Lecture Notes
Royal Sanitary Institute
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As a Sanitary Inspector you may be called upon at anytime for an expression of opinion regarding the wholesomness of certain classes of foods— it is therefore necessary, that you should have some knowledge of this work— also that you should be familiar with the methods of Sampling, Sealing, and delivery of the samples taken by you.

In the Sampling of Food Stuffs— the greatest care should be exercised in order that the sample may represent the Mass from which it is taken— It is then divided into three equal parts. and placed into clean, dry, bottles supplied for this purpose, the samples are now sealed in such a manner. that it is impossible to gain access to the contents of the bottles without first destroying the seal. a label is attached to each sample. bearing the following particulars.

Number of Sample.
Description.
Where sample was taken
Date.
Inspectors signature.

One of these samples is left with the Vendor.

or his Agent. the second delivered to the Analyst, and the third is retained by the Inspector. until called upon to dispose of it

I will now endeavour to treat with the

Inspection of Tinned Foods.

Strictly speaking all varieties of tinned foods found in the market. whether meats. fruits, or vegetables, in order to be entirely beyond criticism. should not differ from the corresponding freshly cooked varieties which they are intended to replace. excepting that they are free from bacteria. Such a degree of perfection is. however. difficult. even if possible, to attain. and nearly all commercial Canned products. even if made from the best materials. are liable to contain either Antiseptic substances, Coloring-matter intentionally added by the manufacturer, or metallic impurities accidentally derived from the vessels in which they are prepared. or from the containers in which they are sealed.

Methods of Canning Food

The fresh product is cleaned

Carefully, and packed in cans with the requisite amount of water. The cans are then sealed, and subjected to the effect of steam or boiling water. till the contents are thoroughly cooked. Each can is then tapped or punctured at one end to expell the air, and again heated. after which the hole is closed by a lump of Solder. thus forming a vacuum in the can. which is afterwards heated for a sufficient time to destroy the bacteria. usually for several hours

Another method much in use at present. consists in first cooking the food at a temperature of 82° to 88° Centigrade. before transferring to the cans, and afterwards Subjecting the cans when sealed. to a high heat of about 125° Centigrade. in dry air in so-called retorts, this heating or "processing" as it is termed. being carried on for a sufficient length of time to completely sterilize the contents of the can. Obviously a much shorter time is required for this than when the temperature of boiling water is employed. and the sterilization is much more effective.

The preservation of food by canning was long thought to be due to the perfect exclusion

of Air, but is now known to depend on the perfect Sterilization, or destruction of bacteria, and it has been proved that as far as keeping qualities are concerned, it makes no difference whether or not Air is present in the Can, if the contents are Sterile, though for purposes of inspection the vacuum, in the case of Tin Cans, is of great use, in that as a natural consequence of the vacuum, when the goods are sound, the ends of the Cans are usually Concave.

Accidental Impurities

Under this head are included,

(1) = Products of decomposition, due to the incomplete Sterilization of the contents of the Can.

(2) = Metallic Salts due to the solvent action of the juices of the contents on the inner surface of the Can, or the vessel in which the product has been previously cooked.

In the case of canned vegetable products, decomposition rarely results in the formation of Ptomains, even after the can has long been open, though these toxins are sometimes formed, in canned meat and fish.

Decomposition is readily apparent after

Ptomaines

are produced by the putrefactive action of micro-organisms on nitrogenous organic matter. Many of these are virulent poisons acting up actions that resemble those of the vegeto-alkaloids a long closely connected with the toxic products that are formed by the bacteria of specific diseases.

opening a can, from a cursory examination of its contents. The appearance, taste, and odor will not fail to indicate the unfitness of the contents for food, if decomposition is at all advanced. It is however, often of great advantage to detect spoiled cans without opening. As a rule, when a can is spoiled, it is usually in the condition termed "blown" i.e. with the ends convex, instead of normal or concave.

Although nearly all forms of bacterial decomposition are accompanied by bulging of the ends of the cans, there are some exceptions. In the souring of canned sweet corn, for instance, it is exceptional that swelling occurs. Ordinarily, on the inspection of canned goods - the bulged cans or "Swells" as they are termed, are sifted out, and the condition of the others tested by Sounding, or Striking the cans, if the contents are sweet, a peculiar note is produced when the can is struck, readily distinguishable from the dull tone of the unsound can by any one familiar with the work. Also Sound cans may be distinguished from unsound in a lot of Suspicious Goods, when the

Swelling of the ends is not apparent. by the following method:

Boil the cans for one hour. Causing the ends of all to swell. then cool, and set aside for a few hours, during which the sound cans will snap back. while the unsound will continue convex. by reason of the fact that the swelling in this case is due to the generation of gas by the bacteria present.

