Bulletin 354 July, 1933

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FOOD PRODUCTS

AND THE TWENTY-FIFTH REPORT ON

DRUG PRODUCTS

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Press of the Wilson H. Lee Co., Orange, Conn.

CONTENTS AND SUMMARY

THE THIRTY-SEVENTH REPORT ON FOOD PRODUCTS AND THE TWENTY-FIFTH REPORT ON DRUGS

E. M. BAILEY

General food control in this state began in 1895 with the passage by the General Assembly of an act to regulate the manufacture and sale of food products from the standpoint of adulteration and misbranding. Prior to that time there were several special statutes in force governing the manufacture and sale of certain foods, notably vinegar, butter, and molasses.

In 1906 the federal food and drugs act was passed and the following year the food law in Connecticut was superseded by an act practically the same as the federal law in its provision. The new statute brought drugs under official control.

These measures have brought about notable improvement in the quality and character of food products and of drugs. In the course of time, however, it has become evident that the provisions of present laws are not adequate in all respects to prevent certain abuses in the merchandizing of foods and drugs that should be checked. Control officials, both federal and state, have given serious thought to measures that will remedy present defects in the law and a bill has recently been transmitted to Congress by the Secretary of Agriculture that embodies such provisions.

Important among the changes proposed are provisions to control so-called collateral advertising; to provide for definitions and standards for food products that shall have the force and effect of law (such are merely advisory at present); and a provision that will bring cosmetic preparations within the scope of the act. There are other provisions that will materially aid in control work and afford greater protection for consumers.

The law in this State provides that both the Dairy and Food Commissioner and this Station may sample and examine foods and drugs in order to determine whether any provisions of the law are violated. The Dairy and Food Commissioner, however, is charged with the enforcement of the law.

The present report summarizes the control work done for the year 1932. In addition to this a considerable amount of collaborative work has been done. Fifty-two tobacco samples, involving 468 separate determinations, have been analyzed for the Soils Department; and 20 samples have been examined for the Tobacco

Substation at Windsor. Various members of the staff have collaborated with the Association of Official Agricultural Chemists in studies of analytical methods and in related work. The chemist in charge has continued to serve as a member of the Foods Standards Committee of the United States Department of Agriculture, and as a member of the Council on Pharmacy and Chemistry and of the Committee on Foods of the American Medical Association.

The loyal and efficient cooperation of the department staff in carrying on the activities of the department is gratefully acknowledged.

FOODS

BAKING POWDER

Baking powder is the leavening agent produced by the mixing of an acid-reacting material and sodium bicarbonate, with or without starch or flour. It yields not less than 12 per cent of available carbon dioxide.

The acid-reacting materials in baking powder are: (1) tartaric acid or its acid salts, (2) acid salts of phosphoric acid, (3) compounds of aluminum, or (4) any combination of these in substantial proportions.

Seven samples were examined and all met the requirements of the standard.

TABLE 1. ANALYSES OF BAKING POWDER

D.C.No.	Brand and dealer	Carbon dioxide	
		Total	Available
		%	%
	Bridgeport		
52470	*Calumet.* Healey's Pure Food Store.....	14.33	13.90
52472	*Clabber Girl,* " " " "	14.90	13.42
52469	*Davis O K.* " " " "	14.10	13.08
52471	*Royal.* " " " "	13.27	12.90
52468	*Rumford.* " " " "	14.20	13.42
	East Glastonbury		
52486	*Nation-Wide.* L. A. Weir.....	13.81	12.57
	New London		
52667	*Quaker Maid.* Atlantic and Pacific Tea Co...	15.24	15.00

BEVERAGES

The law relating to bottled beverages holds the term "beverage" to include "all bottled carbonated beverages, including those commonly known as 'soda water'; all bottled non-alcoholic proprietary beverages by whatever names called, including malt and cereal drinks; grape, lime, and other fruit juices put up in containers; fruit-flavored sirups, powders or mixtures and concentrated fruit juices, when sold at retail and designed for the preparation of beverages through the addition of water, with or without sugar; and all bottled spring and mineral waters."

The law further stipulates that no impure, contaminated or polluted water and no adulterated material, saccharin or coal tar color, other than certified color, may be used in the manufacture of beverages. Beverages, other than cereal beverages, cider, or spring or mineral water, shall have a sugar content of not less than 5 per cent by weight.

Beverages as contemplated in the law, other than spring and mineral waters and malt and cereal beverages, may be classed in three general groups. On the one hand there are the uncarbonated, undiluted fruit juices; on the other the carbonated drinks of the soda water type; and between these groups a miscellaneous class of considerable variety embracing diluted juices of the type usually known as fruitades (for example, orangeade), drinks of the soda water type but containing some measure of natural fruit juice, and other combinations.

A definition for fruit juice in general, and definitions for two specific fruit juices have been adopted by the United States Department of Agriculture and are recognized in the regulations of this State. These definitions are as follows:

Fruit juice is the unfermented liquid obtained from the first pressing of sound, ripe, fresh fruit or its pulp, and conforms in name to the fruit from which it is obtained.

Grape juice is the unfermented juice of sound, ripe grapes. It is obtained by a single pressing of the fruit, with or without the aid of heat, and with or without the removal of insoluble matter.

Orange juice is the unfermented juice obtained from sound, ripe, sweet oranges. It may contain a portion of the pulp and/or of the volatile oil.

There is no general definition for "soda water" but a number of specific products in this general class have been defined.

Ginger ale flavor, ginger ale concentrate, is the beverage flavor in which ginger is the essential constituent, with or without aromatic and pungent ingredients, citrous oils, fruit juices, and caramel color.

Ginger ale is the carbonated beverage prepared from ginger ale flavor, harmless organic acid, potable water and a sirup of one or more of the following: sugar, invert sugar, dextrose; with or without the addition of caramel color.

Sarsaparilla flavor is the beverage flavor prepared from oil of sassafras and methylsalicylate, or oil of wintergreen or oil of sweet birch, with or without other aromatic and flavoring substances and caramel color. It derives its characteristic flavor from oil of sassafras and methylsalicylate.

Sarsaparilla is the carbonated beverage prepared from sarsaparilla flavor, potable water, and a sirup of one or more of the following: sugar, invert

sugar, dextrose; with or without harmless organic acid, and with or without the addition of caramel color.

Root beer flavor, root beer concentrate, is the beverage flavor in which oil of sassafras and methylsalicylate (or oil of wintergreen or oil of sweet birch) are the principal flavoring constituents, and contains other flavoring substances, with or without the addition of caramel color.

Root beer is the carbonated beverage prepared from root beer flavor, potable water and a sirup of one or more of the following: sugar, invert sugar, dextrose; with or without harmless organic acid, and with or without the addition of caramel color.

Birch beer flavor, birch beer concentrate, is the beverage flavor in which methylsalicylate (or oil of sweet birch or oil of wintergreen) and oil of sassafras are the principal flavoring constituents, with or without other flavoring substances, and with or without caramel color. The flavor of methylsalicylate predominates.

Birch beer is the carbonated beverage prepared from birch beer flavor, potable water, and a sirup of one or more of the following: sugar, invert sugar, dextrose; with or without harmless organic acid, and with or without the addition of caramel color.

Cream soda water flavor, cream soda water concentrate, is the beverage flavor prepared from vanilla, tonka, vanillin, or coumarin, singly or in combination, together with other flavoring substances; with or without the addition of caramel color.

Cream soda water, "cream soda," is the carbonated beverage prepared from cream soda water flavor, potable water and a sirup of one or more of the following: sugar, invert sugar, dextrose; with or without harmless organic acid, and with or without the addition of caramel color.

Other familiar beverages that logically belong in this general class are orange, lemon and lime sodas. These products have not been officially defined but their identity may be described as follows:

Orange soda water, "orange soda" is the carbonated beverage prepared from orange soda water flavor, potable water, citric acid, and a sirup of one or more of the following: sugar, invert sugar, dextrose.

Orange soda water flavor, orange soda water concentrate, is the beverage flavor in which oil of orange or terpeneless oil of orange is the essential flavoring constituent.

Lemon soda water, "lemon soda" is the carbonated beverage prepared from lemon soda water flavor, potable water, citric acid, and a sirup of one or more of the following: sugar, invert sugar, dextrose.

Lemon soda water flavor, lemon soda water concentrate, is the beverage flavor in which oil of lemon or terpeneless oil of lemon is the essential flavoring constituent.

Lime soda water, "lime soda" is the carbonated beverage prepared from lime soda water flavor, potable water, citric acid, and a sirup of one or more of the following: sugar, invert sugar, dextrose.

Lime soda water flavor, lime soda water concentrate, is the beverage flavor in which oil of limes or terpeneless oil of limes is the essential flavoring constituent.

Other long recognized beverages of this group are grape, strawberry, and raspberry sodas. These products also are carbonated drinks prepared from concentrates, the flavors of which are generally synthetic and the colors usually artificial.

Our law permits the use of certified color in beverages but we have not interpreted this to mean that color may be used without declaration. In fact, beverages of this class, almost without exception, are labelled with a declaration of artificial color and flavor when the color and flavor are of that character.

Beverages of the "soda water" class are not consumed primarily for their nutritive value; they quench thirst, please the palate and give refreshment. It is true that by reason of their sugar content they contribute to energy production in the body, and these beverages which contain substantial quantities of fruit juice contribute an additional diet factor, vitamin C; but to compare foods which supply only energy with foods which supply in addition tissue-building material (protein and mineral salts), is to misrepresent nutritional values. Occasionally advertising for carbonated beverages is found which makes such erroneous comparisons. When prepared under sanitary conditions carbonated beverages are wholesome and acceptable adjuncts to the diet.

Many beverages are sold under coined or fanciful names. There is nothing in our statutes to prevent such practice provided the name does not misrepresent the product; but it would be helpful to the consumer and to the control official, and it would also clarify trade practice, if in addition to coined names the class or group name, that is, soda water, fruitade or fruit juice, were indicated.

One hundred and fifty-one samples of carbonated and related beverages were examined during the year and only seven were illegal. Six contained artificial color without declaration and one, a ginger ale syrup, contained phosphoric acid as an acidulant whereas our definition for ginger ale recognizes only harmless organic acid acidulants.

A sample of cherry cider was examined. It contained 11.95 per cent of solids, 5.72 per cent of invert sugar, 4.85 per cent of sucrose and the acidity, calculated as acetic acid, was 0.22 per cent. The flavor appeared to be natural.

EGGS AND EGG PRODUCTS

A statute enacted in 1931 authorizes the Commissioner of Agriculture to establish grades for fresh eggs. The act prohibits the sale or advertising of eggs as "fresh," "strictly fresh," "hennery," "new laid" or like descriptions if such eggs are not in fact fresh eggs. Specifications for fresh eggs, to be determined by candling, are given as follows: air cells not more than ¼ inch in depth, localized and regular; whites firm and clear; yolks may be visible; no visible germ development.

Our examination of eggs for the Dairy and Food Commissioner, who is charged with the enforcement of the so-called cold storage egg law, has included candling and the supplementary evidence of a determination of ammoniacal nitrogen and of tests for dipping.

In order to find out how the evaluation of eggs as carried out by expert candlers in the Department of Agriculture would compare with that as carried out in this laboratory a coöperative program was arranged whereby samples were secured by agents of the Department of Agriculture and classified by them on the basis of candling after which the same eggs were submitted to us for examination according to our usual procedure.

Thirty-eight samples were examined.

On 10 samples there was agreement that the eggs were strictly fresh. The ammoniacal nitrogen ranged from 1.0 to 1.5 and averaged 1.3 mgms. per 100 gms. of egg.

On 10 samples there was agreement that the eggs were distinctly not fresh. The ammoniacal nitrogen ranged from 1.9 to 2.9 and averaged 2.3 mgms. per 100 gms. of egg.

On 15 samples there was agreement that the eggs might be passed as fresh, but there was criticism in some cases by the Department of Agriculture of the designated grade under which they were sold. The ammoniacal nitrogen in this group ranged from 1.4 to 1.9 and averaged 1.7 mgms. per 100 gms. of egg.

On three samples there was some doubt. The ammoniacal nitrogen ranged from 2.0 to 2.1 mgms. per 100 gms. of egg. It is perhaps too liberal to pass these as fresh eggs. It would appear from the results just noted that 1.8 mgms. per 100 gms. is more liberal than is necessary for strictly fresh eggs, and liberal enough for eggs that are passably fresh.

In addition to these samples, 33 were submitted by the Dairy and Food Commissioner in his regular inspection. Twenty-seven of these samples were sold as fresh eggs, but seven of them were not of that class. Six samples were not sold under labels that indicated fresh eggs.

DRIED EGG YOLK

Two samples of dried egg yolk were submitted by a purchaser. The name of the manufacturer of the products was not given.

Analyses	No. 9015 egg yolk powder %	No. 9016 egg yolk flakes %
Moisture	2.71	3.17
Ash	3.19	3.52
Protein (N x 6.25)	32.56	33.38
Fat	59.95	59.57
Total P_2O_5	2.60	2.65

Both samples appear to be genuine egg yolk as claimed. On a moisture-free basis the analyses agree with analyses of authentic egg yolk.[1]

[1] Mitchell. Jour. Assoc. Off. Agr. Chem., 15, No. 2: 321. 1932.

FATS AND OILS

BUTTER

Four official samples of butter and sweet butter were examined for the Dairy and Food Commissioner and all were of standard quality.

A sample of sweet butter, No. 451, was examined for moisture and found to contain slightly in excess of 16 per cent. This is a little in excess of our former limit for moisture in butter, but no evidence that the product did not meet the required 80 per cent of fat which is at present the only numerical standard for butter.

Sample 8960 was submitted by a health officer who suspected the character of the fat. The usual constants were determined and found to be within the range for milk fat.

LARD

Sixteen samples of lard were submitted by the Dairy and Food Commissioner. No evidence of adulteration was found. The stearine crystals were typical of lard stearine and the melting points of the glycerides were normal. Previous surveys made in 1925 and 1928 revealed no adulterated products.

It is of interest to compare this experience with that recorded in our reports for 1896 and 1902, when about one-third of the samples examined were found not to be genuine.

Analyses are given in Table 2.

OLIVE OIL AND SALAD OIL

Fifty-six official samples of olive oil and one of salad oil were examined for the Dairy and Food Commissioner.

Five samples were examined for health officers and others.

The salad oil, 51862, was declared to be artificially colored. The sample was not highly colored. No color was extracted by direct treatment with 90 per cent alcohol. A petroleum ether solution of the oil extracted successively with 3 per cent sodium hydroxide, 1.2 hydrochloric acid and a mixture of 85 per cent phosphoric acid and concentrated sulphuric acid did not remove any color. Color was extracted by treatment with acetone but on evaporation of the acetone the color could not be extracted from the oily residue with normal hydrochloric acid. The color present was apparently of vegetable origin but its identity could not be established.

Two samples of olive oil, 50075 and 50095, Italian Beauty Brand Lucca oil, contained coal tar color and were of doubtful purity. No cottonseed, sesame or peanut oils were detected, and the test for rapeseed oil suggested by Thomas and Yu[1] yielded magnesium soaps that were insoluble in 90 per cent alcohol; but the fatty acids

[1] Jour. Amer. Chem. Soc., 45: 129. 1923.

