U. S. DEPARTMENT OF AGRICULTURE.

BUREAU OF CHEMISTRY—BULLETIN NO. 13.

H. W. WILEY, Chief of Bureau.

FOODS

AND

FOOD ADULTERANTS.

INVESTIGATIONS MADE UNDER DIRECTION OF

H. W. WILEY,

CHIEF OF THE BUREAU OF CHEMISTRY,

BY

W. D. BIGELOW,

WITH THE COLLABORATION OF EDWARD MACKAY CHACE, L. S. MUNSON, L. M. TOLMAN, AND OTHERS.

PART TENTH.

PRESERVED MEATS.

WASHINGTON:

GOVERNMENT PRINTING OFFICE.

1902.

U. S. DEPARTMENT OF AGRICULTURE.

BUREAU OF CHEMISTRY—BULLETIN NO. 13.

H. W. WILEY, Chief of Bureau.

FOODS

AND

FOOD ADULTERANTS.

INVESTIGATIONS MADE UNDER DIRECTION OF

H. W WILEY,

CHIEF OF THE BUREAU OF CHEMISTRY,

BY

W. D. BIGELOW,

WITH THE COLLABORATION OF EDWARD MACKAY CHACE, L. S. MUNSON, L. M. TOLMAN, AND OTHERS.

PART TENTH.

PRESERVED MEATS.

WASHINGTON:

GOVERNMENT PRINTING OFFICE.

1902.

LETTER OF TRANSMITTAL.

U. S. Department of Agriculture,
Bureau of Chemistry,
Washington, D. C., October 11, 1901.

Sir: I hereby transmit for your inspection and approval the manuscript of part 10 of Bulletin No. 13, of this Bureau, relating to preserved meats, and respectfully recommend the publication of the same.

The scope and nature of the work are duly set forth in the introduction.

Respectfully,

H. W. Wiley, *Chief.*

Hon. James Wilson,
Secretary of Agriculture.

INTRODUCTION.

The amount of work which was necessary for the preparation of this important part of Bulletin 13 has postponed its publication far beyond the time originally intended. It was thought better, however, to withhold the manuscript from publication until the analytical work had not only been accomplished, but further until any doubtful points could be reviewed and any uncertain matter eliminated. To this end, all of the analyses of a doubtful nature were repeated, if necessary, with fresh samples purchased in the open market. In addition to this, in all important cases the results of the analyses were submitted to the manufacturers for the purpose of permitting them to make any representations in regard to the analytical data which might seem advisable before their publication. It often happens that deleterious substances or other adulterants are found in articles of manufactured foods without knowledge of their presence on the part of the manufacturers. This is due chiefly to the purchase by the manufacturer of certain of the materials in a manufactured or partly prepared state. In many cases these materials contain preservatives or other adulterants, and thus these matters find their way into the finished product.

In work of this kind we desire to safeguard in every possible way the interests of the consumer and the trade, which are also the interests of agriculture, since the object of our work is not solely to study foods in regard to their composition and the adulterants which they may contain, but further to establish the purity and wholesomeness of staple articles of food so that the consumer may have a reasonable assurance in their purchase that he is securing that which he desires.

For the purpose of carefully studying the finished manufactured foods, it is highly desirable that a knowledge of the technical processes employed be secured. To this end, a member of the Bureau has visited many of the establishments where preserved meats are prepared, for the purpose of studying the technical processes and of personally informing himself on the precautions employed to secure freedom from contamination, adulteration, and other impurities.

Further than this, in order to gain a more perfect knowledge of the changes which were produced in the processes of preservation, the foods have been prepared in many cases in the laboratory. By this means the composition and character of the original product can

be studied and finally compared with the properties of the finished material.

The importance of the preservation of foods increases from year to year, since there is an increasing desire on the part of consumers to use foods which are properly preserved and which, for this reason, have a convenience for many purposes not possessed by foods subject to decay. Especially is this true for the supplies for the Army and Navy, for mining and logging camps, scientific expeditions, and for other purposes where access to fresh foods is difficult or impossible.

The preserved-meat industry has grown to vast proportions, and these products of the United States are found in every market. It is gratifying to know that, as a result of our investigations, we have found so little to criticise and so much to commend in these necessary products.

While we make no claim to any superior accuracy of work, we have endeavored to give the benefit of the doubt in all cases to the manufacturer and not to report the presence of adulterants until they have been indicated by unmistakable evidence. In some cases this evidence is not accepted as final by the manufacturers, and in these instances we have given them every opportunity to establish the negative of our results. What is published, as has been indicated, is for the interests of our consumers and our trade and not for the purpose of discriminating in any way against any manufacturer. If, in spite of all precautions, any injustice has been done it is not due to any intention or desire, but because analytical methods and processes of investigation, conducted according to the best light which we can find, have given us data which we have erroneously interpreted. It is believed, however, that there are few instances, perhaps none, of this kind in the following pages.

In addition to the work accomplished by the members of the Bureau whose names appear upon the title-page, the following members rendered valuable assistance: Mr. W. H. Krug determined all the fats; Mr. T. C. Trescot determined nitrogen in all its forms; Mr. J. K. Haywood assisted in the work on glycogen; Mr. William Skinner assisted in the examination of the fats, and Mr. C. H. Vosburg made the starch determinations.

H. W. Wiley,
Chief of Bureau.

CONTENTS.

