

## FOOD ADULTERATION.

Helen Monsch.

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## FOOD ADULTERATIONS.

Many housekeepers spend a large part of their time planning and preparing daily meals, in order to have them as appetizing and digestible as possible, but few of them stop to think much less to examine the article of food obtained from the grocer, to be sure that they have not a substitute. Some are willing to contentedly pay a high price for a poor article, without questioning it at all, while others <sup>demand</sup> such cheap food, that the only way it can be furnished them is in a form so adulterated, not only with cheap, but sometimes even with poisonous substances, as to make it unfit for use.

There are, in this world, all types of people, among them men who are willing to do anything for money, and some of these, in order to satisfy this demand for cheap food, started the business of adulteration, and others have followed, so that to-day there is scarcely an article of food that is not tampered with.

This fraudulent sophistication of food has been common however since 1820, when Mr. Frederick Accum published his treatise on "Adulteration of Food and Culinary Poisons", with the sensational motto, "there is death in the pot".

There seem to be three objects aimed at in the adulteration of foods.

First:- to increase the bulk or weight of the article.

Second:- to improve the appearance,

Third:- to give it a false strength.

In olden times the remedies for such misdemeanors were prompt and effectual. In "Lieber Albus", for example, there are not only the strictest regulations set forth concerning the manner in which the business of the baker

should be conducted, but there are also the penalties for failing to abide by the same. "If any default" it says, "shall be found in the bread of the baker in the city, the first time let him be drawn upon a hurdle from the guildhall to his own house, through the great street where there be most people assembled, and through the great streets which are most dirty, with a faulty loaf hanging about his neck; if a second time he shall be found committing the same offence, let him be drawn from the guildhall through the great street of Cheap



in the manner aforesaid, to the pillory, and let him be put upon the pillory, and remain there one hour of each day; and the third time that such a default shall be found, he shall be drawn and the oven shall be pulled down, and the baker made to forswear the trade within the city forever." It further tells of William de Stratford, who suffered this punishment for selling bread of a short weight, and of a certain other for making bread of filth and cobwebs. The last time the punishment was inflicted, was in the sixteenth year of the reign of Henry the Sixth. A <sup>ke</sup>light punishment was also imposed upon the butchers and vintners for fraudulent dealing.

Since this time, however, the adulteration of food has been constantly increasing, so that every advancement in science, both microscopical and chemical, has served only to exhibit a greater and greater number of adulterated forms of articles of diet.

It is the purpose, therefore, of this paper, to indicate some of the more common food substances commonly adulterated, the manner of their detection, in the kitchen, if possible, and to suggest some remedies and means of avoidance.

#### Butter.

Probably the most generally adulterated food is butter. It is adulterated ~~1st~~, with water—pure butter should contain ten to fifteen per cent of its weight in water, and two and one half per cent of salt. But when butter is brought to the melting point, water and salt may be stirred in until the mixture becomes cold. One investigator states that fifty per cent of water may be incorporated with butter in this way.

Estimation of water.—Fill a small bottle with butter; melt and let stand one half hour near the fire. Water and salt having a greater specific gravity, will sink, and be milky-white, because of the presence of whey, while the butter, which floats on the top, will be yellow.

2nd.—Adulteration with starch.—Another substituted substance in butter, espec-



ially in inferior grades, is starch, - usually potato flour. This adulteration, however, is practiced only at particular times, according to the wholesale price of the butter.

Estimation of starch:- For the detection of starch the microscope is a necessity. Spread a layer of butter on the slide, and examine it. The starch grains can usually be distinguished. If, however, tincture of iodine is applied, and the characteristic violet reaction is obtained we may know that this substance is present. But to-day, it may be added, starch adulteration is comparatively little practiced.

3rd;- adulteration with animal fat. The fat of beef is chiefly employed and in this form of adulteration, although the fats of veal, mutton suet and lard are also used.