TABLE 2. ANALYSES OF LARD

No.	Dealer	Butyro-refractometer reading at 40° C	M. P. of glycerides, degrees C	Halphen test
	Bethel			
53430	Beckett Bros.	50.8	63.6	negative
	Middletown			
53407	Economy Market	51.1	63.8	"
53409	Public Market	51.1	63.6	"
	Pawtucket			
53412	Gordon's Market	51.2	63.6	"
	Torrington			
53403	Fulton Market Co.	51.3	63.3	"
	Thompsonville			
53195	Pearl Street Market	50.7	63.4	"
53196	H. Furay	50.7	64.3	"
53197	W. T. Watson Co.	51.2	64.4	"
	Waterbury			
53416	D. Yovetz	52.3	64.4	"
53194	Vinnigs Market	51.2	63.9	"
	Willimantic			
53179	S. Adams Co.	51.0	64.4	"
53180	First National Stores	51.0	64.9	"
53182	Atlantic and Pacific Tea Co.	51.8	64.1	"
	Windsor			
53198	Dillon and Whelen	51.0	65.3	"
53199	McPherson Bros.	51.2	63.4	"
53400	J. P. Gagner & Co.	51.5	63.5	"

obtained from the soaps melted at 46-46.5° whereas the fatty acids obtained from rapeseed by this procedure should melt at 35°. The refraction and the iodine number of the oil, 65.4 and 97 respectively, were too high for olive oil, and the saponification number, 185.6, was barely within the limits for olive oil.

Three other samples, 49951, 53500, and 53153 were adulterated with cottonseed oil. They were in all cases bought in bulk and bottled by the dealer.

The adulterated or suspicious samples are as follows:

No.	Brand	Dealer
50075	Italian Beauty Lucca	E. Rosner, New Haven
50095	Italian Beauty Lucca	E. Rosner, New Haven
49951	Not given	International Grocery Co., Inc., Middletown
53153	Not given	P. Carola, New Haven
53500	Not given	D. Bellassi, New London

FLAVORING EXTRACTS

The quality of flavoring extracts as reflected by surveys in the last 10 years is very satisfactory. In 1925, of 38 samples examined, only three were deficient; in 1922 only one of 17 samples tested was below standard.

In our report for 1914 there is a comment on the quality of flavoring extracts that had been examined up to that time. It says: "The condition of flavoring extracts continues to be very unsatisfactory. As a rule they are legally labelled but the percentage of pure extracts of full standard strength is still very low."

LEMON EXTRACT

Lemon extract for food flavoring purposes should contain not less than 5 per cent by volume of oil of lemon. Terpeneless extract of lemon should contain not less than 0.2 per cent of citral derived from lemon oil.

Twenty-six samples of lemon extract, three of terpeneless extract of lemon and one of lemon flavor were examined for the Dairy and Food Commissioner. Only one sample of lemon extract was distinctly below standard. Two were slightly deficient in lemon oil. The terpeneless products met the citral requirement, but one sample, 52945, was incorrectly labeled; the carton plainly stated "pure lemon extract," whereas the bottle was correctly labeled terpeneless lemon extract.

Analyses are given in Table 3.

The terpeneless extracts were 52945, Hudson Tea Co., Brooklyn, N. Y., sold by M. Pear, Moodus; 53418, Morrow Extract Corp., New York, sold by Liberty Fruit Store, E. Port Chester; 53423, Anna Elizabeth Wade, E. Orange, N. J., sold by C. E. Badgley, Canaan. Citral content ranged from 0.19 to 0.21 per cent.

The sample of lemon flavor, 51255, was of the emulsion type and contained 0.44 per cent of lemon oil. It was made by the Ruprich Products Co., Westboro, Wis. It was artificially colored without declaration.

ORANGE EXTRACT

Orange extract should contain not less than 5 per cent by volume of orange oil. Terpeneless orange extract is prepared by shaking oil of orange with dilute alcohol, or by dissolving terpeneless oil of orange in dilute alcohol. It corresponds in flavoring strength to orange extract.

Five samples of orange extract and one of terpeneless orange extract were examined for the Dairy and Food Commissioner. All of the orange extracts met the standard for oil of orange content. The terpeneless product 53429 bore the statement "guaranteed under the Food and Drugs Act" giving the serial number, a device that long since has been disallowed.

Analyses of orange extracts are given in Table 4.

TABLE 3. ANALYSES OF LEMON EXTRACT

No.	Manufacturer or distributor	Dealer	Lemon oil by volume
			%
53181	American Laboratories, Inc., Richmond, Va. *Virginia Rambler*	Windham Market, Willimantic	6.0
53193	Armour and Co., Chicago, Ill	Vinnig's Market, Warehouse Point	8.7
53171	Baker Extract Co., Springfield, Mass	Dietter's Market, Hamden	9.5
53421	J. B. Baker Co., Harrisville, R. I	E. S. Bacus, Thompson	6.9
53402	Chas. H. Baldwin & Sons, West Stockbridge, Mass	H. S. Comstock, Winsted	7.9
53167	Boyce Extract Co., New York, *Puritan Brand*	A. Barardy, Plainville	5.2
53173	Joseph Burnett Co., Boston, Mass	Dietter's Market, Hamden	16.2
53188	The Cloverdale Co., Cambridge, Mass	The Cloverdale Store, Danielson	5.4
53178	Eclipse Food Products Co., Providence. R. I. *Eclipse Brand*	E. Lamire, Willimantic	5.4
53163	First National Stores, Inc., Boston, Mass. *Fi-Na-St*	First National Stores, Inc., Plainville	7.4
53411	The R. T. French Co., Rochester, N. Y., *French's*	James Reade, Pawcatuck	4.9
53401	Grocers Alliance Distributing Co., Chicago, Ill. *I. G. A. Brand*	H. S. Comstock, Winsted	5.3
53164	Hallock-Denton Co., Newark, N. Y., *Hallock's Pure*	A. Mancini, Bristol	5.2
53168	Hodes Bros., New Haven, Conn. *High Star Brand*	Mix E. Swirsky, Southington	6.1
53428	Lee & Osgood, Norwich, Conn	Edmond Jodoin, Jewett City	5.0
53425	Francis H. Leggett & Co., New York, *Premier*	A. Lukashevich, Meriden	5.2
53422	New England Stores Service Corp., Boston, Mass. *Nessco Pure*	E. S. Bacus, Thompson	5.5
53419	Prospect Supply Co., Inc., Yonkers, N. Y. *New Liberty Brand*	Liberty Fruit Store, E. Portchester	4.9
53158	The Quaker Maid Co., Inc., New York, *Rajah Brand*	Atlantic & Pacific Tea Co., Naugatuck	5.9
53155	Seeman Bros., Inc., New York, White Rose Brand	The Taylor Market, Naugatuck	4.8
53405	The Sisson Drug Co., Hartford, Conn. *Delmonico Brand*	H. A. King, Chester	5.3
53187	E. T. Smith Co., Worcester, Mass. *Jack Rose Brand*	Andrew Jawarski, Danielson	4.1
53192	Twitchell-Champlain Co., Portland, Me. *Hatchet Brand*	Gallup Bros. & Linden, Danielson	5.3
53186	United Wholesale Grocery Co., Worcester, Mass. *United Brand*	Geo. T. Heneault, Danielson	5.3
53417	Vernon Mfg. Co., Mt. Vernon, N. Y. *Howland's Pure*	Liberty Fruit Store, E. Portchester	7.7
53156	The Williams & Carlton Co., East Hartford, Conn. *William's Pure*	Boylan's Market, Naugatuck	6.4

TABLE 4. ANALYSES OF ORANGE EXTRACTS

No.	Manufacturer or distributor	Dealers	Orange oil by volume
			%
53159	The Quaker Maid Co., Inc., New York, *Rajah Brand*	Atlantic & Pacific Co., Naugatuck	6.3
53160	Schlotterbeck & Foss, Portland, Me. *Foss Pure*	W. F. Brennan, Naugatuck	7.9
53406	The Sisson Drug Co., Hartford, Conn. *Delmonico Brand*	H. A. King, Chester	5.8
53161	Sprague, Warner & Co., Chicago, Ill. *Ferndale Brand*	W. F. Brennan, Naugatuck	6.0
53157	The Williams & Carlton Co., East Hartford, Conn. *Williams Pure*	Boylan's Market, Naugatuck	5.6

PEPPERMINT EXTRACT

One sample of peppermint extract was examined. It was found to contain 2.7 per cent by volume of oil of pepperment which is somewhat less than the amount required by the standard (3 per cent).

VANILLA EXTRACT

One sample, 51257, was submitted by the Dairy and Food Commissioner. It was brought to his attention by a prospective purchaser. It was not a labelled product, but was represented to be "100 times concentrated." A detailed analysis of the product indicated that it was probably a true vanilla extract fortified with added vanillin and resin in a dilute alcoholic menstruum containing a considerable quantity of glycerine. On the basis of vanillin content 1.18 gms. per 100 cc it cannot be considered more than about six times the strength of ordinary vanilla extract.

EXAMINATION OF FRUITS AND VEGETABLES FOR ARSENIC

Inspection of fruits and vegetables for evidence of excessive amounts of arsenical spray residues was continued during the past year. Only the arsenic content was determined. The accepted tolerance for arsenic in foods is now 0.01 grain per pound, which is equivalent to 1.4 parts per million.

APPLES

Samples of apples were taken in the market and from orchards during the interval from July to October. Sixty-one samples were submitted by the Dairy and Food Commissioner and ninety-two were taken by the Station. Of the Commissioner's samples only two were in excess of the tolerance (1.4 p.p.m.), and none exceeded 2.0 p.p.m. Of the Station samples 12 were in excess of 1.4 p.p.m.; but only six were in excess of 2.0 p.p.m. and only one exceeded 3.0 p.p.m., the highest amount found being 3.8 p.p.m. The results may be summarized as follows:

Total number of samples examined	153
Samples in excess of 1.4 p.p.m.	14
Samples in excess of 2.0 p.p.m.	6
Samples in excess of 3.0 p.p.m.	1
Highest arsenic content found, p.p.m.	3.8

Spray residue on fruits and vegetables has not presented a serious problem in this State so far as our observations have disclosed. It is proposed to avoid late applications of spray materials and to avoid the use of lead-containing spray materials so far as possible so that the likelihood of dangerous excesses of injurious

residues will be further reduced in the future. The removal of residues from fruits can be accomplished by the use of commercial fruit-washing machines where large packs must be treated. On a small scale simple home-made devices will take care of emergency needs. Tanks or barrels may be used for the acid-dip solution and for rinsing purposes and the fruit can be dipped and rinsed by hand. In this way 60 or more bushels of apples can be satisfactorily treated in an hour. The effectiveness of such a procedure is illustrated by the following typical results.

Sample 299, before treatment	2.8 p.p.m.	As_2O_3
after wiping	2.3 p.p.m.	"
Sample 319, before treatment	1.4 p.p.m.	"
after acid treatment	0.2 p.p.m.	"
Sample 321, before treatment	2.6 p.p.m.	"
after acid treatment	0.1 p.p.m.	"

Wiping of fruit is not likely to be effective. Washing should be done before the fruit has been stored; after storage for some time spray residue is more difficult to remove. The treatment with dilute acid does not injure the fruit or destroy keeping qualities. It is not necessary to dry the fruit after rinsing.

Farmers Bulletin 1687 U. S. Department of Agriculture gives a full discussion of methods for removal of spray residues; a very complete study of the problem is also given in Extension Bulletin 87 of the New Jersey Agricultural Experiment Station.

STRING BEANS

During June, July and August thirty-seven samples of string beans were collected in various markets in the State. Eleven of these represented stock grown outside of this State and the remainder represented local production. Only one sample was found to contain arsenic in excess of the tolerance, and the amount in this case was only 1.6 p.p.m.

Fifteen samples were examined for the Department of Entomology of this Station for investigational purposes.

CELERY

Eighteen official samples of celery were examined representing both local and out-of-state production. No excessive amounts of arsenic were found. In this examination the whole of the sample was tested since the tops are often used in making soups and broths.

CABBAGE

Only six official samples of cabbage were examined, but none were found to contain excessive amounts of arsenic. Both inner and outer leaves were examined.

One sample was examined for a local grower. The head well

stripped of outer leaves showed 1.2 p.p.m. of arsenic; but the outer leaves carried a large excess, nearly 0.3 grain per pound, and these would be dangerous not only for human consumption, but for feeding to farm animals as well.

LIMA BEANS

One sample was tested and no evidence of arsenic was found.

CAULIFLOWER

Three samples of cauliflower were examined for the Commissioner and none showed excesses of arsenical residue. A sample representing stock seized by a federal inspector acting with an agent of the City Board of Health of New Haven, the product having been shipped from a neighboring State, was found to carry a large excess of residue. Three separate vegetables were tested and the arsenic content found to range from 0.2 grain to 1.4 grains per pound.

MISCELLANEOUS

One sample of plums, four samples of peach twigs and one sample of soil were examined for the Department of Entomology and of Botany in connection with investigations of spray injury.

GELATIN

Fifteen samples of gelatin products were analyzed for the Dairy and Food Commissioner, seven being examined for arsenic content only.

Edible gelatin should contain not less than 15 per cent of nitrogen, not more than 2 per cent of ash, and no excessive amount of metallic impurities. At present our regulations provide that 1.4 parts of arsenic (As_2O_3), 30 parts of copper and 100 parts of zinc in one million parts of gelatin will not be regarded as excessive.

Gelatin is used in domestic jelly desserts; and it is used in commercial jelly powders and as a stabilizer in the manufacture of ice cream.

One sample, 52477, contained an excessive amount of arsenic, 3.5 p.p.m.; but of seven more samples of the same brand purchased at various places in the State only one slightly exceeded the limit of 1.4 p.p.m. The average for the eight samples was about 1.2 p.p.m. The high figure obtained on the original sample was carefully checked and no error was found; but on the basis of the further samples examined it is evident that an excessive arsenic content is not characteristic of this brand.

Analyses are given in Table 5.

TABLE 5. ANALYSES OF GELATIN

No.	Manufacturer or distributor	Dealer	Nitrogen	Ash	Copper (Metallic)	Zinc (Metallic)	Arsenic (As_2O_3)
			%	%	p.p.m.	p.p.m.	p.p.m.
52476	Peter Cooper, Gowanda, N. Y.	First Nat'l Stores, Bridgeport	14.89	1.87	trace	57.9	trace
52477	Cox Gelatine Co., New York City	C. S. Backus, Thompson	14.91	1.86	3.0	49.8	1.2[1]
52478	Crystal Gelatine Co., Boston, Mass.	W. H. Mansfield Co., Putnam	15.15	1.21	3.0	1.6	trace
52474	C. B. Knox Gelatine Co., Johnstown, N. Y.	Atlantic & Pacific Tea Co., Bridgeport	15.05	1.46	17.5	6.4	trace
52475	Minute Tapioca Co., Orange, Mass.	Atlantic & Pacific Tea Co., Bridgeport	15.51	0.48	2.4	14.5	1.3
52473	Quaker Maid Co., New York City	Atlantic & Pacific Tea Co., Bridgeport	14.93	1.31	3.0	19.3	0.5
52665	Royal Baking Powder Co., New York City	National Economy Co., New London	15.11	1.44	2.4	16.1	trace
52900	Williams & Carleton Co., East Hartford, Conn.	Whiton's Grocery, Stafford Springs	14.94	1.42	20.0	19.3	trace

[1] Average for eight samples.

ICE CREAM

Fifty-eight samples of ice cream and related products were examined for the Dairy and Food Commissioner.

Analyses of ice cream samples are given in Table 6.

Extensive surveys made over a period of years show that the legal standard of 8 per cent milk fat in plain ice cream and of 6 per cent for fruit and nut ice creams has been generally exceeded. Checking the fat content of ice cream is only a part of the inspection service devoted to this and similar products. Dispensing establishments, including drug stores, soda fountains, and roadside stands, are inspected as to sanitary conditions; and manufacturing plants are also inspected.