	Page.
Preparation of canned or tinned meat	1375
Canned roast beef or boiled beef	1375
Selection and preparation of the meat	1375
Boiling	1376
Canning	1376
Processing	1376
Inspection of packing houses	1377
Packing house No. 1	1377
Packing house No. 2	1379
Packing house No. 3	1381
Packing house No. 4	1382
Packing house No. 5	1384
Packing house No. 6	1386
Shrinkage	1387
Beef extract	1389
Canned corn beef	1390
Selection and preparation of meat	1390
Curing	1390
Boiling	1391
Canning	1391
Processing	1391
Canned tongue	1391
Curing	1391
Boiling	1391
Canned smoked meat	1391
Canned chicken and turkey	1392
Canned sausage	1392
Miscellaneous meats	1392
Examination of canned meat	1393
Preparation of sample	1393
Detection of indols, skatols, phenols, and aromatic oxy-acids	1393
Detection of ptomaines	1394
Determination of water	1395
Determination of ash	1395
Determination of fat	1395
Determination of nitrogen and nitrogenous substances	1396
Total nitrogen	1396
Coagulated proteids	1396
Proteoses, peptones, and gelatin	1396
Meat bases	1397

Examination of canned meat—Continued. Page.
Determination of starch 1398
Qualitative determination 1398
Quantitative determination 1398
Mayerhofer's method 1398
Diastase method 1399
Ambühl's method 1399
Determination of glycogen 1399
Braütigam and Edelmann's method 1400
Courlay and Coremons' method 1400
Brücke's method 1400
Haywood's method 1401
Method of Pflüger and Nerking 1402
Determination of reducing sugar 1403
Determination of nitrates 1403
Qualitative detection of nitrates 1403
Method of Schlösing-Wagner 1403
Picric-acid method 1405
Detection of borax or boric acid 1406
Quantitative determination of boric acid 1407
Detection of fluorids and silico-fluorids 1407
First method 1408
Second method 1408
Detection of salicylic acid 1408
Detection of benzoic acid 1408
Mohler's method 1409
Other methods 1409
Detection of saccharin 1410
Detection of sulphites 1410
Detection of coloring matter 1410
Determination of heavy metals 1411
Examination of fats 1412
Determination of specific gravity 1412
Determination at 15.5° 1412
Determination at the temperature of boiling water 1413
Standardization of flasks 1413
Determination 1414
Determination of index of refraction 1415
Abbe's refractometer 1415
Zeiss butyro-refractometer 1416
Determination of iodin absorption 1417
Preparation of reagents 1417
Determination 1418
Standardizing the sodium thiosulphate solution 1418
Weighing the sample 1418
Absorption of iodin 1418
Titration of the unabsorbed iodin 1419
Setting the value of iodin solution by thiosulphate solution 1419
Determination of saponification number and soluble and insoluble acids 1419
Preparation of reagents 1419
Weighing of sample 1420
Koetstorfer or saponification number 1420
Soluble acids 1421
Insoluble acids or Hehner number 1421

Page.
Examination of canned meat—Continued.
Examination of fats—Continued.
Determination of free fatty acids 1421
Determination of volatile acids 1422
Determination of acetyl value 1422
Distillation process 1422
Filtration process 1423
Determination of phytosterol and cholesterol 1423
Determination of the unsaponifiable residue 1423
Determination of melting points of fats 1424
Wiley's method 1424
Preparation of reagents 1424
Apparatus 1424
Determination 1425
Determination of melting point of fatty acids 1426
Determination of Maumené number 1427
Determination of resin oil 1427
Halphen reaction of cotton-seed oil 1428
Bechi or silver nitrate test for cotton-seed oil 1428
Separation of arachidic acid 1429
Baudouin test for sesame oil 1430
Villivecchia test for sesame oil 1430
Tocher test for sesame oil 1431
Microscopical examination 1431
Composition and characteristics of canned meat 1431
Canned roast beef 1433
Canned corned beef 1434
Canned dried and smoked beef 1435
Horse meat 1436
Canned ham and bacon 1438
Canned tongue 1439
Canned fowl 1439
Potted beef 1440
Potted chicken and turkey 1440
Potted ham 1441
Potted tongue 1441
Mixed and miscellaneous potted goods 1442
Deviled meat 1442
Canned sausage 1442
Pâtés and purées 1443
Miscellaneous meats 1443
Descriptive and analytical tables 1443

ILLUSTRATIONS.

Page.
FIG. 1. Schlösing-Wagner apparatus for detection of nitrates 1404
2. Zeiss's butyro-refractometer 1416
3. Apparatus for the determination of the melting point of fats 1425

FOODS AND FOOD ADULTERANTS.

PART X.—PRESERVED MEATS.

PREPARATION OF CANNED OR TINNED MEAT.

The process of canning varies to some extent with the kind of meat that is to be preserved and the ideas of the individual manufacturer. The various methods employed are so nearly identical that the minute description of each would entail much needless repetition. At the same time, several points of difference occur—differences of time, temperature, methods of handling, and apparatus—slight in themselves, but of such a nature as to make it impracticable to give more than a general description which embodies the essential features of the methods commonly employed.

CANNED ROAST BEEF OR BOILED BEEF.

SELECTION AND PREPARATION OF THE MEATS.

The portions of the carcass used for canning depend to some extent on the state of the market for fresh beef. All of the meat on the fore quarter, with the exception of the shank meat and the "third rib," is usually used, and often those portions are not reserved. Sometimes the cheaper cuts from the hind quarters are canned. Carcasses of fat animals are used only in case of an unusual demand for canned meat. There are two reasons for this, each of which is sufficient. Fat meat will bring a better price in the fresh state, and the leaner the meat the better the appearance of the preserved article. It is my observation that only good wholesome meat is used for canning. It should be noted here that "trimmings" consist of fat and gristle cut from the thoroughly cleaned carcass, and from the standpoint of cleanliness there is no reason why they should not be used as food. As a matter of fact, however, they are of more value for the preparation of fat and are tanked for that purpose.

The meat selected for preserving is boned, cut into pieces of from 1 to 3 or 4 pounds, and trimmed to remove as much gristle as possible and the larger pieces of fat. It is desired that the pieces of meat be as uniform in size as practicable, in order that the larger pieces may

be thoroughly cooked before the smaller ones begin to disintegrate. The meat is then parboiled.

