

FOOD ABUSIFICATION

THESIS.

Rebecca Rees Washington, '05.

1. Cured Meats and Vegetables

2. Tea, Coffee and Cocoa

3. Spring Pastes

APPENDIX

LIST OF REFERENCES

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FOOD ADULTERATIONS.

OUTLINE

INTRODUCTION

Adulteration of Food Defined

DISCUSSION

1. Canned Fruits and Vegetables
2. Tea, Coffee and Cocoa
3. Baking Powders

CONCLUSION

LIST OF AUTHORITIES

United States Bulletins

The question of food adulterations is of very great importance at the present time, since the greater amount of our food supply consists of canned and preserved products.

Not many years ago, canned food products were considered luxuries, and only people of means could afford them, but as times have grown better, there is a growing demand, by all classes of people, for the manufactured goods, and it is the producer trying to meet the popular demand that has, in a great measure, facilitated the manufacture of goods which must necessarily be inferior.

The average individual wants the greatest quantity for the least money, regardless of the purity of the article purchased. Manufacturers cannot give high grade food for low prices.

Hence the pure product is imitated by using cheap, undesirable, and often poisonous, substances, to give the desired flavor and color. This brings to mind an instance under my own observation. A woman was purchasing baking powder. The clerk showed her several of the better brands and gave prices. She remarked that she wanted something cheaper and when shown the ten cent can, she took it.

The law of the state of New York defines adulterations of food as follows:

The term food shall include every article of food and drink used and adulterations are

- (1) If any substance or substances has or have been mixed with it so as to reduce or lower, or injuriously effect, its quality or strength.
- (2) If any inferior or cheaper substance or substances have been substituted, wholly or in part, for the article.
- (3) If any valuable material has been wholly or in part abstracted.

- (4) If it be in imitation of, or sold under, the name of another article.
- (5) If it consist wholly or in part of a diseased or decomposed or putrid or rotten animal or vegetable matter, whether manufactured or not, as in the case of milk, if it is the product of a diseased animal.
- (6) If it be colored or coated or powdered or polished whereby damage is concealed, or it is made to appear better than it is, or of greater value.
- (7) If it contain an added poisonous ingredient which may render such article injurious to health of persons consuming it.

CANNED FRUITS AND VEGETABLES.

Among the most commonly adulterated are canned fruits, vegetables, jellies, ect., which are adulterated with substances to imitate their natural color and attractiveness, and with antiseptics to preserve them and retard all fermentation after canning.

A list of the more common Antiseptic Adulterants are Boric, Salicylic, Sulphurous and Benzoic Acids and their compounds.

Often the imitation compounds are salts of Zinc, Lead, Copper, Iron, Tin, ect.

In the process of canning such vegetables as peas, beans and corn, it is difficult to sterilize them thoroughly without prolonged heat. Such a process requires much time and labor and softens the vegetables too much for keeping, so the usual method is to heat for short periods and add a small per cent of Salicylic Acid before cleaning, to prevent further fermentation.

Salicylic acid in small amounts improves the texture of dried and canned meats, as hams, dried beef, and fish, and is not easily detected; but when used in great quantities, can be easily detected by

the odor from the meats while cooking and may also be injurious.

The fumes of Sulphurous acid have the power of bleaching, as well as that of an antiseptic and disinfecting action, as in the bleaching of mushrooms.

Boric acid facilitates canning, having antiseptic properties, and also preserves the texture of fruit or vegetable. In canned peaches and meats, a small per cent of boric acid is used to keep them brittle and tender.

Bonzoic acid and Formalin have much the same action as the preceding substances, although they are not used so extensively.

Formaldehyde has been found in samples of Condensed Milk, Mince Meat, and Strawberries. After the passage of Pure Food Laws its use was prohibited for a great many years, but it is gradually slipping into use again, especially in France it is amde use of.

Years ago it was a common practise among canners to cook peas, beans, pickles, ect., in copper and zinc lined kettles. It was discovered that these kettles gave the characteristic green color to vegetables, and as their use was discontinued, zinc, copper, lead, tin, and iron salts of these metals were added to produce the same effect.

The French law now permits the use of small amounts of copper, Nearly all canned French peas and beans are colored with copper salts.

Prussian Blue, Paris Green, Indigo are used extensively to color foods. Chinchilla and cochineal are used in candies.

The use of commercial canned fruits is constantly increasing and while the most reliable firms handle high grade fruits, some of the cheaper grades of jams and jellies are made of entirely different material from what they purport to be.