A change in the ice cream law was made by the General Assembly in the session of 1933. The requirement for milk fat was raised from 8 per cent to 10 per cent in plain ice cream, and from 6 per cent to 8 per cent in fruit and nut ice creams. For the control of overrun the provision is made that no ice cream shall contain less than 1.6 lbs. of food solids per gallon. For an ice cream containing 35 per cent of solids this is equivalent to a total weight of about 4.6 lbs. per gallon and represents approximately 100 per cent overrun.

In the bill as presented to the legislature there was a proposal for a classification of frozen desserts with definitions and standards for each class. This feature was not favorably considered, largely because of representations of a few concessionaires who objected to forfeiting the trade advantage that they claimed had become established for the name "frozen custard." Under the classification proposed this product would have been classed under the more properly descriptive name of "ice-milk" because it is generally inferior to ice cream in milk fat content, and does not contain the ingredient that should characterize a "custard," viz., eggs.

In addition to ice cream samples submitted by the Dairy and Food Commissioner 12 samples have been examined for purchasers and others.

Miscellaneous frozen dessert products examined included "frozen custard," spumoni and ice cream bars. Of 18 samples of "frozen custard," 11 met or exceeded the required fat standard for ice cream and seven did not. The products that were below the ice cream standard were sold under declarations of fat content which were met in all cases. The ice cream portion of chocolate coated ice cream bars met the fat standard for ice cream. Spumoni is Italian ice cream and the two samples examined also met the requirements as to content of milk fat.

IODIZED SALT

Two samples of iodized salt were submitted by the Commissioner. They were the products of the Worcester Salt Company

TABLE 6. ANALYSES OF ICE CREAM

No.	Flavor and brand	Dealer	Manufacturer	Fat
				%
		Bridgeport		
51372	Neapolitan	W. D. Mighetto	Clover Farms, Inc.	9.6
51375	Vanilla-Strawberry	Royal Candy Co.	Own make	9.6
51369	Neapolitan brick	Villari's Pharmacy	Park City I. C. Co.	10.8
		Glastonbury		
53136	Vanilla—Fro-Joy	Frankel Drug Co.	General I. C. Co.	15.1
53137	Thrift Brick-Fro-Joy	Frankel Drug Co.	General I. C. Co.	9.4
		Hartford		
53138	Harlequin Brick	Atwood Patent Medicine Shop	CeBrook I. C. Co.	13.0
53139	Family Treat Brick	Atwood Patent Medicine Shop	CeBrook I. C. Co.	12.3
52210	Ice Cream Mix	CeBrook I. C. Co.	Own make	13.6
52211	Vanilla	CeBrook I. C. Co.	Own make	18.8
52741	Harlequin Brick	Highland Dairy Co.	Own make	13.1
52742	Chocolate and Vanilla	Highland Dairy Co.	Own make	14.1
53135	Progress Brick	Highland Dairy Co.	Own make	9.5
51924	Family Treat	Quality Drug Co.	CeBrook I. C. Co.	10.8
51923	Progress Brick	Rivoli Soda Shop	Crown I. C. Co., New Britain	10.8
		New Britain		
53140	Progress Brick	Crown I. C. Co.	Own make	12.2
		New Haven		
51926	Vanilla	Basel's Confectionery	Own make	11.8
51927	Strawberry	Basel's Confectionery	Own make	9.4
52505	Vanilla	DeFelice & Sons	Own make	16.8
51925	Strawberry	Great A. & P. Tea Co.	Hood's	11.8
		Stratford		
51948	Vanilla and Fruit	Royal Candy Kitchen	Own make	7.8
		Waterbury		
51909	Thrift-Fro-Joy	Hillside Pharmacy	General I. C. Co.	9.6
51921	U-Save Brick	A. H. Merriman & Sons, Inc.	Own make	9.4
51912	Thrift	Whelan's I. C. Co.	General I. C. Co.	7.2
51905	Economy Package	R. F. Worden & Sons, Inc.	Own make	9.2

and the International Salt Company respectively. These salts are reinforced with iodine in the form of potassium iodide to the extent of .01 per cent in the first and .015 per cent in the second. Analyses showed about .006 per cent in both cases. The method employed for the determination was a modification of one that we employ for determining iodine in mineral mixtures used in cattle feeds.[1]

MAPLE SYRUP

Sixteen samples of maple syrup were submitted by the Dairy and Food Commissioner.

The moisture limit, 35 per cent for pure maple syrup, was not exceeded in any case, but two samples, 50956 and 50691, were not pure maple syrups.

Analyses are given in Table 7.

Only products labelled or sold as pure maple syrup were examined. Many mixtures of maple syrup and cane sugar are sold under label declarations which plainly show the true character of the products.

Three unofficial samples were examined for individuals.

MEAT AND MEAT PRODUCTS

The only official samples of meat products examined were three of frankfurts submitted by the Dairy and Food Commissioner.

No.	Dealer	Remarks
50066	Joe's Cash Market, Norwich.....	Cereal present, not declared.
50090	Sachem Packing Co., Norwich.....	Cereal present, not declared. Excess water (19.7%).
50681	Joseph Jerrykitz, Torrington.....	Passed. Cereal was properly declared and was not in excess. No excess water.

In the manufacture of sausage 3 per cent of water or ice is permitted, and in those types that are smoked or cooked somewhat more is allowed, but in no case should there be more than is necessary to facilitate packing in casings or to make the product palatable. In control practice 10 per cent of added water is the accepted limit in the manufacture of frankfurts.

Cereal or other starchy material may be added provided its presence is declared and does not exceed 3.5 per cent. Other "conditioners" such as milk powder must likewise be declared if used.

Six other samples of frankfurts were examined. One of these was said to contain milk powder but we could find no satisfactory evidence of its presence, either microscopically or by chemical tests. The other samples were tested merely for added water.

One sample of bologna was also examined for water content.

[1] Knapheide and Lamb, Jour. Amer. Chem. Soc., 50: 2121.

TABLE 7. ANALYSES OF MAPLE SYRUP

No.	Manufacturer or distributor (as labelled or as stated by dealer)	Dealer	Moisture	Ash	Lead No. (Winton)
			%	%	
50693	Atlantic & Pacific Tea Co.....	Atlantic & Pacific Tea Co., Danbury.....	33.9	0.69	1.72
50953	Chas. H. Baldwin & Sons, West Stockbridge, Mass.....	Whiton's Grocery, Stafford Springs.....	31.8	0.64	1.38
50696	E. Bartlett, Jeffersonville, Vt.....	E. S. Backus, Thompson.....	33.8	0.73	1.82
50692	Cary Maple Sugar Co., St. Johnsbury, Vt.	The Mohican Co., Danbury.....	33.0	0.70	1.63
50954	Green Mountain Packing Co., St. Albans, Vt.....	A. H. Phillip Co., Stafford Springs.....	32.7	0.64	1.48
50956	Amos Hinds, Mill Brook, N. Y.....	The Mohican Co., Danbury.....	34.6	0.01	0.04
50691	Amos Hinds, Mill Brook, N. Y.....	The Mohican Co., Danbury.....	35.0	0.02	0.23
50994	Mrs. W. P. Johnson, Columbia, Conn....	S. Adams, Willimantic.....	31.8	0.84	1.79
50694	S. S. Pierce Co., Boston, Mass.....	E. W. Mullane, Putnam.....	33.2	0.51	1.22
53413	Rival Foods, Inc., Cambridge, Mass.....	H. O. Williams Co., Old Mystic.....	33.1	0.61	1.48
50955	Rival Foods, Inc., Cambridge, Mass.....	E. C. Allyn & Sons, Hazardville.....	32.1	0.62	1.36
50993	A. E. Skinner, Underhill, Vt.....	H. Longo, Danielson.....	31.7	0.58	1.28
52488	Vermont Maple Co-operative, Burlington, Vt.....	The First National Stores, Newington....	31.0	0.46	1.21
53424	Weidman-Ward & Co., Inc., Albany, N.Y.	W. R. Boardman, Lakeville.....	33.0	0.69	1.81
53427	R. C. Williams & Co., New York.....	Orr & Tanner, Southington.....	33.8	0.59	1.41
50952	J. C. Winn, Tolland, Mass.....	J. A. Radocchio, Winsted.....	34.4	0.69	1.56

MILK AND MILK PRODUCTS

MARKET MILK

Two hundred and sixty-five samples of market milk were examined.

Seventy-six official samples were examined for the Dairy and Food Commissioner. Fifty-seven were passed as of standard quality and nineteen were below standard. Twenty-two unofficial samples were also submitted by the Commissioner. No evidence of adulteration was found.

One hundred and sixty-seven samples were examined for consumers and producers.

CREAM

According to statute cream contains not less than 16 per cent of butterfat. In commercial practice "light" cream usually tests about 20 per cent of fat and "heavy" cream about 40 per cent.

Ten official samples of cream were examined for the Dairy and Food Commissioner. They were of standard fat content and were not found to be adulterated.

Five samples drawn by inspectors of the Commissioner's office were examined for a dealer. Four were found to contain gelatin and were therefore adulterated. The analyses of these samples are given in Table 8.

TABLE 8. ANALYSES OF CREAM

D. C. No.	Fat	Acidity	Ash	CaO	Protein	Alk. of ash, cc $\frac{N}{10}$HCl per 100gms.	Gelatin test
	%	%	%	%	%		
51033	40.5	0.085	0.42	0.106	2.04	17.1	Positive
51034	40.5	0.085	0.41	0.105	2.36	17.7	Positive
51035	40.5	0.080	0.40	0.109	2.11	16.5	Positive
51036	41.5	0.190	0.39	0.106	1.98	15.7	Negative
51037	41.0	0.085	0.41	0.108	1.98	18.1	Positive

Seventeen samples were examined for consumers and producers. Two of these were suspected of containing foreign fat but the usual constants, butyro-refractometer reading at 40° C., Reichert-Meissl No. and Polenske No. were all within the limits for milk fat.

CHEESE

Three samples of cheese were examined for the Department of Health of New Britain. All were sold as whole milk cheese. Two were as represented but one, No. 411, was a skimmed milk product and was, moreover, infested with maggots and unfit for food.

Analyses were as follows:

	No. 409 %	No. 410 %	No. 411 %
Water	31.48	25.66	41.92
Ash	6.91	4.93	6.37
Protein	26.90	34.71	43.23
Fat	32.50	30.58	3.75

SALAD DRESSING

Four samples of mayonnaise and three samples of mineral oil dressing have been examined.

Analyses are given in Table 9.

The "fat" in the mineral oil dressings was largely or entirely mineral oil, as shown by the low saponification numbers 0.56 to 6.74.

As noted in previous reports egg yolk has been estimated on the basis of total phosphoric acid content because of the unreliability of lipoid phosphoric acid as an index of egg content. The limitations of total phosphoric acid as an index are obvious, but it has served well in all true mayonnaise dressings so far as we have had opportunity to check with known formulae. Lepper and Vorhes[1] have devised a more adequate procedure.

SPECIAL AND MISCELLANEOUS FOODS

Various food products have been examined for purchasers, dietitians and others interested. Responsibility for the identity and sampling of these products rests with the persons submitting them. We are responsible for the analysis of the products as received. Analyses are given in Table 10.

9163. *Thynn Bread.* The circular accompanying this sample emphasized the low carbohydrate content of the bread and its consequent suitability for the diets of those suffering from obesity and diabetes. The bread contained practically the same amount of total carbohydrate as ordinary white bread when compared on the same moisture basis. It was therefore in no wise suitable for the diet of anyone who could not tolerate ordinary bread.

1034. *St. John's Bread, Carob Bread.* The wrapper of this bread emphasized starchless carob-fruit, soy bean and cereal as ingredients of this product. The bread had substantially the same carbohydrate content as wheat bread. There were no suggestions of special dietetic uses.

[1] Mayonnaise Analysis and Interpretation. Paper presented at Meeting of Assoc. Off. Agr. Chem., 1932.

TABLE 9. ANALYSES OF SALAD DRESSINGS

No.	Brand and manufacturer or distributor	Solids	Fat	Approximate egg yolk	Total P_2O_5	Salt	Nitrogen
	Mayonnaise	%	%	%	%	%	%
7998	Birdsall & Wilcox, New Haven, Conn.	87.43	83.06	7.3	0.102	0.82	0.3
49915	E. M. Salisbury, Providence, R. I.	82.74	74.95	12.6	0.177	0.99	0.4
9474	Yantic Grain & Products Co., Norwich, Conn., *Mar-Vel-Lus brand*	85.35	79.44	7.3	0.103	1.19	0.3
9475	Mayonnaise Service Corp., New York	81.21	74.68	9.5	0.133	1.25	0.3
	Mineral Oil Dressing						
49919	Battle Creek Food Co., Battle Creek, Mich. *No-Fat*	77.22	66.41	none	none	0.58	trace
49918	Dietetic Supply House, Chicago, Ill. *Cellu*	85.18	82.39	5.1	0.071	0.21	0.3
49746	Otis Clapp & Son, Boston, Mass., *Supermaise*	85.90	78.64	7.4	0.103	1.35	0.3

358. *Proteo Bread.* Claimed to be suitable for the diabetic and for others on restricted diets. The total carbohydrate was about one-half that found in ordinary bread and protein was correspondingly higher. Whether or not this bread is suitable for a diabetic patient is a question of individual tolerance. There can be no ideal bread for diabetics generally.

Samples 8611, 8612, 8613, and 8614 were foods recommended to a diabetic by his personal physician. The foods were made or distributed by Julius Meinl of Vienna. The cookies, 8611 and 8612, were said to contain 0.6 gram of carbohydrate each. On the basis of average weights of the cookies and the available carbohydrate shown by analysis the claimed amount was not exceeded. No. 8613 was "diabetic" chocolate claimed to contain 44 per cent of fat, which figure was substantiated by our analysis. The product is a preparation of chocolate and not plain bitter chocolate. No. 8614 was chocolate coated bonbons. Most of the carbohydrate is "undetermined," but on the basis of that part which may be regarded as available the claim of 7 per cent is fairly approximated and not exceeded. The fat content was over 50 per cent indicating some fat in the filling. The foods were claimed not to contain glycerine and no evidence of glycerine was found.

9587. *Chewing gum.* Claimed to be free from cane sugar, glucose, dextrose, starch and saccharin. The carbohydrate responded to tests for, and appeared to be, levulose.

SPICES

Early inspections of spices sold in Connecticut did not show a very satisfactory degree of purity. Thus in 1897 only 65 per cent of the samples examined were regarded as pure. Surveys made at rather frequent intervals since that time have shown substantial improvement. In 1909 the average purity was found to be 90 per cent and in 1917, 87 per cent. Inspections made since that time, including the one made this year, show that the general improvement has been sustained; of nearly 300 samples examined the proportion found to meet the requirements of the standards is again about 90 per cent.

ALLSPICE

Allspice (pimento), is the dried, nearly ripe fruit of *Pimenta officinalis.* It contains not less than 8 per cent of quercitannic acid, not more than 25 per cent of crude fiber, not more than 6 per cent of total ash and not more than 0.4 per cent of ash insoluble in hydrochloric acid.

Seven samples were examined and all met the requirements of the standard. The slight excess of fiber in one of the samples may be disregarded.

Analyses are given in Table 11.