PARBOILING.[a]

Some houses vary the time of boiling from eight to twenty minutes, owing to the size of the pieces of meat. Others boil for a definite time—twenty or thirty minutes, and in one case one hour.

CANNING.

The parboiled meat is packed in cans, either by machine or by hand. To each pound of meat is added from one-half ounce to 1 ounce of some liquid, such as "soup liquor," in its natural state or after concentration. In some cases salt is dissolved in this liquor for the purpose of seasoning the meat, and sometimes a little molasses is added. The tops are then soldered on the cans.

PROCESSING.

The cans are now placed in "process retorts" and heated by steam under pressure. In some houses the cans are first heated for from one and a half to two hours at the temperature of about 216° F., with closed vent, when the heat is interrupted and the vents are opened to allow the air to escape and then resealed. In other houses the cans are heated for the same length of time with open vent, at the temperature of from 225° to 230° F., after which the heat is interrupted and the cans sealed. In both cases the cans are subjected to a second heating, the temperature varying in different houses between 235° and 250° F., and the time varying from one hour to an hour and three-quarters. The cans are then left under a spray of cold water for several hours, when they are washed, painted, and labeled.

The above description contains the essential features of the process as carried out by various canning establishments. The details of manipulation vary in different houses.

The most important modification is that described in a recent patent. This consists in placing the cans, with open vent, in a vacuum apparatus and sealing them in vacuo. The cans are then carried slowly, by means of an endless conveyer, through an oil bath whose temperature is kept at about 240° F., the speed being so regulated that they remain in the oil bath long enough for processing. They are then transferred automatically to other carriers and carried successively through a bath of strong sodium carbonate solution, one of dilute sodium carbonate solution, and one of water. They are then passed through a bath of cold water and under a spray, after which they go to a sorting table

[a] The reason for parboiling and its effect on the product are given on page 1389 *et seq.*

for painting and labeling. Throughout the process the cans are handled automatically.

INSPECTION OF PACKING HOUSES.

In March, 1899, the writer accompanied the court of inquiry convened to investigate the food furnished by the Subsistence Department of the United States Army to troops during the Spanish-American War in its western trip of inspection of those Western packing houses which furnished meat to the United States Army during the war with Spain. In the course of this inspection a batch of fresh beef was canned under the observation of the writer in each of six packing houses.[a] At every stage of the operation weighings were made and appropriate samples were taken for subsequent examination. In each house it was requested that the method ordinarily employed for the preparation of canned roast beef should be followed exactly, and the foreman of each canning department gave every assurance, and in the case of the Chicago houses testified under oath, that the method employed was the regular method used by his firm for the preparation of canned roast beef.

The details of the methods employed in each canning room follow.

Packing House No. 1.

The weight of fresh meat employed was 743 pounds. This meat was taken entirely from the forequarter of the beef, and represented all of the meat on the forequarters except the shank, which is sold for soup bones, and the "third rib," which is placed on the market as such. The rest of the quarter is carefully boned, as much of the fat and gristle as practicable is trimmed away, and the meat is boiled for a few minutes for the purpose of shrinking. The 743 pounds used in this run were placed in a vat of water at a temperature of 96° (205° F.). The addition of the cold meat reduced the temperature only about 5° or 6°. The meat was cooked for thirty minutes, and heated by injected steam, when it weighed 529 pounds, showing a shrinkage of 214 pounds. It was then placed on tables and again trimmed, and the trimmings, consisting of fat and gristle to the amount of 25 pounds, were removed. The meat was then placed in 2-pound cans, 2 ounces of "jelly" of the following composition being added to each can (laboratory number, 18040):

	Per cent.
Solids	21.51
Proteids	19.01
Ash	2.34
Sodium chlorid	1.29

[a] Libby, McNeill & Libby, Armour & Co., Nelson Morris & Co., Cudahy Packing Company, Armour Packing Company, The G. H. Hammond Company.

The "soup liquor" in which the meat was boiled (laboratory number, 18038) weighed about 967 pounds, and was composed as follows:

	Per cent.
Solids	0.98
Proteids	.01
Meat bases	.35
Ash	.28
Sodium chlorid	.04

In this case samples of the original meat were not taken, and the results from this run are, perhaps, of less interest than from those of the five other packing houses.

For the purpose of comparing the shrinkage resulting from this run the composition of the fresh beef employed in four other packing houses is taken into consideration. It is assumed that the material extracted by boiling is of the same composition as that extracted during the four runs mentioned; that is, that the same relative amounts of water, proteids, meat bases, fat, and ash are removed by boiling. Calculated on this basis, Table I shows the number of pounds of each ingredient which probably existed in the fresh meat employed, the number of pounds extracted by boiling, the number of pounds added in canning, and the number of pounds which were found in the canned beef. While the composition of the fresh meat thus estimated can not be claimed to be exact, it can not be far from the truth, since the column giving the material extracted by boiling must necessarily include everything that was removed from the meat in the process of canning. The figures representing the weight of water and fat lost, however, are obtained by difference.

TABLE 1.—*The influence of canning on the composition of the beef.*

	Fresh beef.	Extracted by boiling.	Added in canning.	Calculated composition of canned beef.	Composition of canned beef as determined by analysis.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Water	482.8	202.7	23.5	.....	303.6
Proteids	102.2	.1	5.7	107.8	107.4
Meat bases	10.9	3.3	.....	7.6	8.2
Fat	94.4	22.8	.....	.....	71.6
Ash	9.5	2.7	.7	6.8	7.2
Undetermined	13.2	.....	.....	.....	6.0
Total	713.0	.....	.....	.....	504.0

The meat was processed for about three hours for the purpose of completely sterilizing, cooled under a spray of cold water, and samples taken for analysis. The composition was as follows (laboratory No., 18003):

	Per cent.
Water	60.24
Proteids (total)	21.31
Proteids (coagulated)	16.56
Proteoses, peptones, and gelatin	4.75
Meat bases	1.62
Fat	14.20
Ash	1.43
Chlorin	.74
Undetermined	1.20

PACKING HOUSE No. 2.