Beef fat, when prepared on a large scale, and worked into an imitation of butter, is sold as "butterine" or "oleomargarine". This article is mainly the olein of fat, with only a small proportion of stearin. When freshly prepared, it is sweet, palatable, and, being sold at a much lower price than butter itself, it is in some cases a useful substitute; but it is to be feared that such a preparation will be used in some cases for the adulteration of butter.

Oleomargarine, when perfectly pure, should be quite useful for cooking purposes, since it is simply the mixture of animal fats in such proportions as to produce a substance having the consistency of butter. But for table use, the results may be questionable. Fat used in preparing oleo oil is that which is cut from the kidneys and intestines. In the better factories, only the best selected fat is used. In less important factories, however, the oleo oil is rendered from butchers' fat, hotel wastes, etc.

Digestibility of Oleomargarine. The digestibility of oleomargarine, as compared with that of butter, was determined by experiment upon the dog, by Jellies of Vienna. He claimed to have demonstrated that perfectly pure oleomargarine was quite as digestible as butter. But it is very difficult, in fact almost



impossible, to obtain perfectly pure oleomargarine, and, it may be added, that fats which would not affect the digestion of a dog, might operate very differently in the human organism, where the digestive powers are so often deranged.

Furthermore, the calories of heat of one gram of buttery fat are about three hundred less than those derived from one gram of oleomargarine, showing that more heat is given up by the oleomargarine, which indicates a more complex fat molecule, and probably also inferior digestibility for the oleomargarine.

As it is always best, however, to be on the safer side, and it is advised that only the very best quality of butter be purchased for table use; and if a cheaper article is desired for cooking, get the kidney suet and prepare the butterine at home. The following recipe has been used by the writer, and has been found to be very satisfactory for all cooking purposes.

#### Recipe.

One pound beef kidney suet; cut into small pieces; put into a crock and covered with cold water. Let stand over night; pour off in the morning, and put on fresh water; drain off, and add one half cup milk. Cook slowly until there is no appearance of fat. Strain, and use wherever you would use butter.

Kitchen test whereby to distinguish genuine butter from oleomargarine, and renovated butter. ---

Many states now have laws requiring the distinctive branding of oleomargarine. There are some, however, where these requirements are lacking, and it is therefore necessary that the cook should have some means of distinguishing. The following test was first used by Mr. Morris, a detective in oleomargarine production.

It is simple and can be employed in any kitchen as easily as in the laboratory. It is quite often spoken of as the "spoon test". Put a small piece of butter in a spoon, and heat over a flame, at first gently, then more strongly. If it is oleomargarine or renovated butter it will boil noisily, sputtering more or less, like a mixture of grease and water when boiled, and produce little or no foam. Genuine butter, on the other hand, boils usually with less noise, and produces an abundance of foam.



### Canned Fruits.

Canned fruits have by no means been ~~xxi~~ omitted by the adulterators.

Adulteration with glucose.

This substitution of glucose for the more expensive sugars is extensively practiced in the manufacture of various food materials, and in the case of no class of foods is there a better opportunity offered for this fraudulent practice, than in fruit products. Bigelow, in one examination, found that of two hundred and fourteen samples of commercial food products examined, one hundred ten contained glucose. The amounts used vary widely. Many samples of the better classes of goods contain no more than from ten to fifteen per cent, while some of the cheapest jams and marmalades had only a small proportion of fruit, and apparently no cane sugar. While glucose may be considered as an article of food, and as such has no deleterious properties, its use in the substitution for a more expensive sugar, must be considered fraudulent unless its presence is in some way indicated to the purchaser. If low priced goods are bought, it is not expected that they will be composed of first class materials, and the use of glucose is the most efficient means of producing cheap fruit products. At the same time all goods should be of the quality represented by the label.