TABLE 10. SPECIAL AND MISCELLANEOUS FOODS

No.	Name of product	Water	Ash	Protein (N x 6.25)	Fiber	Carbohydrate		Fat
						Starch + water-sol.	Undetermined	
		%	%	%	%	%	%	%
9163	Thynn Bread. Thynn Bread, Inc	41.32	3.84	8.23	1.12	39.20	5.45	0.84
1034	St. John's Bread (Carob Bread). St. John's Baking Co., Minneapolis	32.50	1.77	11.40	0.83	45.96	4.72	2.82
358	Proteo Bread. Proteo Foods, Chicago	37.04	2.75	24.54	0.75	29.41		5.51
51386	Vit Quick Cooking Rice. Vit Food Products, New York	9.23	0.81	8.13	0.58	80.90		0.35
8778	Wheat bread. Emanuelson's Bakery, New Haven	38.28	2.11	9.44	0.21	47.94		2.02
8927	Wheat bread. Emanuelson's Bakery, New Haven	36.65	2.35	9.75	0.12	48.84		2.29
	Julius Meinl, Vienna							
8611	Fancy cookies	6.05	1.68	14.38	2.75	2.52	37.04	35.58
8612	Plain cookies	5.25	1.56	55.19	0.22	9.89	12.53	15.36
8613	Diabetiker Schokolade	1.54	1.52	6.69[1]	1.38	7.70	38.53	42.64
8614	Schokolade bonbons	2.02	1.61	9.88[1]	1.50	4.73	26.73	53.53
	Loeb Dietetic Food Co., New York							
9853	Gluten croutons	.....	4.24	42.98[2]	....	40.75[3]	....	....
9587	Diabex chewing gum	....	....	....	....	63.84[4]		....
9588	Dietetic mayonnaise	10.10	0.36	....	....	....	....	88.24[5]
9589	Bran and gluten breakfast cereal	5.88	4.92	33.56	9.70	21.44[3]	19.84	4.66
9590	Prepared soy bean flour with gluten	7.25	5.27	41.88	1.60	26.31[3]	6.92	10.77
9591	Cocoa shells	4.90	7.50	18.25	17.13	4.13[6]	40.34	7.75[7]

[1] N. due to theobromin and caffeine not deducted.
[2] N x 5.70.
[3] Largely starch.
[4] Calculated as levulose.
[5] Largely mineral oil.
[6] Trace of starch.
[7] Petroleum ether extract.

TABLE 11. ANALYSES OF ALLSPICE

No.	Manufacturer	Dealer	Total ash	Ash insol. in HCl	Quercetannic acid	Fiber
			%	%	%	%
52934	W. Boardman & Sons Co., Hartford, Conn	The Talcott Bros. Co., Talcottville	4.58	0.03	11.22	22.55
52929	The R. T. French Co., Philadelphia, Pa	The Mohican Co., So. Manchester	4.54	0.04	12.52	21.93
52947	Independent Grocers' Alliance, Chicago, Ill	J. H. Parcells, New Milford	4.94	0.07	9.98	23.33
52696	McCormick & Co., Baltimore, Md	B. Jacobson, Norwich	4.61	0.08	11.35	25.44
52691	D. L. Slade Co., Boston, Mass	B. Jacobson, Norwich	4.81	0.16	13.57	21.80
52916	Stickney & Poor's Spice Co., Boston, Mass	F. O. Faulk, Saybrook Point	4.42	0.03	12.21	22.18
52924	R. C. Williams & Co., Inc., New York	W. J. Prann, Centerbrook	4.76	0.10	9.48	21.60

BLACK PEPPER AND WHITE PEPPER

Black pepper is the dried immature berry of *Piper nigrum L.* It contains not less than 6.75 per cent of non-volatile ether extract, not less than 30 per cent of starch, not more than 7 per cent of total ash and not more than 1.5 per cent of ash insoluble in hydrochloric acid.

White pepper is the dried immature berry from which the outer or the outer and inner coatings have been removed. It contains not less than 7 per cent of non-volatile ether extract, not less than 52 per cent of starch, not more than 5 per cent of crude fiber, not more than 3.5 per cent of total ash, and not more than 0.3 per cent of ash insoluble in hydrochloric acid.

Analyses of thirteen samples of black pepper and nine samples of white pepper are given in Table 12.

RED PEPPER AND CAYENNE

Red pepper is the red, dried, ripe fruit of any species of *Capsicum.*

Cayenne pepper, cayenne, is the dried ripe fruit of *Capsicum frutescens* or other small-fruited species of *Capsicum.* All cayenne is therefore red pepper, but not all red pepper is necessarily cayenne.

Red pepper contains not more than 8 per cent of total ash and not more than 1 per cent of ash insoluble in hydrochloric acid. Cayenne pepper contains not less than 15 per cent of non-volatile ether extract, not more than 1.5 per cent of starch, not more than 28 per cent of crude fiber, not more than 8 per cent of total ash and not more than 1.25 per cent of ash insoluble in hydrochloric acid.

Some early analyses show as high as 1.5 per cent of starch but such values are probably very largely due to inherent analytical errors in carrying out the diastase method for determining starch, because neither red pepper nor cayenne contains an appreciable amount of starch.

Analyses are given in Table 13.

CINNAMON

Cinnamon is the dried bark of cultivated varieties of *Cinnamomum* from which the outer layers may or may not have been removed.

Ground cinnamon, ground cassia, contains not more than 5 per cent of total ash and not more than 2 per cent of ash insoluble in hydrochloric acid.

Analyses of eight samples examined are given in Table 14.

TABLE 12. ANALYSES OF BLACK PEPPER AND OF WHITE PEPPER

No.	Manufacturer	Dealer	Total ash	Ash insol. in HCl	Non-volatile ether extract	Starch	Fiber
	Black Pepper		%	%	%	%	%
52931	Wm. Boardman & Sons Co., Hartford, Co.	Talcott Bros. Co., Talcottville	4.72	0.09	8.61	34.42	....
52902	Durkee's Famous Foods, Inc., New York	A. H. Phillips Co., Stafford Springs	4.46	0.22	8.87	33.45	....
52678	First National Stores, Inc.	First National Stores, Inc., Litchfield	5.14	0.35	9.33	31.79	....
52928	B. Fischer Co., Inc., Buffalo, N.Y.	Mahieu Groc. Co., So. Manchester	5.18	0.29	10.25	29.49	....
52942	Hudson Tea & Spice Co., Inc., Brooklyn, N.Y.	M. Pear, Moodus	4.94	0.25	8.11	27.94	....
52948	Independent Grocers Alliance, Chicago, Ill.	J. H. Parcells, New Milford	5.16	0.40	8.61	35.89	....
52693	McCormick & Co., Baltimore, Md.	B. Jacobson, Norwich	4.67	0.18	9.63	34.19	....
52690	The Prudential National Corp., Brooklyn, N.Y.	B. Jacobson, Norwich	5.20	0.06	8.27	33.22	....
52687	The Quaker Maid Co., Inc., New York	Atlantic & Pacific Tea Co., Norwich	4.84	0.27	9.37	31.82	....
52915	D. & L. Slade, Boston, Mass.	F. O. Faulk, Saybrook Point	4.70	0.19	8.45	35.13	....
52692	Stickney & Poor Spice Co., Boston, Mass.	B. Jacobson, Norwich	4.02	0.07	9.22	40.65	....
52684	Williams & Carleton Co., East Hartford, Conn.	Buckley Bros., Norwich	4.46	0.11	8.48	36.48	....
52922	R. C. Williams & Co., Inc., New York	W. J. Prann, Centerbrook	4.39	0.09	8.09	35.22	....

TABLE 12. ANALYSES OF BLACK PEPPER AND OF WHITE PEPPER—*Concluded*

No.	Manufacturer	Dealer	Total Ash	Ash insol. in HCl	Non-volatile ether extract	Starch	Fiber
	White Pepper		%	%	%	%	%
52933	Wm. Boardman & Sons Co., Hartford, Conn.	Talcott Bros. Co., Talcottville.	0.96	0.11	7.09	53.89	3.65
52679	First National Stores, Inc., Boston, Mass.	First National Stores, Inc., Litchfield	0.95	0.06	8.65	52.54	3.73
52927	B. Fischer Co., Inc., Buffalo, N.Y.	Mahieu Grocery Co., So. Manchester	0.90	0.05	7.39	53.13	3.88
52918	E. S. Kibbe Co., Hartford, Conn.	F. O. Faulk, Saybrook Point	0.93	0.09	7.23	53.49	4.35
52688	The Quaker Maid Co., Inc., New York	Atlantic & Pacific Tea Co., Norwich	1.02	0.05	7.39	52.40	3.93
52944	C. F. Sauer Co., Richmond, Va.	M. Pear, Moodus	0.95	0.07	7.72	53.83	3.95
52694	Stickney & Poor Co., Boston, Mass.	B. Jacobson, Norwich	1.62	0.01	8.87	54.76	1.60
52686	Williams & Carleton Co., East Hartford, Conn.	Buckley Bros., Norwich	0.90	0.08	7.29	52.90	3.63
52920	R. C. Williams & Co., Inc., New York	W. J. Prann, Centerbrook	1.87	0.12	7.15	53.75	2.30

TABLE 13. ANALYSES OF RED PEPPER AND CAYENNE

No.	Manufacturer	Dealer	Total ash	Ash insol. in HCl	Non-volatile ether extract	Starch	Fiber
	Red Pepper		%	%	%	%	%
52932	Wm. Boardman & Sons Co., Hartford, Conn.	Talcott Bros. Co., Talcottville.	5.94	0.47	....	....	....
52680	First National Stores, Inc., Boston, Mass.	First National Stores, Inc., Litchfield	5.84	0.31	....	....	....
52699	R. T. French Co., Rochester, N. Y.	Whiton's Grocery, Stafford Springs	5.36	0.19	....	....	....
52685	Williams & Carlton Co., East Hartford, Conn.	Buckley Bros., Norwich	5.60	0.42	....	....	....
52921	R. C. Williams & Co., New York.	W. J. Prann, Centerbrook	5.52	0.75	....	....	....
	Cayenne						
52901	Durkee's Famous Foods, Inc., Elmhurst, N. Y.	A. H. Phillips Co., Stafford Springs	5.86	0.36	18.02	0.00	22.60
52689	Quaker Maid Co., New York.	Atlantic & Pacific Tea Co., Norwich	6.22	1.01	15.66	0.00	24.43
52949	W. T. Reynolds & Co., Inc., Poughkeepsie, N. Y.	J. H. Parcells, New Milford	5.42	0.14	18.61	0.00	21.20

TABLE 14. ANALYSES OF CINNAMON

No.	Manufacturer	Dealer	Total ash	Ash insol. in HCl
			%	%
52930	Wm. Boardman & Sons Co., Hartford, Conn.	Talcott Bros. Co., Talcottville	2.96	0.71
52903	Durkee's Famous Foods, Inc., Elmhurst, N. Y.	A. H. Phillips Co., Stafford Springs	3.35	0.27
52943	Hudson Tea Co., Brooklyn, N. Y.	M. Pear, Moodus	3.78	1.08
53150	Independent Grocers Alliance, Chicago, Ill.	J. H. Parcells, New Milford	3.48	0.27
52695	McCormick & Co., Baltimore, Md.	B. Jacobson, Norwich	4.25	0.25
52904	Reid-Murdock & Co., Chicago, Ill.	Stafford Public Mkt., Stafford Springs	3.53	0.49
52917	D. & L. Slade Co., Boston, Mass.	F. O. Faulk, Saybrook Point	3.59	0.23
52923	R. C. Williams & Co., New York	W. J. Prann, Centerbrook	3.82	0.12

MUSTARD

Mustard, also known as ground mustard or mustard flour, is the powder made from mustard seed with the hulls largely removed and with or without the removal of a portion of the fixed oil. It contains not more than 1.5 per cent of starch and not more than 6 per cent of total ash.

Analyses of six samples examined are given in Table 15.

SQUASH

Twenty-three samples of squash were examined for the Associated Seed Growers, Inc., New Haven. Dry matter (solids) was the only determination made.

TOMATO PRODUCTS

CANNED TOMATOES

Two samples of canned tomatoes were submitted by the Commissioner for examination as to their fitness for food. The appearance of the cans indicated an old pack, but no evidence of spoilage was noted.

TOMATO JUICE

Canned or bottled tomato juice is the unconcentrated, pasteurized product consisting of the liquid and a substantial portion of the pulp of ripe tomatoes. It may or may not contain added salt. There are no numerical standards for the product.

Ten commercial products were submitted by the Commissioner. They were examined for preservatives, artificial color, total solids, and salt content.

Analyses are given in Table 16.

TOMATO PASTE

Aside from tomato juice, which is an unconcentrated product, there is a group of tomato products that differ from one another chiefly in degree of concentration.

Tomato puree or tomato pulp contains not less than 8.37 per cent of tomato solids. Tomato paste, otherwise known by the Italian name *salsa di pomodoro,* is a heavier product and contains not less than 22 per cent of tomato solids. *Heavy tomato paste,* sometimes called *concentrated tomato paste,* contains not less than 33 per cent of tomato solids.

The products which we have examined for the Commissioner were purchased prior to the announcement of the standards above mentioned and cannot therefore be properly referred to the specifications cited.

Thirteen samples designated as tomato paste ranged in content of total solids from 24.3 per cent to 30.9 per cent and averaged

TABLE 15. ANALYSES OF MUSTARD

No.	Manufacturer	Dealer	Total ash	Ash insol. in HCl
			%	%
52935	Wm. Boardman & Sons Co., Hartford, Conn.	Talcott Bros. Co., Talcottville	4.01	0.49
52698	J. J. Coleman, Ltd., London, England	Whiton's Grocery, Stafford Springs	4.32	0.02
53151	Independent Grocers Alliance, Chicago, Ill.	J. H. Parcells, New Milford	4.20	0.20
52919	McCormick & Co., Baltimore, Md	Stokes Bros., Old Saybrook	4.18	0.09
52697	D. & L. Slade Co., Boston, Mass.	Whiton's Grocery, Stafford Springs	3.53	0.07
52925	R. C. Williams & Co., Inc., New York	W. J. Prann, Centerbrook	4.61	0.18

TABLE 16. ANALYSES OF TOMATO JUICE

No.	Manufacturer or brand	Dealer	Solids	Salt	Preservative and artificial color
			%	%	
50660	American Packing Co., Evansville, Ind. *Triple A*	First National Stores, Forestville	5.42	0.63	None found
50661	Beech Nut Packing Co., Canajoharie, N. Y. *Beech-Nut*	S. Buynoveky, Forestville	6.23	0.29	None found
50099	California Packing Co., San Francisco, Calif. *Del Monte*	Atlantic & Pacific Tea Co., Naugatuck	7.21	0.54	None found
50659	Campbell Soup Co., Camden, N. J. *Vitamine Rich*	Wolf's Market, Shelton	6.55	0.70	None found
50663	College Inn Food Products Co., Chicago, Ill. *College Inn Homogenized*	A. L. Beede, Bristol	5.81	0.63	None found
50651	H. J. Heinz Co., Pittsburgh, Pa. *Heinz*	Taylor's Market, Naugatuck	6.01	0.37	None found
50657	Edgar F. Hurff, Swedesboro, N. J. *Hurff*	Paul Buchli, Shelton	8.34	0.87	None found
50664	Reid-Murdock & Co., Chicago, Ill. *Monarch*	Tracy's Market, Bristol	6.88	0.77	None found
50096	Sprague-Warner & Co., Chicago, Ill. *Ferndell*	W. F. Brennan, Naugatuck	5.76	0.61	None found
50097	Vincennes Packing Co., Vincennes, Ind. *Alice of Vincennes*	First National Stores, Inc., Naugatuck	5.68	0.84	None found

27.9 per cent. They therefore conformed to the requirement of the present standard.

Seven other products were also designated as tomato paste without claim of heavy or concentrated character. These ranged from 33.33 per cent to 40.6 per cent of solids and averaged 36.0 per cent.

Six samples distinctly labelled as concentrated tomato paste ranged from 26.8 per cent to 35.2 per cent of solids and averaged 30.4 per cent. Four of these were below the present requirement of 33 per cent.