At this place six entire carcasses were taken from the chill room and the fore quarters removed and trimmed, according to the custom of that firm. The weight of the left fore quarters was as follows:

	Pounds.
Ribs (not canned)	130
Shanks (not canned)	84
Bones (other than rib and shank bones)	96
Fat (removed by trimming)	68
Canning meat	358

In order to have as good a sample of the fresh meat as possible for the purpose of analysis and comparison with the canned meats, the right fore quarters were trimmed as if for the purpose of canning and the meat corresponding to that canned, weighing 356 pounds, was put through a sausage mill, thoroughly mixed, and a sample taken for analysis. The sample is designated laboratory No. 17985. Its composition is as follows:

	Per cent.		Per cent.
Water	71.17	Fat	9.89
Coagulated proteids	13.87	Ash	.96
Globulins	1.38	Sodium chlorid	.04
Proteoses, peptones, and gelatin	1.31	Undetermined	.33
Meat bases	1.09		

The canning meat was placed in water in a steam-jacketed tank, the temperature of which stood at 91° (196° F.) The temperature of the water was reduced only about 5° or 6° by the introduction of the meat, and then returned to 91° and remained quite constant, the cooking continuing for fifteen minutes. The boiled meat weighed 235 pounds, showing a net shrinkage of 123 pounds. It was then placed in 2-pound cans, with the addition to each can of 2 ounces of jelly of the following composition (laboratory No., 17989):

	Per cent.
Total solids	4.82
Proteids	1.75
Ash	2.98
Sodium chlorid	2.85

The canned meat is designated as laboratory No. 18000. Its composition is as follows:

	Per cent.
Water	62.47
Proteids (total)	24.88
Proteids, coagulated	22.25
Proteoses, peptones, and gelatin	2.63
Meat bases	1.15
Fat	9.87
Ash	.91
Sodium chlorid	.19

The "soup liquor," in which the meat was cooked, weighed 280 pounds, and had the following composition (laboratory No., 17987):

	Per cent.
Solids	0.880
Proteids	.056
Meat bases	.246
Ash	.250
Sodium chlorid	.050

Table No. 2 is here given, showing the number of pounds of each ingredient originally contained in the fresh meat; the number of pounds of each removed by boiling; the number of pounds added in canning; the number of pounds which, from the foregoing data, would be expected in the canned product; and the number of pounds found by analysis to be in the canned product.

TABLE 2.—*The influence of canning on the composition of the beef.*

	Fresh beef.	Extracted by boiling.	Added in canning.	Calculated composition of canned beef.	Composition of canned beef as determined by analysis.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Water	254.8	122.1	14.1	.....	146.8
Proteids	[a] 59.3	.1	.1	[b] 59.3	[c] 58.5
Meat bases	3.9	.7	.0	3.1	2.7
Fat	35.4	12.2	.....	.....	23.2
Ash	3.4	.7	.2	2.9	2.1
Sodium chlorid	.1	.1	.2	.....	.4
Undetermined	1.2	.....	.....	.....	1.7
Total	358.1	.....	.....	.....	235.4

[a] Coagulated, 49.7 pounds; globulins, 4.9; proteoses, peptones, and gelatin, 4.7 pounds.
[b] Coagulated, 54.6 pounds; proteoses, peptones, and gelatin, 4.6 pounds.
[c] Coagulated, 52.3 pounds; proteoses, peptones, and gelatin, 6.2 pounds.

From consulting these tables it is evident that the shrinkage due to the parboiling of the meat consists very largely of water and fat, partly of meat bases and ash, and that the amount of proteid matter removed would be so small as to be within the limits of error of analysis.

PACKING HOUSE No. 3.

In this case, as in the preceding one, the carcasses were taken from the chill room and the canning meat of the right fore quarters passed through a sausage mill and a sample (laboratory No., 17986) reserved for analysis. Its composition is as follows:

	Per cent.		Per cent.
Water	67.71	Meat bases	1.59
Proteids (total)	15.81	Fat	12.86
Proteids, coagulated	13.94	Ash	.91
Globulins	.56	Sodium chlorid	.04
Proteoses, peptones, and gelatin	1.31		

The corresponding meat on the left forequarters was canned. The weight of the left forequarters was as follows:

	Pounds.
Market cuts (not canned)	255
Fat (removed by trimming)	37
Skin (removed by trimming)	16
Bones (not including bones of market cuts)	115
Canning meats	387.5

The process at this packing house differs markedly from those employed in the other packing houses visited. The canning meat was placed in 115 liters of a solution (laboratory No., 17017) containing about 4 per cent of sodium chlorid, and left overnight. This was stated by the firm to be for the purpose of "washing" the meat. At 9 o'clock the subsequent morning the meat was drained, placed in a vat of boiling water, and boiled twenty-two minutes. The boiled meat weighed 259 pounds, from which 26 pounds of fat, sinews, etc., were removed by trimming. The weight of the meat canned, therefore, was 233 pounds. The meat was put up in 2-pound cans, to each of which was added 1 ounce of "jelly" of the following composition (laboratory No., 17990):

	Per cent.
Solids	14.76
Proteids	11.69
Ash	3.30
Sodium chlorid	2.99

The canned beef is designated as laboratory No. 18018. Its composition is as follows:

	Per cent.		Per cent.
Water	60.80	Meat bases	1.15
Proteids (total)	25.95	Fat	9.16
Proteids, coagulated	23.69	Ash	1.11
Proteoses, peptones, and gelatin	2.26	Sodium chlorid	.19

The "soup liquor" in which the meat was boiled weighed 758 pounds and had the following composition (laboratory No., 17988):