Very little of the canned fruit contains pure fruit juice or good sugar. Often the parings and waste of the fruit are boiled to get a

flavor, glucose or cheap sugar used for sweetening, and analine dye or some coloring matter, to give the desired color. We can readily see what an unwholesome food we would have.

Fruit juice, if any pure juice be present, is diluted with water, until the flavor can scarcely be recognized. Sulphurous and Boric acids preserve firmness and shape of fruit and retard fermentation.

Of the great variety and amount of fruit preservatives and adulterants in use, none of them are especially desirable, most of them being objectionable, and some even harmful and poisonous. The chief objection to the acid is the retarding action upon the juices of the stomach.

In many substances where Salicylic acid has been known to be present, the antiseptic action has not been stopped with the action of the contents upon the can, but continues action after it reaches the stomach, arresting fermentation and retarding the action of the digestive juices.

Sulphur is not so objectionable in itself as sulphur is found to a greater or less extent in both the animal and vegetable bodies, but when the fumes of sulphur are used, there is danger of the sulphur attacking the can and bringing it into a solution of tin.

Benzoic acid and Formalin are the most objectionable because they are the most injurious when taken in small amounts than are the others. Formalin in excess acts as a poison.

The coloring matter and Analine dyes are apt to form precipitates and are especially harmful on account of their poisonous properties.

Metallic compounds are much more objectionable than acids and their use should be prohibited by law, or when small amounts are used the can containing such material should be labeled with the name and amount of the metallic salt used.

TEA, COFFEE AND COCOA.

Tea is made from the leaves of an evergreen shrub that grows in China, India, Japan and elsewhere. The method of preparing tea for the market is a very simple one and there is little danger of adulteration until the fermentation process where the leaves are rolled and placed in the sun to dry. During this drying and fermenting process, there is danger of foreign ferments mixing with the leaves.

The four ways of adulterating tea commonly practised are

- (1) Use of old and partially exhausted leaves
- (2) The use of coloring matter to give color to the tea, known as "facing".
- (3) Addition of foreign leaves.
- (4) Addition of foreign astringents.

All the chemicals used in facing teas are evidently fraudulent, as there is no possible reason for using them. Prussian Blue, Plumbago, Indigo, Purmeric, are the commonest facings used, as high as four per cent of the first two being detected under the microscope.

The artificial colorings are often detected by the colorings of the leaf. The Japanese and Chinese Black teas are adulterated with Plumbago (black lead). The Blue teas with Prussian Blue and the Greenish Blue teas with Indigo. All the colorings are readily detected under the microscope, if not by the appearance of the leaf, Prussian Blue appearing as small blue dots, Plumbago as little bright dots on the tea leaf, Indigo gives a greenish blue color, and Furmeric shows yellow cells of rounded form. Acids will also prove the presence of these coloring matters. Acetic acid and Ferric Chloride give a blue precipitate with Prussian Blue, Indigo forms a deep blue solution with Sulphurous acid, and the addition of an alkali to a solution

containing turmeric turns the yellow cells brown.

Spent leaves are the leaves from which all the strength has been steeped. These old, worn-out leaves are gathered up, re-dried, mixed with fresh teas, and sold as pure new tea. If the amount of extractures found in tea are less than 36 per cent, it may be positive proof of the presence of spent leaves, also the presence of broken and unrolled leaves proves the presence of spent leaves.

The leaves of the tea plant are characteristic in all their markings, and hence are easily distinguished from other and foreign leaves, which might be added as adulterants. A low per cent of soluble ash is also indicative of foreign leaves.

Catachu is a substance sometimes found in teas, added to increase the astringency and indicate a greater strength than they naturally have. Catachu forms a yellow precipitate with silver nitrate.

COFFEE.

With coffee as with tea, various adulterants have been used by the manufacturer, for the purpose of lessening the cost and misleading the consumer. Chicory is the most common adulterant of coffee and in good samples it is hard to distinguish between the two. When thrown upon water, Chicory sinks to the bottom and colors the water, while coffee remains upon the surface. This is one of the chief methods of detecting the presence of chicory. Cereals, legumes, peas, and beans are commonly found in coffee, either shaped and colored in imitation of the coffee bean, or ground and mixed with the ground coffees. Ground bread crumbs, browned and mixed with coffee, or dough shaped like the coffee bean, is a common method of adulteration. The cereals can be easily detected under the microscope, by the different starch cells present, and also by the Iodine test, which gives blue color with starch.

COCOA.