No artificial color was found except in samples where it was properly declared.

VINEGAR

Thirty-seven official samples of vinegar were examined for the Dairy and Food Commissioner and two were tested for individuals. The examination included tests for arsenic in order to determine to what extent arsenical spray residue on apples used for making cider might contaminate vinegar with arsenic.

Arsenic determinations were made on 35 samples and the amounts of arsenic found ranged from none to 0.34 parts per million, expressed as As_2O_3. The average was 0.11 p.p.m. The accepted tolerance for food products is 0.01 grain per pound which is equivalent to 1.4 p.p.m. so it is evident that the greatest amount found in any of the samples tested was only about one-fourth of the tolerated quantity. The samples were taken in towns well distributed over the state and the results are no doubt fairly typical of our vinegar supply.

Twenty-nine of the samples were found to meet the requirements of the statute in regard to acidity and were otherwise genuine in character so far as our tests could discover. Five were somewhat deficient in acid strength, due in two cases to incomplete acidification. Three were not genuine cider vinegar. One of these, 50981, purchased of F. Amicone, Torrington, contained 56 p.p.m. of copper. No. 50968 contained more than 5 per cent of total solids, was high in reducing sugars, and contained added dextrorotatory material. No. 50969 had a Hortvet number of practically zero, was low in soluble and total phosphoric acid, and contained 37 per cent of iron in the ash.

Vinegar, when designated without qualification as to its source, is understood to mean cider vinegar and is the article produced by alcoholic and subsequent acetous fermentations of apple juice. Vinegar has been frequently adulterated in the past and is still not free from such practice. Excessive dilution with water, substitution wholly or in part with colored distilled vinegar, and other more ingenious devices, some of them difficult of detection, are the forms of sophistication most frequently met with. Commenting on this subject our report for 1914 states that vinegar inspections in this State up to that time had shown only about 60 per cent of the samples examined to be genuine and to meet the required standards. Surveys made since then have shown some improvement. Of about 500 samples examined since 1920, 80 per cent have met the standard and have otherwise appeared to be true cider vinegar.

DRUGS

Although foods have been subject to official inspection and analysis in this State since 1895 it was not until 1907 that the statute was broadened to include a similar control over drugs. The provisions of the statutes are designed to prevent adulteration and misbranding. Essentially, adulteration of drugs consists in marketing a drug recognized in the United States Pharmacopoeia or National Formulary if it shall fail to meet the standards and specifications as laid down in those texts; but if a drug not meeting such standards is plainly labelled to show wherein it differs from the official article it is not deemed to be adulterated. This is the provision that legalizes sub-standard drugs. A drug is also adulterated if it differs from or fails to meet the professed standard under which it is sold.

A drug is misbranded if it fails to declare on the label the quantity or proportion of alcohol, morphine, opium, cocaine, heroin, alpha or beta eucaine, chloroform, cannabis indica, chloral hydrate or acetanilid, or of any derivative of these substances that are contained in it. There are several exceptions to this requirement. Another important misbranding provision is the one that forbids statements, designs, or devices regarding therapeutic effects of drugs, when such representations are false.

The first report on drugs issued by the Station was in 1908, when it appears that about 400 samples, representing six different drugs, were examined and only about 40 per cent were found to meet the requirements of the respective standards and specifications.

In the first five years of drug inspection work nearly 1300 samples were drawn and analyzed of which only about one-half (52 per cent), were passed as being in substantial conformity to standards and other requirements.

Without reviewing the intervening years in detail it is of interest to note that in 1931 the inspection included 250 samples, representing 29 different drugs, and 77 per cent were passed. In the five year period ending with 1931, 850 samples were examined and 72 per cent were passed.

These data indicate that there is still much to be desired in the quality and strength of drugs as now dispensed, but the same data indicate also a notable improvement since the beginning of drug control. The difference between 40 per cent of samples found to

be of standard quality in the first year of inspection and nearly 80 per cent found satisfactory in the latest survey is striking.

It is pertinent to remark that one cause for the improvement in drug quality is the fact that pharmacists dispense fewer drug preparations of their own make than they did 25 years ago. The fact that better facilities for compounding and standardizing drugs that are found in the laboratories of large pharmaceutical houses has induced retail druggists to dispense the products of such specialists rather than products of their own manufacture.

It should also be observed that the rather low percentages of samples found to meet standard requirements is in part due to the fact that in some years emphasis has been laid in inspection work upon those preparations that are likely to deteriorate more or less rapidly. This is an explanation rather than an excuse. The pharmacist should take extra precautions with such products. Spirit of nitrous ether, for example, has shown a rather low percentage of samples that can be regarded as satisfactory even in recent inspections. But this product can be kept for long periods of time if the plain instructions of the Pharmacopoeia are followed.

AROMATIC SPIRITS OF AMMONIA

One sample of aromatic spirits of ammonia was tested and found to meet the standard. It contained 1.87 gms. of ammonia in each 100 cc and the alcoholic strength was 64.1 per cent by volume.

ACETYLSALICYLIC ACID (ASPIRIN)

Acid derivatives of salicylic acid used in medicine are chiefly acetylsalicylic acid (aspirin), and methylene-citrylsalicylic acid (novaspirin). In comment upon them and their uses we quote from New and Non-Official Remedies as follows:

"These are employed in rheumatic conditions, and especially as analgesics and antipyretics in colds, neuralgias, etc. Their analgesic effects surpass those of sodium salicylate, with less danger of local irritation. The promiscuous use of acetylsalicylic acid (aspirin) by the laity, especially for the relief of headache, has frequently led to cases of rather severe poisoning, the chief symptoms being edema of the lips, tongue, eyelids, nose or of the entire face; also urticarial rashes, vertigo, nausea and sometimes cyanosis. Some persons are especially susceptible to acetylsalicylic acid and these symptoms are usually ascribed to an idiosyncrasy."

Acetylsalicylic acid is usually dispensed in the form of 5 grain tablets.

Forty-four samples were examined for the Dairy and Food Commissioner and the results are given in Table 17. All of the samples contained substantially five grains of acetylsalicylic acid as declared, but some of them contained free salicylic acid in excess of the very small amount allowed by the specifications given in the Pharmacopoeia. The official limit for free salicylic acid in acetyl-

TABLE 17. ANALYSES OF ASPIRIN TABLETS

No.	Manufacturer or distributor	Dealer	Average weight per tablet, grains	Acetylsalicylic acid		Free salicylic acid, grains per tablet
				Per-centage	Grains per tablet	
51727	American Medical Products Co., Inc.	Merken Pharmacy, Hartford	5.51	85.08	4.69	0.02
52498	American Medical Products Co., Inc.	Hartford Drug Co., Inc., Hartford	5.65	87.54	4.95	0.03
52493	American Pharmacal Co.	A. W. Ackerman, Durham	5.62	87.50	4.92	0.01
51742	Aspirin Co. of America	Wershous Drug Store, Inc., Norwalk	5.43	88.23	4.79	none
51714	Aspirin Products Co.	The Arrow Drug Co., Hartford	5.52	87.40	4.82	trace
51676	The Bayer Co., Inc.	H. F. Bassett, New Milford	6.20	80.69	5.00	none
52654	Brewer & Co., Inc.	E. W. Pigeon, Broad Brook	5.51	84.42	4.65	none
51724	Certified Aspirin Co.	L. W. Leib, Hartford	5.74	87.86	5.04	none
52663	Certified Aspirin Co.	Geo. Byington, Plainville	5.70	84.67	4.82	0.01
51723	The Dill Co.	Corner Soda Shop, East Hartford	5.80	90.94	5.27	0.02
52499	The Dill Co.	Corner Soda Shop, East Hartford	5.78	90.55	5.24	0.02
52668	Feldman-Martin, Inc.	Middlesex Drug Co., Higganum	5.57	87.50	4.87	none
51730	Hance Bros. & White	Salisbury Pharmacy, Salisbury	5.95	81.72	4.86	0.03
52176	Hance Bros. & White	The Crowell Pharmacy, New London	6.05	79.87	4.83	trace
52653	Hance Bros. & White	The Simpson-Cohn-Boesch Co., Hartford	6.03	82.00	4.94	trace
52662	Hance Bros. & White	Pelchar's Pharmacy, Terryville	6.14	79.91	4.91	0.03
52174	The Heneph Co., Inc.	Skilton's Cash Store, Morris	5.69	84.88	4.83	0.02
52677	The Heneph Co., Inc.	Skilton's Cash Store, Morris	5.68	86.43	4.91	0.02
52664	Higgin's Pharmacy	Higgin's Pharmacy, Pawcatuck	5.95	85.98	5.12	trace
51718	Eli Lilly & Co.	Webb & Seigel, Torrington	6.27	81.80	5.13	0.02
52669	Eli Lilly & Co.	The Sisson Drug Co., Hartford	6.19	78.49	4.86	none
51678	McKesson & Robbins, Inc.	H. F. Bassett, New Milford	6.42	80.00	5.14	none
51685	The Norwich Pharmacy Co.	Mahoney's Corner Drug Store, Shelton	5.44	88.06	4.79	none
51731	The Norwich Pharmacy Co.	F. C. Bunnell, Winsted	5.39	90.68	4.89	none
51681	Nyal Co.	Park Pharmacy, New Milford	4.94	83.99	4.94	none
51886	The Penslar Co.	Park Pharmacy, Torrington	5.93	82.20	4.88	none
51725	Premo Pharmacal Laboratories	Arsenal Pharmacy, Hartford	5.55	87.03	4.83	none

TABLE 17. ANALYSES OF ASPIRIN TABLETS—*Concluded*

No.	Manufacturer or distributor	Dealer	Average weight per tablet, grains	Acetylsalicylic acid		Free salicylic acid, grains per tablet
				Percentage	Grains per tablet	
51864	Qualitest Laboratories	R. E. Dower, Pawcatuck	6.07	83.84	5.09	none
52159	Royal Manufacturing Co	Pelton's Pharmacy, Middletown	5.67	84.54	4.79	0.02
52673	Royal Manufacturing Co	Pelton's Pharmacy, Middletown	5.71	87.41	4.99	0.02
52941	Dr. Saur's Aspirin Co	Ed. Elkin, Cobalt	5.61	85.99	4.82	0.02
51677	Schieffelin & Co	H. F. Bassett, New Milford	5.49	85.92	4.72	trace
52151	Service Drug Sundry Co	Zim's Restaurant, Riverside	6.04	83.04	5.02	trace
51682	Squibb & Sons	Park Pharmacy, New Milford	5.39	90.36	4.87	none
51716	Stearn's	Peter Glassman, Hartford	5.90	87.76	5.18	trace
51728	Stearn's	Scharr Pharmacy, Hartford	5.90	88.17	5.20	0.02
52497	Stearn's	Scharr Pharmacy, Hartford	5.83	86.37	5.05	0.02
52492	Superba Co	J. B. Harrington, Granby	5.73	89.14	5.11	0.02
51863	Tru-Lax Products Co	Brown & Stone, No. Stonington	5.97	83.66	5.00	0.02
52907	Tru-Lax Manufacturing Co	A. L. Lewis, Riverton	5.94	83.89	4.98	0.05
51679	United Drug Co	H. F. Bassett, New Milford	5.82	79.54	4.63	trace
51688	Upjohn's	Blume's Pharmacy, Derby	5.68	84.89	4.82	none
51695	Whelan Laboratories	Whelan Drug Co., Bridgeport	5.95	81.07	4.82	none
51719	Wyeth's	Opperman's Drug Store, Torrington	5.62	91.38	5.14	none

salicylic acid is 0.1 per cent, which on the basis of a 5 grain tablet is 0.005 grains. Nineteen samples exceeded this tolerance.

SPIRIT OF NITROUS ETHER

One sample was examined and the standard of 4.0 per cent of ethylnitrite fully met. It was purchased at F. F. Douden's, Guilford.

SOLUTIONS OF SILVER-PROTEIN

Silver compounds are used in medicine to produce caustic, astringent, and germicidal effects. For caustic and astringent effects silver nitrate is preferred. When antiseptic action without attending irritation and astringency is desired, colloidal silver preparations are used.

Commercial preparations usually are made by dissolving reduced silver or silver oxide or some silver-proteinate in an excess of denatured protein and drying in vacuo. These products when dissolved in water produce colloidal solutions consisting of indefinite mixtures of silver, silver oxide, and silver-protein complexes in which silver does not exist to any great extent as free ions.

There are several types of silver-protein preparations of which the best known are the two recognized in the Pharmacopoeia, viz., the strong and the mild. Silver protein, strong, contains the lowest percentage of silver (7.5 to 8.5 per cent), but has the strongest germicidal action. Mild silver protein contains 19 to 25 per cent of silver.

Thirty-six samples were submitted by the Dairy and Food Commissioner. Eleven of these were of the strong type and twenty-five were mild. Strong silver-protein is usually dispensed in 2 per cent solutions and the mild type in 10 per cent solutions.

Analyses are given in Table 18.

The antiseptic efficiency of silver compounds is regarded as proportional to ionic silver and may be judged by comparative restraining effects on gas-formation by yeast according to the technique described in the Pharmacopoeia. Thus strong silver protein inhibits gas formation almost completely while mild preparations permit copious production of gas.

Among the samples of strong silver-protein solution, No. 51726 was deficient in solids and the actual silver content was also markedly deficient. The second sample, 52496, from the same source was substantially of the required silver content but it did not meet the U.S.P. yeast test; it behaved like mild silver-protein rather than the stronger preparation. Two other samples, 52672 and 52160, while they contained the required amount of silver, failed to meet the yeast test. Sample 52946 was the powdered material

TABLE 18. ANALYSES OF SILVER-PROTEIN PREPARATIONS

No.	Dispensed by	Solids	Silver in solids	Ash	Nitrogen	Silver	Nitrogen / silver	U.S.P. yeast test
		%	%	%	%	%		
	Strong type, 2% solution							
51726	Arsenal Pharmacy, Hartford	1.05	8.14	0.126	0.143	0.085	1.68	Passed
52496	Arsenal Pharmacy, Hartford	1.79	8.27	0.316	0.262	0.148	1.77	Not passed
51715	Temkin Drug Co., Hartford	1.88	8.08	0.224	0.256	0.152	1.68	Passed
51717	Peter Glassman, Hartford	1.92	8.20	0.229	0.266	0.158	1.68	Passed
52162	Liggett's Drug Store, Middletown	1.81	8.03	0.212	0.247	0.145	1.70	Passed
52672	Woodward's Drug Store, Middletown	1.76	8.52	0.321	0.256	0.150	1.71	Not passed
52160	Woodward's Drug Store, Middletown	1.94	8.65	0.353	0.279	0.168	1.66	Not passed
51893	Leary's Drug Store, Naugatuck	2.14	8.37	0.265	0.290	0.179	1.62	Passed
52177	Starr Bros., Inc., New London	1.93	7.87	0.262	0.267	0.152	1.76	Passed
51741	Wm. H. Jones Drug Store, Stamford	1.79	8.44	0.223	0.242	0.151	1.60	Passed
	Strong type, powder							
52946	Woodward's Drug Store, Middletown	.....	8.70	.....	.....	.....	1.67	Not passed
	Mild type, 10% solution							
51851	Branford Pharmacy, Branford	10.91	20.1	3.92	0.96	2.19	0.44	Passed
51850	Spaulding Co., Branford	12.19	20.6	4.43	1.09	2.52	0.43	Passed
52495	Spaulding Co., Branford	10.02	20.7	3.62	0.89	2.07	0.43	Passed
51689	Harding Drug Store, Derby	9.22	19.7	2.64	1.19	1.82	0.65	Passed
51722	Hartford Drug Co., East Hartford	9.88	19.9	2.86	1.22	1.97	0.62	Passed
51745	E. Norwalk Drug Store, East Norwalk	9.76	20.5	3.52	0.89	2.00	0.44	Passed
51746	Randall's Pharmacy, Fairfield	7.33	19.2	2.49	0.84	1.41	0.59	Passed
52655	Randall's Pharmacy, Fairfield	8.46	19.9	2.98	1.00	1.68	0.59	Passed
52161	Hartman Drug Co., Middletown	9.85	19.9	2.82	1.20	1.96	0.61	Passed
52158	Pelton's Pharmacy, Middletown	9.41	19.5	2.89	1.10	1.84	0.60	Passed
51865	Knox Drug Store, Mystic	9.43	19.9	2.72	0.91	1.88	0.49	Passed