	Per cent.
Solids	1.95
Proteids	.144
Meat bases	.190
Ash	.780
Sodium chlorid	.590

Table No. 3 gives the composition of the fresh and canned meat and, as nearly as can be determined, the weight of the various substances extracted by the salt solution and the "soup liquor," as well as that added by the "jelly" used in canning, all in terms of pounds in the total run:

TABLE 3.—*The influence of canning on the composition of the beef.*

	Fresh beef.	Extracted by salt solution.	Extracted by boiling.	Added in canning (jelly, etc.).	Calculated composition of canned beef.	Composition of canned beef as determined by analysis.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Water	262.4	.....	128.0	5.1	.....	139.5
Proteids	[a] 61.3	1.4	1.1	.7	59.5	[b] 60.4
Meat bases	6.2	2.6	1.4	.....	2.2	2.7
Fat	49.8	.....	28.5	.....	.....	21.3
Ash, free from sodium chlorid	3.2	.8	1.4	.2	1.2	2.2
Sodium chlorid	.2	.....	.....	.18	4.1	.4
Undetermined	4.4	.....	.....	.....	.....	6.5
Total	387.5	.....	.....	.....	.....	233.0

[a] Coagulated, 54 pounds; globulins, 2.2 pounds; proteoses, peptones, and gelatin, 5.1 pounds.
[b] Coagulated, 55.2 pounds; proteoses, peptones, and gelatin, 5.2 pounds.

From the above table it is seen that the shrinkage in the process of canning amounts to 39.87 per cent of the fresh meat. The materials thus removed have the following composition:

	Per cent.
Water	79.56
Fat	18.59
Meat bases	2.26
Ash	.58

As in the preceding cases the percentage of proteids removed is so slight that it may be entirely omitted, amounting, as it does, to less than one-third of 1 per cent.

PACKING HOUSE No. 4.

Owing to the limited time available for this establishment, it was not attempted to take the meat from the chill room, but a truck of meat which was standing before the boiling tanks ready for parboiling was taken and used in the experiment. This meat had the appearance

of being, as it was claimed by the company, of the same character as that used in other experiments. Its content of fat was somewhat higher. For the purpose of comparison it is assumed that the composition of material extracted in boiling is the same as the average of the runs from which the samples of fresh meat were obtained, and from these data the composition of the fresh meat used in the preparation of Table No. 4 is calculated. This table, therefore, does not have the same significance as if a sample of the original meat had been obtained. A correct idea of the matter extracted by boiling, however, and a fair idea of the influence of canning on the meat can be obtained from this table.

The meat employed for canning weighed 478 pounds. It was placed in water at 41° (106° F.) and heated by means of injected steam. The boiling began in three minutes after the introduction of the meat and continued for thirty minutes. The boiled meat weighed 296 pounds. It was then trimmed and 7 pounds of fat and gristle removed. The meat was then placed in 2-pound cans, to each of which was added 2 ounces of a solution of the following composition (laboratory No., 18021):

	Per cent.
Solids	17.93
Proteids	.00
Meat bases	.00
Ash	14.45
Sodium chlorid	12.95

The "soup liquor" (laboratory No., 18037) weighed 963 pounds, and had the following composition:

	Per cent.
Solids	1.01
Proteids	.11
Meat bases	.38
Ash	.41
Sodium chlorid	.17

The canned meat is designated as laboratory No. 18011. Its composition is as follows:

Water	51.97	Meat bases	1.97
Proteids (total)	20.01	Fat	23.83
Proteids, coagulated	17.88	Ash	1.34
Proteoses, peptones, and gelatin	2.13	Sodium chlorid	.36

Table 5 gives the composition of the fresh and canned meat, and of the material extracted by boiling and added in canning, all expressed in pounds of each ingredient in the total run.

TABLE 4.—*The influence of canning on the composition of the beef.*

	Fresh beef.	Extracted by boiling.	Added in canning.	Calculated composition of canned beef.	Composition of canned beef as determined by analysis.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Water	284.1	147.7	18	.....	180.3
Proteids	[a]73.7	[b]1.1	.....	[c]72.6	[d]69.4
Meat bases	8.4	3.8	.....	.....	6.8
Fat	95.9	.....	.....	.....	82.7
Ash	[e]6.0	[f]4	[g]3.2	5.2	[h]4.7
Undetermined	2.9	.....	.....	.....	3.1
Total	471.0	.....	.....	.....	347.0

[a] Coagulated, 59.1 pounds; globulins, 10.5 pounds; proteoses, peptones, and gelatin, 4.1 pounds.
[b] Peptones.
[c] Coagulated, 69.6 pounds; proteoses, peptones, and gelatin, 3 pounds.
[d] Coagulated, 62 pounds; proteoses, peptones, and gelatin, 7.4 pounds.
[e] Sodium chlorid, 1.9 pounds.
[f] Sodium chlorid, 1.6 pounds.
[g] Sodium chlorid, 1.4 pounds.
[h] Sodium chlorid, 1.6 pounds.

The shrinkage during this experiment amounted to 26.33 per cent of the original meat.

PACKING HOUSE NO. 5.

In this case six carcasses were taken from the chill room, the left fore quarters used for canning and the canning meat on the right fore quarters ground in a sausage mill, thoroughly mixed, and a sample (laboratory No., 18036) taken for analysis.