By the action of bacteria upon nitrogenous matter. a chemical compound. basic in character is formed. this compound is known as Ptomains. some being highly poisonous. while many are inert. The majority of the known ptomains. represent simple ammonia substitution compounds. The kind of ptomains formed. will depend upon the organism present. the nature of the food substance. the temperature. the stage of putrefaction. etc

Action of Fruits and Vegetables on Tin Plate

The amount of tin dissolved by various canned fruits and vegetables is roughly indicated by the corrosion of the inner surface of the can. The results

of analysis show that although notable traces of tin were found in acid fruits and Rhubarb. and large traces in some green vegetables, that canned blueberries contained as a rule, much more tin in solution. than any other canned goods examined, and in every instance the inner tin lining was found to be extensively corroded. and in some cases it had been almost entirely dissolved off. leaving the underlying iron bare.

A wide range of variation exists in the amount of tin dissolved by various fruits etc. In the case of Pumpkin and Squash. for example, the tin dissolved is surprisingly large in quantity, Considering the supposed inert nature of these vegetables. Samples of canned Sardines put up in mustard, vinegar. and oil have also been examined, and found to be high in tin. The highest figures showed 0.376 Gram (Expressed as Metallic tin) in a half-pound can. In these cases the corrosion of the interior of the cans was very marked.

In summing up I wish to impress upon you the following facts.

Canned foods may be considered unwholesome from the following causes.

(1) = Changes in the food itself, decomposition owning to preservative precautions being inefficient; or the development of poisonous properties from ptomains or toxins, these may be present prior to canning, or may rapidly develop after the tin is opened.

(2) = The addition of certain chemical antiseptics to preserve the contents.

(3) = Impurities yielded by "tins" or the solder used in their manufacture. By the action of the juices upon the tins. tin, lead or even arsenic and zinc, may be taken up from the tins and solder.

It is the vegetable acids naturally in the food, - those which are formed during fermentation of vegetable matter, or those which are added for preservative purposes (vinegar and oil) - which act upon the metals, and this action

may be increased by the galvanism which is sometimes set up between the metals present.

During the process of Canning, should there be any flaw in the tins, or the Solder seal be imperfectly applied, or should the [redacted] heating process be but partially performed, [redacted] the contents may go bad, and in the latter case, owing to the accumulation of the Gases of putrefaction, the tops and bottoms of the tins become convex, and the tin when struck, gives out a hollow or drum like sound.

Minor degrees of gas-formation may sometimes be best detected by perforating the tins under water, when small bubbles of gas will be seen to rise.

The bulging of tins, though generally produced by the formation of the gases of putrefaction, may be local and due to rough treatment, whereby they are dented, and the contents displaced. The condition may also be due to the freezing of tins containing liquid or semi-liquid food (as in cold storage) the ends of the tins may be thus bulged out by the expansion of the frozen liquid.

juices — should be lacquered inside.

Poisonous symptoms has been traced to the presence of tin in preserved foods. Where the metal is corroded, which is most common at such spots where it has been in contact with fat, the cause of the corrosion is due to the formation of basic Stannous Chloride. A tin sulphide is also sometimes formed by the action of the albuminous matters upon the receptacles made of that metal.

You will therefore see that when called upon to express an opinion in regard to canned foods. or to take samples of same. that particular attention must be payed to the following.

~~1= Ascertain if possible the age of the~~
~~age of the supplies.~~

~~2= Make note of all writing upon the label.~~

~~3= Examine the external condition of the~~
~~can and note the following points.~~

(1)- Examine the external condition of the can.

(2)- Make note of all writing upon the label.

(3)- Are the ends of the cans. Concave or Convex.

(4)- Note the number of solder holes which should not be more than one.

(5) Note Conditions under which cans are stored.

(6)- Open the can and examine the interior note any marked blackening of the tin plating due to sulphide of iron or tin.

(7)- note any erosion of the metal if present, Condemn the Sample.

(B) Examine the contents. note Smell and taste

(C) In the case of meat. examine the surface for blackened patches due to metallic contamination.

Note condition of the gelatine, which should be solid at ordinary temperatures.

Note condition of the fat and of the meat fibre.

In the case of fruits. jams, etc. note any signs of moulds or bubbles of gas due to the fermentation of the contents.

In the foregoing I have endeavoured to give you a brief outline of the points necessary to decide as to the condemnation and condition of tinned foods. But you will of course understand. that it is a very broad subject. and it is impossible to go into it in a really satisfactory manner in the short time allotted to me this evening. and you will also understand that it is only as Sanitary Inspectors who might be called upon to sample and pass an opinion on such tinned foods. and not as Food Inspectors that I am addressing you.

As Sanitary Inspectors you would of

Course work in conjunction with the Food Inspectors, and if possible place the matter before them. before taking any action

However as Sanitary Inspectors whose duty it is to protect the health of the public, it is necessary that you should have some knowledge of food and its impurities. and be able to act upon your own initiative.

I trust that I have made the points upon which I have touched sufficiently clear.

John McWhinnie M.C.S. &c.

City Analyst.