TABLE 18. ANALYSES OF SILVER-PROTEIN PREPARATIONS—*Concluded*

No.	Dispensed by	Solids	Silver in solids	Ash	Nitrogen	Silver	Nitrogen / silver	U.S.P. yeast test
		%	%	%	%	%		
51894	Adams Pharmacy, Naugatuck	9.31	19.9	2.81	1.13	1.85	0.61	Passed
51895	Naugatuck Drug Co., Naugatuck	9.15	19.9	2.77	1.12	1.82	0.62	Passed
52175	James Drug Store, New London	6.50	19.0	1.77	0.80	1.23	0.65	Not passed
52666	James Drug Store, New London	9.25	18.9	2.67	1.14	1.75	0.65	Passed
51680	Park Pharmacy, New Milford	10.10	20.5	3.02	1.29	2.07	0.62	Passed
51868	Niantic Pharmacy, Niantic	9.35	20.5	3.36	0.89	1.92	0.46	Passed
51687	E. J. Bardin, Shelton	9.19	19.3	2.50	1.17	1.77	0.66	Passed
51740	Ferguson's Pharmacy, Stamford	10.23	18.7	2.90	1.12	1.92	0.58	Passed
52152	Hamilton Pharmacy, Stratford	8.64	20.8	2.67	1.03	1.80	0.57	Passed
52652	Hamilton Pharmacy, Stratford	8.81	20.4	2.76	1.08	1.79	0.60	Passed
51885	Park Pharmacy, Torrington	9.10	20.0	2.80	1.09	1.82	0.60	Passed
52178	Bay State Drug Co., Willimantic	10.00	21.2	3.57	0.90	2.12	0.42	Passed
52179	Curran & Flynn, Willimantic	9.69	21.4	2.87	1.23	2.07	0.59	Passed
52180	J. J. Hickey Drug Co., Willimantic	9.76	21.2	2.91	1.23	2.07	0.59	Passed

from which samples 52672 and 52160 were prepared, and it also failed to pass the yeast test, although the silver assay met the U.S.P. specifications, as did also the solutions made from it as dispensed by the druggist. We must conclude that the antiseptic properties of this product are those of the mild form of silver-protein rather than of the strong type.

Of the mild preparations none showed any notable deficiencies in silver content of solids; five samples, however, were deficient in total solids by more that 10 per cent. One was high in solids, but the silver content of the solution was not excessive.

TURPENTINE

Four samples of turpentine have been examined. Three were drawn by, or submitted to, the Station, and one was submitted by the Commissioner. All of them were found to conform substantially to the specifications for the pure article; No. 50699 was somewhat high in unpolymerized residue.

A number of official samples were examined last year.[1] By an oversight some of the analytical data, notably specific gravity and refractive index, were incompletely expressed. The tabulation is, therefore, repeated here in correct form; and the four samples examined in 1932 are included (Table 19).

MISCELLANEOUS

Each year the laboratory is called upon for examinations of miscellaneous articles of food, drugs, and other materials. These requests come from health officers or other public officers and some are from individuals. There are also frequent requests for the examination of exhibits in connection with the suspected poisoning of domestic animals.

During the past year ninety-five samples of foods and drugs and thirty-three of animal tissues or stomach contents have been submitted. These cannot be discussed in detail in each case. The work in some instances requires considerable time, particularly the investigation of animal poisoning. Many times laboratory results fail to give satisfactory explanations of causes, but the experience of several years past leads us to believe that quite frequently poisonous plants upon which animals have browsed in pastures are responsible. Deadly nightshade, sheep laurel and water hemlock are not uncommon in this region and all are poisonous plants. Mr. Shepard investigated an interesting case that had the following history.

Several animals died and lead arsenate was suspected to be the cause because spraying operations had been carried on upon foliage to which the animals might have had access. Examination of the

[1] Conn. Exp. Station Bull. 341, p. 734. 1931.

TABLE 19. ANALYSES OF TURPENTINE

No.	Dealer	Place of sampling	Specific gravity at 15.5° C	Refractive index at 20° C	Unpolymerized residue per cent by volume	Initial B. P. at °C	Distilling below 170° C per cent
	1931						
49708	Atwell Bros.	Durham	0.889	1.474	1.9	146	82.5
49731	Butler's Hardware Store	Guilford	0.876	1.472	1.2	153	92.6
49711	City Hardware Co.	Bristol	0.877	1.473	1.4	148	93.0
49712	City Hardware Co.	Middletown	0.874	1.471	1.8	154	96.5
49734	The Darrow & Comstock Co.	New London	0.871	1.472	1.7	154	97.1
49732	H. S. Davis	Guilford	0.874	1.472	1.2	155	94.5
49740	Dickerman Hardware & Supply Co.	Wallingford	0.871	1.472	2.0	153	96.4
49721	The Fairfield Hardware Co.	Fairfield	0.871	1.472	1.9	150	97.1
49726	Franklyn Hardware Co.	Norwich	0.871	1.472	1.6	155	98.2
49713	The Harley-Giant Co.	Willimantic	0.862	1.466	4.7	146	94.0
49709	Johnson Bros.	Northford	0.873	1.471	2.5	157	94.4
49714	The Jordan Hardware Co.	Willimantic	0.863	1.467	4.7	155	94.5
49744	The Lee & Osgood Co.	Norwich	0.872	1.471	2.0	152	95.8
49739	Lovell & Co.	Stratford	0.866	1.468	3.5	151	91.3
49735	C. H. Mather & Co.	Essex	0.869	1.470	2.2	150	95.3
49742	A. E. Meech	Danielson	0.870	1.472	1.9	155	97.5
49720	The Norwalk Hardware Co.	Norwalk	0.871	1.471	1.6	157	97.0
50669	Quality Paint Stores	New Haven	0.872	1.472	1.6	155	97.2
49736	Seymour Hardware & Supply Co.	Seymour	0.887	1.474	1.6	150	84.8
49710	E. J. Smith Hardware Co.	Collinsville	0.876	1.471	2.1	79	93.0
49737	J. J. Tomko	Shelton	0.871	1.472	1.8	154	96.2
49728	Valley Hardware Co.	Derby	0.870	1.410	1.7	152	94.2
49749	Westport Hardware Co.	Westport	0.869	1.470	2.1	152	98.5
49733	George Williams Co.	New London	0.870	1.472	1.8	155	97.6
	1932						
50699	The Hoffman Wall Paper Co.	Hartford	0.871	1.472	2.4	156	96.2
9373	The Hoffman Wall Paper Co.	Hartford	0.872	1.472	2.1	156	95.0
9405	Paper Maker's Chemical Corp.	Holyoke, Mass.	0.871	1.471	1.5	156	94.2
9209	The F. E. Spencer Co.	New Haven	0.871	1.472	2.0	156	96.7

stomach contents showed no evidence of lead or of arsenic but strychnine was present. This, however, was explained by the fact that *nux vomica* had been administered to the animals by the veterinary who treated them. Some of the tests on the alkaloidal residue obtained were suggestive of atropin. On visiting the pasture a luxuriant growth of deadly nightshade was discovered close to where one of the animals had been found and there was distinct evidence that some of the plant had been browsed off. Atropin tests were later confirmed and as atropin is a constituent of the deadly nightshade the conclusion seemed to be justified that it was the cause of death. Prior to the investigation the circumstances seemed to indicate without much question that spray material was the cause and the spraying company responsible.

Besides the materials already mentioned there were 10 samples of trade waste liquids examined for the State Water Commission; five samples of tobacco examined for individuals who wished to know the nicotine content; and seventy-two samples were analyzed for investigational purposes in collaboration with the Soils Department and the Tobacco Station.

EXAMINATION OF COMPOSITION TUMBLERS WITH REFERENCE TO POSSIBLE LIBERATION OF FORMALDEHYDE

H. J. Fisher

During the year an inquiry was referred to us as to the possibility of the liberation of formaldehyde from composition tumblers which quite recently have come into use for certain household purposes. These receptacles we understand are made from material consisting essentially of a condensation product of the formaldehyde-urea type. The samples examined were purchased in three of our local stores and apparently represented three different brands of products; the identification of the brands was not altogether complete but they represented all the brands that we could find locally at the time the samples were taken. For greater convenience of discussion the brands are referred to by the names of the stores in which they were sold.

Six tumblers of each make were purchased from three stores as follows:

No.	Store	Marked
1310	F. W. Woolworth & Co.	"Beetleware junior" on one (yellow) tumbler only; others no brand name
1311	S. S. Kresge Co.	Bonny Ware U. S. A.
1312	Edw. Malley Co.	Brand name scraped off except for one tumbler with a (B)

Sample 1313 was a ground composite of five "Woolworth" tumblers obtained from another source.

The minute amounts of formaldehyde involved in this study restricted the methods that could be used for its detection and estimation to colorimetric tests. The literature contains a great number of these. Those which we tried were the official[1] phenylhydrazine hydrochloride, phenylhydrazine hydrochloride and sodium nitroprusside, and phenylhydrazine hydrochloride and potassium ferricyanide tests, the phloroglucinol test of Collins and Hanzlik[2] and the Shrewsbury[3] test. Of these tests only the phenylhydrazine hydrochloride-potassium ferricyanide test (hereinafter referred to as the ferricyanide test) and the Shrewsbury test were found satisfactory. With the others either the colors were too fugitive or the tests were not sufficiently sensitive.

THE FERRICYANIDE TEST

The red color given by the phenylhydrazine hydrochloride-potassium ferricyanide test (Assoc. Off. Agr. Chem. Methods, p. 341, §22)[4] could be observed in a 1:1,000,000 dilution, the intensity of the color varied with the concentration of formaldehyde up to 1:2,000 formaldehyde, and the color lasted for hours, so this method was adopted as one of the two to be used in this investigation. While the test may be satisfactory as a qualitative test in the form described in the "Methods", it was found that it required greater specification in details when used for the quantitative estimation of formaldehyde. The technique finally adopted was as follows:

Reagents:

(1) A solution containing 2.5 gm/100 cc phenylhydrazine hydrochloride.

(2) A solution containing 8 gm/100 cc potassium ferricyanide.

(3) An approximately 10 per cent solution of sodium hydroxide.

Dilutions of a 1:1,000 formaldehyde solution were made to give standard solutions containing 1, 2, 3, 4, 5 and 6 parts per million of formaldehyde. Five cc of each of these standard solutions, and 5 cc of each of the solutions to be tested, were pipetted into test-tubes. To each test-tube 3 drops of reagent 1 were added, mixed, 2 drops of reagent 2 added, mixed and allowed to stand for a few seconds. Eight drops of reagent 3 were then added, mixed, and the colors which developed in the test solutions compared at once with the standards. While the red color formed lasts for hours, a turbidity soon begins to develop, and for quantitative comparisons the standard solutions should be treated with the reagents at the same time as the unknowns.

[1] Assoc. Off. Agr. Chem., Methods of Analysis, pp. 340-341. 1930.
[2] Jour. Biol. Chem., 25: 231. 1916.
[3] Analyst, 32: 5. 1907.
[4] This test was proposed by Arnold and Mentzel. Chem. Ztg., 26: 246. 1902.

THE SHREWSBURY TEST

The test given by Shrewsbury, which is really a modification of the Hehner test, was found to be sensitive to one part per million of formaldehyde, the depth of color varied with the concentration of formaldehyde, and the color was intense and extraordinarily permanent, still remaining after 48 hours' standing (with a change in shade from violet to indigo blue, however). This test was therefore adopted as one of those to be used, and most of the unknown solutions were tested both by this method and by the ferricyanide method. The technique employed was as follows.

Five cc of standard solutions containing 1 to 6 parts per million of formaldehyde were pipetted into test-tubes, as were 5 cc of the solutions to be tested. To each test-tube 5 cc of milk and 7 cc of Shrewsbury reagent were added, mixed, allowed to stand over night and the colors compared. Used in this manner the test would determine 2 parts per million in the unknowns.

Where milk was the liquid being investigated, the test was modified by preparing standards by diluting 5 cc of 1 : 1,000 formaldehyde to 500 cc with milk, and then further diluting this solution with milk to give solutions containing 1 to 6 parts per million of formaldehyde. Ten cc of each of these solutions and 10 cc of the unknowns were then mixed with 7 cc of reagent and allowed to stand. Used in this manner the test is sensitive to 1 part per million of formaldehyde.

Both with the Shrewsbury test and with the ferricyanide test, when higher concentrations of formaldehyde than 6 parts per million were encountered the solutions were diluted until the formaldehyde concentration came within this range. The results therefore are not really accurate to more than one significant figure.

The stock 1 : 1,000 formaldehyde solution used for preparing the dilute standard solutions was made by dilution of a C.P. solution of formaldehyde which had been assayed by the peroxide method.[1] The standard solutions were freshly made when needed from this stock solution, as apparently very weak solutions of formaldehyde are not stable.

INTERFERING SUBSTANCES

Benzaldehyde, acetaldehyde, citral and acetone all react completely negatively to the ferricyanide test. A brownish yellow color with no trace of red was given by a few drops of a dilute alcoholic solution of furfural. With the Shrewsbury reagent, benzaldehyde in high concentration gives an immediate grayish blue color; furfural in high concentration gives a deep chocolate brown rapidly changing to black; dilute furfural solutions give a

[1] Assoc. Off. Agr. Chem. Methods, p. 56, §130.

light grass-green color on standing over night. Acetaldehyde, citral and acetone develop no color.

Of the natural materials tested, sauerkraut juice to which formaldehyde had been added gave a normal red color (excess alkali was required to neutralize the acidity of the juice), but a colorless precipitate was likewise formed; no red color could be observed when no formaldehyde was added. By the Shrewsbury test the juice gave a pink color corresponding in intensity to about 2 parts per million of formaldehyde, but this color developed at once in its full intensity, while a standard solution of 2 parts per million of formaldehyde required three minutes for any color to appear, and only reached its maximum depth of color after several hours. A distillate from the juice gave a negative Shrewsbury test and a light orange color by the ferricyanide test.

The distillate from a sample of sweetened orange juice gave a light orange color by the ferricyanide test; the Shrewsbury test was negative. The original juice tested directly by the Shrewsbury method turned black.

What the substance present in the distillates which interferes with the ferricyanide test is is not known. Salkowski[1] found some substance present in distillates from acid solutions of sucrose and levulose which reacted like formaldehyde, and which he believed was hydroxymethyl furfural. It is sufficient to note for the purposes of this investigation that the distillate from orange juice, under the conditions here used, gives no reaction with the Shrewsbury reagent.