Its composition is as follows:

	Per cent.		Per cent.
Water	65.81	Meat bases	1.02
Proteids (total)	15.65	Fat	15.33
Proteids, coagulated	12.55	Ash	1.00
Globulins	2.23	Sodium chlorid	.04
Proteoses, peptones, and gelatin	.87		

This company sometimes cans all of the fore quarters except the shank, sometimes markets the third rib, and sometimes even cans a portion of the meat on the shank. In this case it was attempted to trim the meat so as to represent an average run. The different portions of the fore quarters weighed as follows:

	Pounds.		Pounds.
Canning meat	303.0	Shank bones	29.0
Two ribs	29.0	Tank bones	105.5
Six clods	32.0	Tank fat	27.0
Rolls	29.0		
Shank beef	38.0	Total	603.5

The meat was placed in a vat of boiling water and boiled for twenty minutes, after which it weighed 204 pounds, showing a shrinkage of 33.79 per cent. After boiling, the meat was again trimmed and 10 pounds of fat and gristle were removed, leaving 194 pounds, which was placed in 1-pound cans, to each of which was added 1 ounce of "jelly" of the following composition:

	Per cent.
Solids	2.92
Proteids	.01
Meat bases	.01
Ash	1.34
Sodium chlorid	.86

The "soup liquor" (laboratory No., 18020) weighed 631 pounds, and had the following composition:

	Per cent.
Solids	0.58
Proteids	.08
Meat bases	.10
Ash	.21
Sodium chlorid	.04

The canned meat is designated as laboratory No. 18013. Its composition is as follows:

	Per cent.		Per cent.
Water	56.18	Meat bases	1.56
Proteids (total)	23.62	Fat	16.96
Proteids, coagulated	21.06	Ash	.78
Proteoses, peptones, and gelatin	2.56	Sodium chlorid	.08

Table No. 5 gives the composition of the fresh and canned meat and of the material extracted by boiling and added as jelly, all expressed in terms of the number of pounds of each ingredient in the total run.

TABLE 5.—*The influence of canning on the composition of the beef.*

	Fresh beef.	Extracted by boiling.	Added in canning.	Calculated composition of canned beef.	Composition of canned beef as determined by analysis.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Water	192.8	69.7	12.9	.....	109
Proteids	[a]45.9	.5	.01	[b]45.4	[c]45.8
Meat bases	3	.7	.01	2.3	3
Fat	44.9	12	.....	.....	32.9
Ash	[d]2.9	[e]1.3	[f].18	1.8	[g]1.5
Undetermined	3.5	.....	.....	.....	1.8
Total	293	.....	.....	.....	194

[a] Coagulated, 36.8 pounds; globulins, 6.5 pounds; proteoses, peptones, and gelatin, 2.6 pounds.
[b] Coagulated, 43.3 pounds; proteoses, peptones, and gelatin, 2.6 pounds.
[c] Coagulated, 40.8 pounds; proteoses, peptones, and gelatin, 5 pounds.
[d] Sodium chlorid, 0.27 pound.
[e] Sodium chlorid, 0.25 pound.
[f] Sodium chlorid, 0.11 pound.
[g] Sodium chlorid, 0.16 pound.

PACKING HOUSE No. 6.

The practice at this packing house differs slightly from the others in the portions of the carcasses which are canned; that is, the canning meat is not taken entirely from the fore quarters. It was desired to follow the practice of the company as nearly as possible, and the trimming was therefore done, as in the other cases, according to their usual custom. Eight carcasses were taken from the chill room, the left side trimmed as if for canning, and the canning meat run through a sausage mill, thoroughly mixed, and a sample taken for analysis. This sample is designated as laboratory No. 17996. Its composition is as follows:

	Per cent.		Per cent.
Water	69.33	Meat bases	1.12
Proteids (total)	16.81	Fat	10.68
Proteids, coagulated	12.69	Ash	1.13
Globulins	3.06	Sodium chlorid	.24
Proteoses, peptones, and gelatin	1.06		

The right sides were trimmed for canning, and weighed as follows:

	Pounds.		Pounds.
3 ribs	53	24 beef hams	261
5 rolls	43	Shank meat	85
5 loins	166	Soft bones	198
3 tenderloins	13	Shank bones	107
3 sirloin butts	28	Tank tallow	132
3 boneless strips	24	Canning meat	598
8 rump butts	36	Total	1,761
8 flank steaks	8		
8 kidneys	9		

The canning meat was placed in water at 10° (50° F.) and heated by means of injected steam. After five minutes the temperature had reached 50° (122° F.) and was boiling at the end of eleven minutes. The boiling was continued for one hour. After boiling, the meat weighed 320 pounds. To each 2-pound can were added 1.5 ounces of the "soup liquor" in which the meat had been boiled. The soup liquor employed (laboratory No., 17977) weighed 1,500 pounds and had the following composition:

	Per cent.
Solids	0.92
Proteids	.09
Meat bases	.23
Ash	.28
Sodium chlorid	.11

The composition of the canned beef (laboratory No., 18014) is as follows:

	Pounds.		Pounds.
Water	56.18	Meat bases	1.44
Proteids, total	31.57	Fat	7.72
Coagulated	27.94	Ash	.82
Proteoses, peptones, and gelatin	3.63	Sodium chlorid	.04

Table 6 gives the composition of the fresh meat, of the material extracted by boiling, of the material added in canning, the composition of the canned meat as calculated from the preceding data, and the composition of the canned meat as determined by analysis, all expressed in pounds of each ingredient in the total run.

TABLE 6.—*The influence of canning on the composition of the beef.*

	Fresh beef.	Extracted by boiling.	Added in canning.	Calculated composition of canned beef.	Composition of canned beef as determined by analysis.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Water	414.6	243.2	12.9	.....	184.3
Proteids	[a] 100.5	[b] 1.3	.....	[c] 99.2	[d] 101
Meat bases	6.7	3.4	.....	3.3	4.6
Fat	63.9	39.2	.....	.....	24.7
Ash	[e] 6.8	[f] 4.2	(g)	3	[h] 2.6
Undetermined	5.5	.....	.....	5.5	2.8
Total	598	.....	.....	.....	320

[a] Coagulated, 75.9 pounds; globulins, 18.3 pounds; proteoses, peptones, and gelatin, 6.3 pounds.
[b] Proteoses, peptones, and gelatin, 1.3 pounds.
[c] Coagulated, 94.2 pounds; proteoses, peptones, and gelatin, 6 pounds.
[d] Coagulated, 89.4 pounds; proteoses, peptones, and gelatin, 11.6 pounds.
[e] Sodium chlorid, 1.5 pounds.
[f] Sodium chlorid, 1.6 pounds.
[g] Sodium chlorid, 0.2 pound.
[h] Sodium chlorid, 0.1 pound.