### Preservatives.-

Preservatives find the most extensive use with those classes of fruit products put up in glass, and not hermetically sealed. With fruits put up in tin, or in sealed glass jars the use of any preservative would be superfluous, if the fruit and receptacle were properly sterilized, and the latter, at the time of canning, properly sealed. It would seem, also, that their use for the purpose of preserving jellies and jams subsequent to their preparation should not be necessary, since the high content of sugar present is sufficient to prevent fermentation. This point is borne out in the home preparation of jellies, jams and marmalades, where no preservative is used, and yet where the danger of spoiling is slight. While many manufacturers, undoubtedly use preservatives to prevent spoiling, subsequent to the preparation of the articles, others use them for the purpose of keeping the



fruit until it is worked up into the finished product. Pulped fruits, are thus kept several weeks before preserving.

Salicylic and benzoic acids, or their sodium salts, are the preservatives most commonly employed with fruit products, and they are found in more than half of all jellies and jams. Formaldehyde and sulphurous acid are also used.

Action of preservatives upon the digestive system.- Halberton finds that the use of formaldehyde prevents or retards both gastric and pancreatic digestion, and also checks the rennet curdling of milk. He further states that its use disintegrates blood and irritates the skin. Hence it must be much more harmful to the delicate membrane of the alimentary canal.

Salicylic acid administered even in small doses, in such proportions as at times is found in food, causes palpitation of the heart, sleeplessness, and headache. It is therefore, thought to be quite injurious to health.

Coal tar dyes are extensively employed in coloring canned and preserved goods, candies, sausages, and catsups, as well as most of the preserves and jellies. Many of these coal tar products are known to be poisonous, and they are only employed to improve the appearance of inferior, damaged or adulterated foods.

Starch paste also, is quite frequently added, especially to the inferior products.

It has also been found that nearly all jellies, jams and preserves examined, such as strawberry, currant, raspberry, orange, pear etc/ consists largely of other fruit jelly as a base, -chiefly apple, artificially flavored, containing preservatives and often colored to imitate the genuine articles. Some of the jellies etc., examined, have been found to contain not a trace of the fruit of which the label represented them as consisting. One example in point was a blackberry jelly, examined at the North Dakota Experiment Station, found to consist of starch paste, sweetened, colored with coal tar dyes to imitate blackberry, preserved with formaldehyde, and sulphurous acid, and artificially flavored. It was also noticed at this Station that not only the cheaper articles, were thus adulterated, but even the best grade of food products on the market, that is to say, products of firms, having the highest



standing, and who claim absolute purity for their goods. There are only three wo things to be done,-first,- the sa fest ,best and cheapest way, is to preserve e one's own fruit. Second,-if one must buy of the groceat there ar e certain points to be kept in mind while buying canned goods: to make a preliminary study of the fruits, and a comparison with thex fresh fruit . In jellies and jams, containing starch, there is a tur bidity, and often an appreciable amount of insoluble mater- ial, whixx whereas if it is absent the solution is perfectly clea r. By this in- spection, low grade fruit preserves ma y be detected in the case of jams. An ex- amination of the seeds may re veal the presence of foreign fruits. In case of pre- ducts put up in tins, any bulging of the ca n, or escape of gas o n opening, showing incomplete sterilization, should be carefully noted. If the interior of the can is blackened, it is probable that the fruit has undergone fermentation or decomposi- tion. It is further advised to study the bulletins of the E xperiment Stations, a and then to demand only those brands of food products which have been found to be chemica lly pure. Quite a number of the Experiment Stations are now issuing such bulletins . Two of these at pæsent are especia lly valuable in this connec- tion.-viz. Bull. No. 53, N. Dak. Ex. Sta., and Bull. No. 38, Mont. EX. Sta.