Foreign materials, as starch, sugar vanilla, and extracts, are found adulterating cocoa. The starch when not in excess of 10 per cent are not considered as adulterants, as they keep the powders freer from moisture and from ~~absorbing~~ ^{desert.} defect., but when in excess of 20 or 30 per cent, they are fraudulent, and are considered as adulterants, though they are not especially harmful at any time. Wheat starch is the one most commonly found. More harmful and even injurious are the chemicals used -- Ferric Oxide, Potassium Chromate, Copper Sulphate and Nickle Sulphate. These are not only an imposition upon the consumer, but if some of them are used in small amounts, they act as a poison to the system.

One of the most fraudulent practises is the removal of the fat from the cocoa bean, making the cocoa preparations more and more inferior. To restore color to the cocoa anything poisonous or not is added, Red Dyes, Mineral Acids, Seeds, ect. The microscopic and Iodine tests will discover the amount and source of starch adulterant used.

BAKING POWDERS.

Baking Powders are so widely used in the preparation of food for the table, and the lightness and digestibility of such foods depends so much upon the constituents of the powder used that too close attention cannot be paid to the kind and amount of adulterants used in the manufacture of baking powders.

Dr. Wiley in his bulletin on Baking Powder says: "It is generally supposed that there is a vast deal of adulteration in Baking Powder, but since there is at law no standard of excellence or purity in Baking Powder, it is difficult to say what is an adulterant, unless it be an unhealthful ingredient."

Any powder which will generate carbonic acid gas, and produce lightness in bread, may be called a baking powder, but of course the powder which is purest generates the most amount of gas for the least powder, and which at the same time leaves a residue which is least injurious, is without doubt the best powder.

According to Dr. Wiley, baking powders are classified into three classes.

- (1) Cream of Tartar Baking Powders
- (2) Alum Baking Powders
- (3) Phosphate Powders

All baking powders are compounds of an acid salt, and an alkali, and perhaps some starch as a filler to keep the powder from absorbing moisture.

The harmfulness of baking powders is in the residue they leave. The purer the ingredients in the powder, the less injurious the residue.

The tartaric acid used in the manufacture of tartrate powders is now 98 per cent pure and the residue left after its use is a compound of Sodium and Potassium known as Rochelle Salts, which is not harmful and is thought by some to be beneficial, as it is mildly laxative in its action.

The Phosphate powders may be considered best, but they are not so desirable as the Tartrate powders, as they lose strength so quickly when in contact with moisture, and their residue is more harmful than the tartrate powders.

The alum powders seem to be the least desirable as alum does not form a part of the animal or vegetable body; hence it is not desirable as a food. Its action is astringent, and the undesirable residue left after using is much greater in proportion to the leavening power than in the better baking powders.

A filler of starch or flour is often necessary in Baking Powders

to preserve their strength and keep them from absorbing moisture. As much as 85 per cent may be used but any in excess of this amount may be considered as an adulterant.

With our present knowledge of food adulterations and the many ways and means of detecting their presence in food, there is no reason why canned and preserved foods should not be as pure and wholesome as the natural product.

Recently much time and money have been spent to stop this fraudulent practise among manufacturers and wholesalers. Experiment stations have been established in nearly every state and men and methods employed for the purpose of examining different foods and detecting their adulterations. Pure food laws have been passed and manufacturers are being compelled to label all adulterated foods with the kind and amount of adulterant used. To avoid compliance with this law, manufacturers have devised every possible means of evading it. Labels containing a list of the adulterants are placed on the can upside-down or printed in German, French or some unfamiliar language, so that they will not be noticeable, or not readable. Fancy borders are often placed around the top of the can, the words PURE FOOD printed in large letters, and the adulterants in a small, inconspicuous type.

Every woman in the home can protect herself against these adulterants, especially the ones in common use. The first and best protection is to buy only reliable brands of goods and be willing to pay the prices asked for them. Simple methods of detection are also within the reach of every housekeeper. Only a little time and a common knowledge of the adulterants is necessary. Simple heating tests prove the presence of some of the adulterants and heating with acids or alkalis is another method practised. Baking powders when treated with water alone, will prove the strength of the ingredients. A test

with kiodine proves the presence of starch graind and precipitates from some of the common acids proves the presence of metallic salts. Borax can be detected in dried meats when they are cooked.

There is but one way to entirely do away with food adulteration and that is to strike at the root of the evil, the people who willingly buy the adulterated product because it is cheap. It is an economic principle that supply is as demand, and just as long as people willingly demand adulterated foods, becaude they are cheap, just so long will the supply of these cheap foods increase.