From this table it appears that the shrinkage amounted to 46.49 per cent of the fresh meat. Of this shrinkage 82.85 per cent is water, 14.11 per cent is fat, 1.51 per cent ash, and 0.82 per cent meat bases.

Of the five experiments, conducted without extraction in salt solution, this one affords by far the most severe test of the process of canning. The low temperature of the water in which the meat was originally placed might permit the extraction of a portion of the soluble globulins, and, on the other hand, the long-continued boiling would have a tendency to decompose the connective tissue of the meat and cause loss of the small particles of insoluble proteids separated by disintegration. It was found, however, that although the shrinkage was much higher than in the preceding experiments, no proteid matter was extracted. The fact that the weight of proteid matter, as determined by analysis, is in excess of the weight as calculated from the composition of the fresh beef and of the soup liquor may be attributed to inaccuracy of analytical work, since the difference is within the range of the limits of analytical error.

SHRINKAGE.

As has been previously stated, the meat is always parboiled before canning. While in the plant of The G. H. Hammond Company I had several cans filled with fresh uncooked beef, sealed and "processed" with the others. This was done with a view to determining the effect

of parboiling on the finished product. On opening the cans it was found in each case that the meat had shrunken to about two-thirds its former volume, and that with it was a considerable quantity of a liquid containing a rather large amount of particles of solid matter. The appearance of the sample was so uninviting that it would effectually preclude its sale. The contents of one can were submitted to analysis. Total weight of sample, 31 ounces. The meat weighed 21 ounces and was composed as follows (laboratory No., 18015):

	Per cent.
Water	63.83
Proteids	27.25
Meat bases	1.09
Fat	4.62
Ash	1.01
Sodium chlorid	.04
Undetermined	1.20
Total	100.00

The liquid from the same can (laboratory No., 18023) weighed 10 ounces and contained:

	Per cent.
Solids	6.93
Proteids and gelatin	1.94
Meat bases	1.84
Ash	1.22
Sodium chlorid	1.15

From these figures we find that the beef lost 32.06 per cent of its weight in "processing." The material lost contained:

	Per cent.
Water	94.08
Proteids	1.90
Meat bases	1.80

In order to compare the material thus expelled with that lost in the process of parboiling in the packing house, the amount and composition of the material extracted by the "soup liquor" in the previous experiments are given below.

(Packing house No. 1, at which the fresh beef was not sampled, and No. 3, in which the meat was previously partially corned, are omitted.)

TABLE 7.—*Loss by "shrinking."*

Packing house.	Initial temperature.	Time of boiling.	Shrinkage.			
			Per cent of total weight lost.	Per cent of total protein lost.	Per cent of total meat bases lost.	Per cent of total ash lost.
	Degrees.	*Minutes.*				
No. 2	91	[a]15	34.36	0.17	15.38	20.59
No. 4	41	30	38.64	1.49	45.24	66.66
No. 5	Boiling.	20	33.79	1.09	23.33	44.83
No. 6	10	60	46.49	1.29	50.75	61.76
	10	([b])	32.06	2.30	54.69	38.97

[a] The tempearture did not exceed 91°, which was maintained for the time given.

[b] Not parboiled. The loss in this sample was due to extraction by the liquid expelled from the meat during processing.

It thus appears that less proteid matter is extracted when meat is plunged into boiling water or water that is quickly heated to the boiling point than when it is packed into a can and the can exposed to a temperature but little above the boiling point of water. In the former case the soluble proteids near the surface of the meat are coagulated before they can diffuse into the surrounding water, while in the latter case, owing to the low conductivity of meat, the temperature at the surface of the can rises slowly, and the juice which is driven from the meat carries with it much proteid matter in solution, to be precipitated by coagulation from the liquor surrounding the meat when a sufficiently high temperature is reached.

Parboiling, therefore, or "shrinking," as it is technically called, is practiced, because to produce a marketable article it is necessary that beef be cooked before it is canned. As has been previously shown, it detracts little from the muscle-forming element of the meat. The only substances removed are water, fat, soluble ash, and meat bases. Of these, fat is useful in supplying fuel for body heat, and the meat bases, and perhaps the soluble ash, may have some value as stimulants. (See beef extract, below.)

Parboiling also serves another purpose. By removing a large quantity of water it increases the relative percentage of nutritious compounds and thus forms a somewhat concentrated food. This is best illustrated in Table 8, which gives the number of ounces of beef found in each can and the number of ounces of fresh beef used in its preparation.

TABLE 8.—*Equivalents of fresh and canned beef.*

Laboratory number.	Canned beef.	Equivalent to fresh beef.
	Ounces.	*Ounces.*
No. 18000	29	44.2
No. 18003	29.9	42.6
No. 18011	28.5	38.7
No. 18013	12.6	19
No. 18014	30.5	57
No. 18018	30.6	50.9

Thus a can of 30 ounces of roast beef contains the equivalent of 48.9 ounces of fresh beef (average), and would contain practically everything of value in the fresh beef with the exception of a portion of the fat.

BEEF EXTRACT.

The "soup liquor" (the water in which the meat has been parboiled previous to canning) was formerly discarded and allowed to run into the sewer. During the last few years, however, its value was greater than that of the fuel necessary to its evaporation, and it has been used

in the preparation of beef extract. This fact has led to the most exaggerated rumors, which represented canned roast beef as little more than a by-product in the preparation of extract of beef. As a matter of fact the soup liquor from canned roast beef furnishes but a small part of the beef extract made by the packing houses.