#### Vinega r.

In connection with the subje ct of fruit pres ervation it might be sugges ted, that in canning such fruits as a pples/~~peasars~~ pears, peaches etc. they are to be thoroughly washed, and the parings used in making vinegar. In this wa y, one avoids the danger arising from the adulterations so common in the case of vinegar. Next to butter, it may be said, there is no one article of table use more generally or more dangerously adulterated. The principal ~~dx~~ adulterants of vinegar, are water, sulphuric acid, burnt sugar, and sometimes acrid substances such as chillies and grains of paradise., and also acetic and pyroligneous acids. The wa ter is added to vinegar to increase its bulk . Sulphuric acid, and the acrid materials are added to produce pungency, and burnt sugar to restore the color lost by dilution. Some of the vinegars sold at small hucksters shops, and oyster sta lls consist of little else than sulphuric acid and water, colored



with burnt sugar, and only a very little of the vinegar claimed to be "cider vinegar" will answer the test for this article.

But how are we to distinguish? There is no way except by chemical analysis. But if one is willing to undergo a little more trouble at canning time, ~~the~~ wash the parings, cover them with water and a little sugar, and boil them well, we will upon allowing acetic acid fermentation to take place, obtain quite a satisfactory vinegar, and one which we know to be free from all poisonous or deleterious substances.

#### Baking Powders.

The value of baking powder is primarily determined by the amount of gas generated by it under the conditions associated with kneading and baking of bread. There is another condition, however, which is very important, and that is as to how the residues from the baking powders exist in the bread, and what the effects of such compounds are upon the human system.

In making bread with yeast the principal products of the action of the yeast plant are the gas, carbon di-oxide, and a lechöl, the latter of which is entirely dissipated during baking.

Cream of tartar baking powders leave in the bread the double tartrate of sodium and potassium, which is commonly known as Rochelle salts, so frequently used as a laxative. But the alum and alum phosphate powders are questionable. It is true that only small amounts of the alum may be in a form capable of being dissolved by the digestive fluids, yet on the other hand, we know of the harmful effects of large quantities of soluble aluminum salts. These salts have the power of interfering with the digestive processes.

Moreover, with cream of tartar and phosphate baking powders, the residuum is about eighty per cent. of the amount of powder used, but the alum baking powders are of such weak leavening power that several times as much powder must be used and therefore there is several times as much residuum.

There is no simple test whereby alum can be detected in baking powders.



but it can be avoided by making one's own baking powders . Of course this is no new discovery. But though our grandparents worked unconsciously, with no scientific knowledge, they did many sensible things. One pound cream of tartar plus one half pound of baking soda, plus one half pound flour or corn starch, makes a baking powder that any cook may be proud to use.

Soda being cheap, and the substances from which it is made being so plentiful it is seldom adulterated. In buying cream of tartar, however, which is an expensive substance, great care must be exercised or an inferior article will be obtained.

#### Coffee.

Scarcely had coffee been introduced into this country when its adulteration began. The chief substitutes for coffee are wheat, peas, cereals and chicory.

Chicory is the most common adulterant used, and can generally be detected by sprinkling the mixture on cold water. Coffee (greasy with volatile oil) floats while chicory sinks and gives a brownish color to the water.

It has been suggested in several cases, that the housekeeper make her own articles of food rather than trust to the honesty of the merchant and producer, but this is often impossible. There are however, in almost every state, laws requiring that all goods be labelled.

Coffee, sugar and condiments should be marked with the name and percentage composition of their ingredients, especially as they are not strictly foods, but tools or instruments, as it were, to bring about the making of food.

This paper ~~includes~~ <sup>considers</sup> only the smaller fraction of the adulteration actually existent, but it is fondly hoped that it may suggest farther interest in this important subject.

There is no more need ~~for~~ <sup>of</sup> adulterated foods being put upon the table, than of our submitting to the serving of foods illy or inadequately prepared. If more women were to use greater intelligence in the kitchen, they could often detect impurities in foods; if they were willing to expend a little more time and energy



they could, in many cases, prepare pure substitutes for adulterated market foods, or, it would at least be possible to make a study of the readily obtainable bulletins of the various state experiment stations, and of the United States Department of Agriculture, where a constantly increasing fund of information is being accumulated regarding foods and food adulterants.



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