
5. Consistency is determined by running a known volume through a standard funnel and determining the time taken to receive a calculated volume from the base of the funnel.

Microbiological Safety

The microbiological safety of the product is very important. This can be tested by culturing samples of the product in special media and then counting both pathogenic and non-pathogenic organisms. Since the microbiological examination of a product requires specialised techniques advice has to be sought on this aspect. The prospective manufacturer should contact established institutions handling food manufacture problems.

Conclusion

This account has provided some basic information on the manufacture of salad cream/mayonnaise and problems that are usually encountered. It does not attempt to provide solutions for actual operational problems; for that, it is advisable to consult the Food Research Institute.

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