THE BEHAVIOR OF HEXAMETHYLENETETRAMINE TOWARD THE TESTS

The question might arise as to whether the formaldehyde, shown in this investigation to be extracted from the tumblers, were in solution as free formaldehyde or as a formaldehyde-urea compound. It is known that hexamethylenetetramine is readily broken down by acids, but is very stable towards alkali. It was thought that as this compound is analogous to the compounds of formaldehyde and urea, if it were shown that hexamethylenetetramine would react like formaldehyde to the Shrewsbury test, in which conditions are strongly acid, and not to the ferricyanide test, which is an alkaline test, this distinction could be used to offer at least some evidence as to whether the formaldehyde were free or combined in the solutions that had been in contact with the tumblers. It was in fact found that hexamethylenetetramine solutions reacted negatively to the ferricyanide test and positively to the Shrewsbury test (although with less intensity than a solution of formaldehyde of equivalent concentration). The fact that in nearly all the determinations of formaldehyde made in the solutions which had been in the tumblers the results are practically identical by both methods

[1] Biochem. Ztschr., 68: 337. 1915.

indicates that probably the formaldehyde is in the free state. In fact, in the case of one sample of water which had stood in a tumbler at 75° for 24 hours, the formaldehyde could be plainly smelled.

THE RECOVERY OF FORMALDEHYDE BY DISTILLATION

As it was necessary with some of the solutions to be employed in the investigation to resort to distillation before testing, the recovery of formaldehyde on distillation was studied. It was found that distillation of 40 cc from a total volume of 200 cc, as recommended in the "Methods" (p. 340, 17), would not give quantitative recoveries. After some experiment the following procedure, which did give quantitative recoveries even from milk and sauerkraut juice, was adopted.

Fifty cc of sample plus 30 cc of water plus a few drops of phosphoric acid were distilled into a 50 cc volumetric flask, with the end of the condenser trapped in 5 cc of water in the flask, until 40 cc of distillate were collected. The contents of the flask were then made up to volume and tested.

THE EXAMINATION OF THE TUMBLERS

All the tumblers when received were rinsed with water and wiped dry. They were then, in all cases except one, filled with 100 cc of the solution whose effect on the tumblers was to be studied, covered with watch-glasses and allowed to stand for a definite length of time at a definite temperature, after which the solutions were poured into beakers and tested for formaldehyde. The tumblers were then rinsed, wiped dry, and used again. The liquids were measured into the beakers at the temperatures at which they were to stand.

In one case the tumblers were filled with 200 cc of water instead of 100 cc and allowed to stand 24 hours at room temperature in order by comparison with the 100 cc series to establish whether the amount of formaldehyde taken up were a function of the volume of solution or of the tumbler surface exposed.

The action of water, 4 per cent acetic acid, milk and orange juice on the tumblers at various temperatures was studied. In order to see whether the evolution of formaldehyde were continuous or only due to the leaching out of some unpolymerized material, three successive 24 hour runs at room temperature with water, and two with acetic acid, were made on the same tumblers. Results are shown in detail in Tables 20 and 21.

The liquids, times and temperatures used are shown in Table 23. Figures shown in this table are mostly averages of four to twelve determinations, solutions being tested by both the ferricyanide and Shrewsbury methods. Milk was tested only by the Shrewsbury method. Determinations of formaldehyde in orange juice were

made on the distillate. In the case of the determinations in acetic acid by the ferricyanide method sufficient excess alkali was used in the test itself to neutralize the acid; neutralization previous to adding the phenylhydrazine and ferricyanide apparently destroyed the formaldehyde.

When filled brim full the tumblers held the following amounts of liquid.

No.	Contents
1310	250 cc
1311	225 cc
1312	359 cc

If filled as they would be in use, however, the Woolworth and Kresge tumblers would hold about 200 cc., and the Malley tumblers 300 cc. It is on the basis of these figures that the amount of formaldehyde in a full tumbler given in the latter part of Table 23 has been calculated.

CONCLUSIONS

The identity of formaldehyde was not established beyond the observance of positive reactions to the tests herein discussed and the detection of the characteristic odor of formaldehyde in certain instances. With this reservation it may be concluded:

(1) All liquids extract some formaldehyde from all three makes of tumblers, but more than twice as much from the Kresge tumblers as from the other two. There is variation in the amount of formaldehyde extracted not only between different makes but between different tumblers of the same make.

(2) The formaldehyde is at least partly extracted as free formaldehyde.

(3) The evolution of formaldehyde is continuous, being due to decomposition of the plastic itself and not to extraction of a soluble impurity.

(4) The amount of formaldehyde extracted is a function of the amount of tumbler surface exposed to the action of the liquid. In this connection it should be noted that the ground sample, 1313, gave up 190 parts per million of formaldehyde to 10 times its weight of water in 24 hours at room temperature.

(5) The amount of formaldehyde extracted increases with time, rise in temperature, and increasing acidity.

At temperatures as high as 75°, the increase in the amount of formaldehyde extracted is very great; the tumblers all crack however if held at this temperature for an extended period of time. (In fact, several tumblers cracked spontaneously on long standing at room temperature in the laboratory while empty).

It should be borne in mind that the length of time the various liquids remained in the tumblers in these experiments greatly exceeded the amount of time they would be in contact with the tumblers in household use. It is doubtful that any detectable amount

TABLE 20. FORMALDEHYDE EXTRACTED FROM TUMBLERS BY WATER

100 cc. Water, 24 hr. at Room Temperature. Tumblers Rinsed and Refilled after each Run.

Formaldehyde, parts per million

No.	First run			Second run			Third run			Average of all
	Ferricyanide	Shrewsbury	Ave.	Ferricyanide	Shrewsbury	Ave.	Ferricyanide	Shrewsbury	Ave.	
1310 A	2.5	3.0	2.8	3.5	2.5	3.0	3.5	3.5	3.5	3.1
1310 B	1.0	1.5	1.3	1.5	2.0	1.8	•1.5	1.5	1.5	1.5
1310 Ave.			2.1			2.4			2.5	2.3
1311 A	1.5	4.5	3.0	3.5	4.5	4.0	4.5	5.5	5.0	4.0
1311 B	8.0	>20		8.0	20	14	8.0	18	13	12
1311 Ave.			4.7			9.0			9.0	8.0
1312 A	2.0	2.0	2.0	2.0	2.5	2.3	2.5	2.5	2.5	2.3
1312 B	3.0	>10		4.0	5.5	4.8	Tumbler	cracked		4.2
1312 Ave.			2.3			3.6			2.5	3.3
Average										4.5

of formaldehyde would be taken up from a tumbler by any beverage during the short time it would remain in the tumbler in ordinary practice.

Even under the extraordinary conditions obtaining in the experiments here recorded the magnitudes of formaldehyde indicated in most cases are probably of no physiological significance. It has been found that infants and kittens fed with milk containing formaldehyde in the proportion of 50 parts per million suffered no impairment in health and well-being so far as careful observations could discover.[1]

TABLE 21. FORMALDEHYDE EXTRACTED FROM TUMBLERS BY ACETIC ACID

100 cc. 4 per cent Acetic Acid (pH = 2.26), 24 hour at Room Temperature

Formaldehyde, parts per million

No.	First run			Second run			Average
	Ferricyanide	Shrewsbury	Ave.	Ferricyanide	Shrewsbury	Ave.	
1310 E	9.0	7.5	8.3	12	10	11	9.7
1310 F	9.0	4.5	6.8	6.0	2.5	4.3	5.6
1310 Ave.			7.6			7.7	7.7
1311 E	53	38	46	70	70	70	58
1311 F	60	165	113	110	80	95	104
1311 Ave.			80			83	81
1312 E	23	<20		20	15	18	19
1312 F	30	23	27	35	25	30	29
1312 Ave.			25			24	24
Average							38

TABLE 22. COMPOSITION TUMBLER SURFACE EXPOSED TO DIFFERENT VOLUMES OF LIQUID

No.	Volume of liquid cc	Tumbler surface, sq. cm.
1310	100	90.9
	200	152.0
1311	100	94.5
	200	157.2
1312	100	92.5
	200	158.6
	300	229.0

[1] Park, W. H., Pub. Health and Hygiene, 1920 Edition, p. 348.

TABLE 23. FORMALDEHYDE EXTRACTED BY DIFFERENT LIQUIDS AT VARIOUS TEMPERATURES OVER VARIOUS PERIODS[1]

Formaldehyde	No.	Water						Orange juice pH 3.22-3.74		Milk		4% Acetic acid pH2.26
		Room temp. 24 hr., 100 cc.	Room temp. 24 hr. 200 cc	Room temp. 1 hr.	37° C. 1 hr.	75° C. 1 hr.,	75° C. 24 hr.	Room temp. 24 hr.	37° C. 1 hr.	Room temp. 24 hr.	Room temp. 1 hr.	37° C. 1 hr.	Room temp. 24 hr.
Parts per million	1310	2.3	1.8	0.0	0.8	35		1.5	1.5	0.5	0.0	0.0	7.7
	1311	8.0	5.9	1.5	3.6	77	3,000	7.2	8.8	10	0.0	2.5	81
	1312	3.3	1.8	0.0	2.7	49		2.3	2.7	1.5	0.0	0.0	24
	Ave.	4.5	3.2	0.5	2.4	54		3.7	4.3	4.0	0.0	0.8	38
Milligrams per Sq. Cm. Surface Exposed	1310	0.0025	0.0024	0.0000	0.0009	0.039		0.0017	0.0017	0.0006	0.0000	0.0000	0.0085
	1311	0.0085	0.0075	0.0016	0.0038	0.082	3.2	0.0076	0.0093	0.011	0.0000	0.0027	0.0086
	1312	0.0031	0.0023	0.0000	0.0029	0.053		0.0025	0.0029	0.0016	0.0000	0.0000	0.026
	Ave.	0.0047	0.0041	0.0005	0.0025	0.058		0.0039	0.0004	0.0043	0.0000	0.0009	0.040
Milligrams in full Tumbler	1310	0.38		0.00	0.14	5.85		0.26	0.26	0.69	0.00	0.00	1.29
	1311	1.34		0.25	0.60	12.8	502	1.19	1.46	1.67	0.00	0.42	13.5
	1312	0.71		0.00	0.66	12.1		0.57	0.66	0.37	0.00	0.00	5.95
	Ave.	0.81		0.08	0.47	10.3		0.67	0.80	0.71	0.00	0.14	6.92

[1] Individual figures are mostly averages of four to twelve determinations.

"HEALTH" CLAIMS IN FOOD ADVERTISING

One of the most conspicuous abuses in the merchandizing of foods is the character of food advertising. It is natural that food manufacturers and distributors should take full advantage of the notable advances that have been made in our knowledge of foods and of nutrition in seeking public favor for their products, and so it comes about that the results of scientific investigations setting forth new conclusions in the field of nutrition are hardly announced before they are used in the exploitation of some article of food. It is probably too much to expect that food industries should follow the plan of the careful investigator and wait until newly announced observations and conclusions have become somewhat seasoned by the test of time and the corroboration of independent studies. In business time is money; and competition is a powerful and compelling factor. So it is that the consumer is beset with a mass of advertising claims some of which are sound, others false, misleading or deceptive, either by direct statement or by implication. Doubtful or unwarranted claims often appear to be made in ignorance or disregard of the truth; in other cases they are based upon isolated and uncorroborated pieces of investigation; in still other instances there are elements of scientific facts underlying the claims but they have been stretched to ridiculous conclusions by the fancy and speculations of over-enthusiastic writers of advertising copy.

The provisions of the federal food and drugs act do not delegate authority over advertising claims or statements that appear elsewhere than on the label of food products or in literature that goes with the package to the consumer. State food laws are similarly restricted. Many states have so-called false advertising laws and often they have been used effectively to check abuses. But such state laws can only be applied within the jurisdiction of the several states.

In 1929 the American Medical Association established a Committee on Foods. At first it functioned as a sub-committee of the Council on Pharmacy and Chemistry, but it is now a separate body. To use the language of its rules, the Committee was created "for the purpose of preventing or discouraging unwarranted, incorrect or false advertising claims in the promotion of food products, and thus protecting the public and the medical profession against deception by untruthful or fraudulent 'health', nutritional or other advertising claims for foods." The formation of this Committee was an outgrowth of the work of the Council dealing with so-called medicinal foods.

It is worthy of note that the work of this Committee has been welcomed by food industries almost without exception and both manufacturers and advertising agencies have coöperated with the Committee to a remarkable degree. Many advertising programs, some of them national in scope, have been revised and brought into accord with the rules and regulations of the Committee. The

Committee does not invade the field already covered by the federal food law nor of those agencies delegated to administer it; but it works in harmony with such agencies and accepts their rulings on matters pertaining to adulteration and misbranding. The Committee's work is essentially in the field of collateral advertising that involves "health" and nutritional claims.

Food products submitted to the Committee are required to be accompanied by full information as to composition, ingredients, and methods of manufacture. Nutritional claims must be supported by adequate and acceptable evidence. The products must conform to the provisions of the federal laws and regulations pertaining to adulteration and misbranding. The Committee does not undertake to determine whether there is violation of such laws; it requires assurance or evidence from the manufacturer on this point. The Committee reserves the right to discuss with federal authorities any apparent violations of their regulations and accepts their rulings in such matters.

While the Committee is without authority to impose its rules and decisions upon manufacturers or distributors of food products, it does grant to them the right to use the seal of the Committee when all of its requirements have been complied with. The significance of this seal is, as set forth in the rules, not a guarantee or recommendation of the accepted product; it signifies that the food product, its label and all published or displayed advertising relating thereto have been considered by the Committee and no conflict with its rules discovered. Acceptances may be withdrawn if evidence is found that the spirit and intent of the rules have been violated.

In the course of this work many interesting and difficult questions arise. As these have been decided from time to time the conclusions have been adopted by the Committee in the form of general decisions for the guidance of committee members and for the reference of food manufacturers and of others interested.

The pronouncements will be of interest to consumers in this State and they are quoted here.

GENERAL DECISIONS OF THE COMMITTEE ON FOODS, AMERICAN MEDICAL ASSOCIATION

Ideal label. The container label of foods should conspicuously present such information as will properly inform the public of the true nature and quantity

of the food within the package. The public deserves to know the ingredients of the foods it purchases. There are no sound arguments justifying secrecy on the composition of foods. Label identification of foods is a most cogent influence for prevention of incorrect, deceptive or fraudulent advertising apart from the package container. A properly informative label lays the basis for good sound advertising, the only kind of advertising the public or the food industry can permit in its own interest.

Accepted foods among other things are intended to serve as examples of foods properly labeled in the interest of the public and of the food industry as a whole. As such examples they militate for the adoption of properly labeled foods throughout the food field and of good equitable advertising and competitive practices.

An illustrative diagram of an ideal food label is presented for the guidance of food manufacturers and represents the type of label the public expects in its own welfare:

Common Name of Food
*(Statement of added minor ingredients)

Example:

RICE FLAKES
*(Flavored with sugar, malt and salt)

—*or*—

Fanciful Trade Name
*(Descriptive statement identifying ingredients)

Example:

BLANCO
*(Sugar, dried fruit, eggs and milk)

Additional Information of a Special Character

Net Contents

Name of Manufacturer, Packer, or Distributor

Good advertising. Food advertising must be considered from the points of view of both the public and the food merchandiser. Sound advertising effectively serves the interests of both. The continued welfare of the food industry rests largely on the dedication of its advertising activities to the good of the public. It is essential therefore to define proper food advertising.

Proper food advertising should use the common name of the food concerned, or in the case of a fanciful trade name should identify the ingredients in the order of their decreasing proportions in the product. Such practice prevents deception. Any statement of the physical, chemical, nutritional or physiologic properties and values of the food should be truthful and expressed in simple common terms. Proper advertising is free from false implications. It does not create incorrect or improper inferences or comparisons between foods. It attempts to promote sales solely on the merits of the food article itself.

Good food advertising harmonizes with established authoritative knowledge popularly expressed. Meritorious foods require no exaggerated, false, misleading claims. The inferior food with alleged fictitious values requires gross superlatives and exaggerations, and flamboyant, vague and mysterious claims. Good advertising discusses nutritional values but avoids specific health claims; it recognizes that health depends on the diet as a whole and on many factors other than foods and not on any one food brand nor any one type of food.

Claims with scientific or technical significance. Statements or claims in food advertising with technical, scientific, nutritional, physiologic or "health" significance shall be carefully phrased so as to be in complete accord with

*Note: Ingredients arranged in order of decreasing proportions.

established knowledge and authoritative opinion, and shall be free from misleading or incorrect popular implications or interpretations.

Superlative and comparative claims. Objection will not be made to superlative and comparative claims without specific scientific or technical significance and which are overtly recognizable as without definite meaning provided they are not deceptive or misleading. Statements expressing or inferring exactness of comparison which is not scientifically or technically warranted or in accord with fact are not permissible.

"One of the best" instead of *"the best"; "an ideal"* instead of *"the ideal"; "one of the richest"* instead of *"the richest";* and similar forms of expression exemplify possible acceptable claims in instances in which the specific superlative statement is not permissible.

Testimonials. Testimonials of a "health," medicinal or therapeutic character, or with such implication, in food advertising by persons unqualified to express a scientific authoritative opinion or judgment on the subject of the testimonial are misleading or deceptive and are not permissible. Testimonials accompanied by the writer's name and used with his permission will be considered as to their acceptability in individual instances.

Analytic statements. Analytic statements on labels and in advertising shall be expressed in such terms as will enable correct technical and popular interpretation and be properly and truthfully informative. Listed analytic components shall be named in conformity with the methods used in their determination and preferably those of the Book of Methods of the Association of Official Agricultural Chemists. The percentage values should be expressed in figures with significance only. Proximate analytic statements for foods expressed to the units or the first decimal place only are in keeping with good analytic practice; in many instances the first decimal place is the limit of significance, in others the units place only is of practical significance; percentage figures for the mineral elements, however, may extend to the second or third decimal place and in special cases even further.

Analytic statements in advertising shall be simply and correctly informative and shall neither directly nor by connotation confuse or mislead those not specially informed in technical or scientific knowledge.

Feeding formulas for infants. The feeding of the baby during the first year is of fundamental importance to its health. Wrong feeding may even be fatally disastrous. For this reason every infant, the breast fed and doubly so the artificially fed, should be under the supervision of a physician experienced and skilled in the care and feeding of infants.

The feeding of an infant by routine feeding formulas and instructions distributed by food manufacturers, or according to directions, printed material, or advice of any person other than the attending physician who can personally observe the condition of the baby, may seriously endanger the health of the infant.

The promulgation of feeding formulas in advertising to the laity is considered to be in conflict with the best experience, authoritative judgment, and basic principles in infant feeding and is not permissible. No objection is taken to published directions for the preparation of mixtures for use in infant feeding.

Academic titles "Doctor" and "M.D." Names of foods including the academic titles "Doctor" or "M.D." accompanied or unaccompanied by the name of a person lend themselves to misleading or deceptive advertising of a medicinal, quasimedicinal or therapeutic character and are not permissible. No objection will be taken to such names for products that have been on the market at least ten years before the institution of this rule (April 15, 1932).

Misleading vague claims. Vague claims of recommendation, approval or use by physician, health or medical authorities, nurses, dietitians, hospitals

and sanatoriums for specific foods and statements of similar import in food advertising are misinformative and convey misleading implications of unique nutritional or therapeutic values, or that these professions or institutions as bodies have specially investigated and passed scientific or professional judgment upon the particular products, which is not true to fact. Proper and correct explicit statements of special uses for or values of individual foods, or statements based on special studies by recognized authorities are permissible.

Use of the term "adequate." The term "adequate" in connection with vitamin, mineral or other nutritional claims in food advertising shall be used with its correct scientific significance. The term is permissible only in connection with definite and stated quantities of food containing the adequate quantity and then only when the claim for adequacy is supported by established knowledge.

"Sleep inducing" claims. "Sleep inducing" claims are not permissible for specific food beverages because of their misleading character implying the possession of unique "sleep inducing" properties by the specific individual foods and because they lead to grossly deceptive advertising practices. No objection is taken to statements averring the relaxation value of hot drinks at bedtime for inducing sleep and accompanied by recommendation for the particular food drink for this purpose.

"Health food" claims. The term "health food" and equivalent claims or statements to the effect that a food gives or assures "health" are vague, meaningless and misleading and are not permissible in food advertising. Statements of well established nutritional or physiologic values of foods are permissible.

Constipation statements. Foods with cellulose roughage not lost in digestion increase the bulk of the intestinal contents, favor its onward movement, and tend to prevent stagnation or dietary constipation due solely to insufficient roughage. Regularity of habit and ample roughage are prime requisites to the proper functioning of the colon. The relative laxative values of foods not containing non-cellulose substances with a specific laxative effect (as prunes or figs) may be roughly estimated from their crude fiber contents.

Constipation may be due to causes other than those of dietary or roughage origin. Advertising to the laity shall refer to constipation due to insufficient roughage or food essentials only. This is considered an important requirement in the interest of the health of the people. Cases of constipation not yielding to the regular ingestion of foods providing considerable roughage should be under the care of a competent physician. A permissible claim for a roughage food follows:

> Constipation due to insufficient roughage in the diet should yield to . . . eaten regularly. A competent physician should be consulted for cases not corrected in this simple manner.

Wheat bran has laxative value due predominantly to the fiber content and not to phytin or other constituents. Whole grain cereals, and vegetables and fruits in general are excellent sources of roughage. Bran itself may be irritating to sensitive bowels; the indigestible cellulose of vegetables and fruits is much less irritating.

Vague mineral claims. Vague or nonspecific "mineral" claims or statements in food advertising may, either directly or indirectly, signify or imply the presence of all the nutritionally valuable mineral elements in physiologically significant quantities in the advertised foods. Such vague statements are not properly informative, are misleading and deceptive and promote bad advertising practices. Advertising should correctly, properly and explicitly instruct the public. "Mineral" claims should stipulate the individual element or elements intended for attention. Elements not present in nutritionally sig-

nificant amounts in a food and in the quantity of the food likely to be consumed in the diet do not warrant mention. "Mineral" claims should name those elements only which are contributed in substantial physiologic amounts by the respective foods in the quantities ordinarily consumed in the diet.

Vitamin claims. Indefinite or general vitamin claims are vague, noninformative and misleading and do not permit a distinction between foods as sources of the respective vitamins. Vitamin claims shall stipulate the specific vitamin or vitamins present. Vitamins present in a food in insufficient quantity to contribute in any significant manner to the respective vitamins value of the diet do not warrant mention. It is desirable that warranted vitamin claims be expressed in appropriate terms indicative of the relative potency of the food as a source of the vitamins in the dietary schedule. Foods may be considered relatively as fair, good and excellent or rich sources of vitamins.

Relative distribution of the vitamins in the various foods is presented in tables by Sherman (Chemistry of Food and Nutrition, 4th edition, 1932) and by a committee appointed jointly by the Lister Institute and the Medical Research Council of England (Vitamins: A Survey of Present Knowledge, 1932). These tables should serve as a guide for comparative vitamin claims for foods in advertising.

Terms "balanced" or "scientifically balanced." The terms "balanced" and "scientifically balanced" as applied to individual foods or to their carbohydrate, protein, fat, vitamin and mineral content are vague in meaning, are usually unsupported by fact, and are misleading by implying that the respective nutritional elements are naturally or purposefully proportioned one to another to provide special or unique nutritional values which adapt the foods to specific uses. Claims that individual foods are superior because of assumed "balanced" composition are misleading for the reason that no one food is expected to be taken alone or to compose the complete diet and, when admixed with other foods, any assumed or actual "balance" is destroyed in unknown ways.

Presumably the term "balanced" as used in advertising for any one food is intended to signify either that it is a complete diet containing ideal proportions of proteins, minerals, vitamins, fats and carbohydrates for optimum nutrition or that two or more of its food essentials content are ideally proportioned to meet optimum nutritional needs. The intended significance, whatever it may be, should be explicitly stated; however, such statements shall be used only if correct for the food as used in the diet. The term "balanced" shall be used only in properly informative statements where its meaning is plainly evident and free of misleading implications.

Questionnaire advertising. Questionnaires addressed to physicians, to members of other professional groups, or to nonprofessional individuals by food manufacturers or their agents, in most instances, do not elicit information of scientific consequence or significance. Questionnaires are of scientific value only when motivated by a sincere desire for truth or unbiased expert opinion rather than by self-centered interests or personal gain and the persons participating are carefully selected and represent those who are scientifically and otherwise qualified to express an unbiased thoroughly scientific opinion in keeping with established knowledge. In all cases, replies to questionnaires will be perfunctory and of little significance unless the replies are from persons whose critique and judgment are entitled to respect.

The use of questionnaires for obtaining information and data from the profession or the public for advertising purposes is to be discouraged. Such information and data are given undue and unwarranted importance and significance by the public, are misunderstood as to their real value and worth, and therefore are misinformative and misleading.

Mastication not an aid to "health" of teeth. Claims that the mastication of specific foods "keeps the teeth and gums clean and healthy" and equivalent

statements are meaningless, misleading and deceptive by implication and are not permissible.

Terms "sterile," "sterilized" and "sterilization." The terms "sterile," "sterilized" and "sterilization" shall be used in food advertising in their correct scientific significance only. Foods processed to be free of pathogenic organisms or to keep sound and wholesome are not necessarily sterile, i. e., free from viable micro-organisms.

Tonic claims. The term "tonic" or its inflected forms have vague and misleading meanings or implications in food advertising and are not permissible.

Chocolate and cocoa products. Special recommendations for children are not permissible for foods consisting largely of chocolate or cocoa which contain considerable quantities of theobromine and caffeine; no objection will be taken, however, to such recommendations in the case of foods that are merely flavored with chocolate or cocoa and which, in quantities likely to be consumed, are free from any probable effects due to theobromine or caffeine, provided the recommendations are permissible for the basic foods themselves.

Gelatin and digestibility of milk. There is no satisfactory evidence that gelatin increases the digestibility of milk or milk products. Such claims are not permissible.

"Diabetic foods." There is authoritative evidence that commercially prepared special "diabetic foods" are of limited usefulness to the diabetic patient and that the availability of insulin makes them no longer necessary. Artificial substitutes for ordinary foods are not to be favored; it is much better for the diabetic patient to learn how to plan his diet with foods in common use and readily available. The diet should be exactly prescribed in carbohydrate, protein and fat and total calories.

The designation of a food as a "diabetic food" merely because it is low in carbohydrates is now unwarranted and misleading and gives the erroneous impression either that the food taken in unrestricted quantities in diabetes is harmless or that it has remedial action. Except for the necessity of restricting foods to avoid overstepping the food tolerance, there are no special diabetic nutritional requirements. The exploitation of starch-free or low carbohydrate foods containing an excess of protein for use by diabetic patients is unwarranted. Protein may be tolerated almost as poorly, if not quite as poorly, as starch in diabetes.

Lay advertising for these special foods shall not include disease names such as diabetes nor directly or indirectly indicate that the foods are curative or increase the ability of the body to utilize sugar, or give the impression of harmlessness when eaten in unrestriced amounts by diabetic patients. Foods marketed for the sick with diabetes shall not be advertised to the public except under the restrictions just stated; advertising of a medicinal or therapeutic character shall be limited to medical periodicals or material for physicians exclusively. The package label shall conform to the preceding requirements but may bear statements that the food is suitable for incorporation in diets indicated for moderate restriction of carbohydrates. Recipes on the label or in the advertising shall prescribe the quantities of each ingredient by weight and state the approximate protein, fat and carbohydrate content of the finished product.

Iodized salt. Iodine is an essential chemical element for normal nutrition. Food and drink may inadequately supply this element and consequently an iodine deficiency disease—simple goiter—may develop. The prevention of goiter is conceived to be largely a nutritional problem depending upon the regular addition of a definite small quantity of an iodine compound, or an adequate quantity of an iodine rich food, to the diet inadequate in this element. A favorable practical method for dispensing the necessary additional food iodine to the public to supplement that naturally present in foods and drink

is the fortification of table salt with a definite quantity of a suitable iodine compound.

Although supplemental iodine supplied through salt or other special foods may prevent goiter that would otherwise occur or cure incipient cases, the simple administration of iodine in this manner is not a "cure all." The prevention of goiter is a matter of normal nutrition; the cure of goiter is a medical problem. All goiter cases should be under efficient medical supervision.

An "accepted" iodized salt shall contain one part sodium or potassium iodide per 5,000 parts salt (approximately 160 parts iodine per million parts salt), or the iodine equivalent of any other suitable iodine compound. Iodized salt containing more than this quantity is considered a medicament not to be advertised to the public for table and cooking uses.

Vitamin and mineral content of sieved fruits or vegetables. Sieved fruits or vegetables prepared for the feeding of infants and children or for other special diets shall retain in highest degree possible with the most efficient available manufacturing methods the vitamin and mineral content of the raw fruits or vegetables; products with materially reduced vitamin or mineral content shall bear appropriate and prominent declaration to that effect.

Vitamin and mineral content of dried vegetables. To be acceptable, dried vegetables, either powdered or in other form, shall retain in highest degree possible with effective manufacturing methods the vitamin and mineral content of the raw vegetables. Products with materially reduced vitamin or mineral content may be accepted provided they are accompanied by labels and advertising prominently and appropriately declaring the vitamin or mineral content with respect to that of the natural vegetable used.

Vitamin content of tomato juice. Tomato juice shall retain in highest degree possible with the most efficient available manufacturing methods the vitamin content of the raw juice; products with materially reduced vitamin content shall bear appropriate and prominent declaration to that effect.

Vitamin content of prepared fruit juices. Fruit juices, whether liquid, frozen or dried, shall be prepared and packed in such a manner as to preserve in the highest degree possible with the most efficient available commercial methods their natural vitamin values; products with materially reduced vitamin content shall bear appropriate and prominent declaration to that effect.

Vitamin fortification. Tentatively no objection is taken to the reasonable fortification of food products, whether intended for special diets, convalescents or general use, with vitamin concentrates or with natural foods rich in vitamins; provided that, should future authentic information disclose evidence of danger from excess of any specific vitamin in the diet or that fortification of common foods with certain specific vitamins is not entirely in the interest of public health, then objection will be taken to such fortification without prejudice to the present decision.

Whole wheat. The terms whole wheat, entire wheat and graham as applied to flour and to bread are synonymous. In harmony with this understanding, these terms shall be used as food names or as parts of food names only when the sole cereal and farinaceous ingredient is whole wheat. Their use as names for foods with other composition is misinformative and misleading. Descriptive food names shall correctly and properly identify the nature of the foods.

Added salt or sugar in sieved vegetables or fruits. Added salt or sugar in sieved vegetables or fruits intended for infant or invalid feeding or for special diets shall be given appropriate and prominent declaration. This information may be of importance to physicians prescribing their use.

Sulphur dioxide in infant foods. Small quantities of sulphur dioxide are permissible in fruit products specially prepared for infants or children, provided the quantity does not exceed that compatible with good manufacturing practice in the preparation of the dried fruit used.

BABCOCK GLASSWARE

The following table summarizes the Babcock test bottles, pipettes, thermometers and lactometers tested during the year. This Station is not required to check the accuracy of lactometers but we compare new instruments with our standard lactometer when requested to do so.

	Total	Inaccurate
Milk test bottles	797	0
Skim milk bottles	24	0
Cream test bottles	163	2
Pipettes	179	0
Thermometers	76	0
Lactometers	5	0
Total	1244	2

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