Assuming that beef extract contains 21.7 per cent of water, which is given by König as the mean of 21 analyses, the amount of commercial beef extract which could be made from the "soup liquors" obtained in the experiments described above is as follows:

Equivalents of "soup liquor" and extract of beef.

Experiment number.	Commercial extract per 100 pounds meat.
	Pounds.
1	1.66
2	.88
4	2.64
5	1.57
6	2.96
Average	1.94

These figures are somewhat too high, as they are calculated from the total solids present in the "soup liquor," whereas the insoluble matter would be removed by filtration in the preparation of beef extract. The manufacturers state that about 1 pound of commercial extract of beef results from the evaporation of the "soup liquor" used for parboiling 100 pounds of beef.

CANNED CORNED BEEF.

SELECTION AND PREPARATION OF MEAT.

The cuts used in the preparation of corned beef are the same as those used for canned roast beef or boiled beef, and the description given under that heading is equally applicable here.

CURING.

Pieces of meat prepared as described above are cured in a brine composed of salt and saltpeter, with or without the addition of sugar, for from 20 to 26 days. A portion of the salt is often replaced by a small amount of a more powerful preservative, such as boric acid. Such preservatives are especially used in damp, hot weather, when many packers say they can not cure successfully without them. In place of sugar New Orleans molasses may be used, and glucose, and even saccharin, are sometimes employed.

BOILING.

Corned meat must be boiled for a much longer time than fresh meat, owing to the large amount of salt that is left from the curing process. It is usually placed in cold water and boiled from three-quarters of an hour to an hour and a half, according to the size of the pieces. The water is changed twice during the boiling.

CANNING.

The canning of corned beef is identical in every respect with that of roast beef.

PROCESSING.

On account of the thorough cooking which corned beef receives before canning, as well as the sterilization of the curing process itself, it may be processed at a lower temperature or in less time than roast beef. Satisfactory results may be obtained by processing three hours in open tanks of boiling water.

CANNED TONGUE.

Canned tongue is commonly divided into ox tongue, calf tongue, lamb tongue, and luncheon tongue. In explanation of these terms it may be said that ox tongues are obtained from every variety of cattle; mutton tongues from sheep of all descriptions; while luncheon tongues are so called because the term sounds more appetizing than hog tongues.

CURING.

Tongues are cured the same as corned beef, except that more sugar is frequently added to the brine.

BOILING.

After being removed from the curing brine the tongues are cooked for two hours, starting in cold water and changing the water twice. The tongue is then trimmed, skinned if bruised or discolored, and canned. Each tongue is rolled up and placed in a separate can. The cans are soldered and heated for about three hours in a bath of salt or calcium chlorid at the temperature of about 115° (240° F.) The vent is ordinarily left open at first and the heating interrupted to close it.

CANNED SMOKED MEAT.

The terms "dried" and "smoked" as used for canned beef are applied to the same article; both terms refer to beef that is first corned and then smoked. Meat intended for smoking is always cured in larger pieces than meat which is to be canned as corned beef; for this reason the former must be exposed to the action of the brine for a much longer period. Canned smoked beef contains a higher per-

centage of water than smoked beef which is sold in the piece; this is because the former is smoked for a shorter time. The popular notion that the method employed by large packing houses for the preparation of smoked meats is materially different from that employed on the farm is erroneous. The only difference is that the smoke rooms of the packing houses are on a much larger scale, and meat is arranged in a number of tiers, often from 5 to 7. The meat is always smoked with hickory wood and sawdust, 2½ cords of the former and 8 barrels of the latter being sometimes employed for a single room, which may contain as high as 60,000 pounds of shoulder or ham or twice that amount of side meat. One establishment in Chicago has 43 smoke rooms of this size and 11 half as large. During the summer months it turns out from 500,000 to 700,000 pounds of smoked meat per day, not including sausages.

Owing to the complete sterilization resulting from curing and smoking, these goods do not require the processing employed with canned roast or boiled beef, although smoked beef which is put into the can in irregular lumps is sometimes processed. Processing is entirely omitted with chipped beef; the melting of the fat would detract much from the appearance of the product. In such cases a small amount of boric acid is added to the meat, not for the sake of preserving it (according to the manufacturers), but to prevent a change of color.

The cans with top soldered on and vent open are placed in a vacuum apparatus, the air extracted, and the vent closed in vacuo. The can and contents are then preserved without processing. Smoked ham and bacon are canned by practically the same process as described above for smoked beef.

CANNED CHICKEN AND TURKEY.

The fowls are dressed and drawn and the whole carcass boiled until the meat is sufficiently cooked to facilitate its separation from the bone. The carcass is then boned and the meat canned and processed by practically the same method as practiced with canned roast or boiled beef.

CANNED SAUSAGE.

A number of small varieties of sausage are placed on the market in hermetically sealed cans. These appear to be identical in every respect with those which are used without canning. Even boric acid, which is commonly used with sausage, but which serves no purpose whatever in canned meat, is ordinarily found in canned sausage.

MISCELLANEOUS MEATS.

Potted meats, deviled meats, pâtés, purées, and a number of other articles that might be mentioned in the same class, are often mixtures

of different kinds of minced meats. There seems to be little attempt to make the commercial name of the article agree in any respect with its composition. Flavor and palatability are chiefly sought, and every packing house has its own formula. If the meats employed in the preparation of these goods are poor in fat, some fat or very fat meat is added. The processing which these goods receive is very similar to that employed with canned roast beef.

EXAMINATION OF CANNED MEAT.

PREPARATION OF SAMPLE.

The entire contents of the can are passed repeatedly through a sausage mill and thoroughly mixed. A sample of about 150 grams is placed in a tightly stoppered bottle for analysis. This sample must be kept on ice to prevent decomposition and all of the determinations should be begun within twenty-four hours of the time of taking sample. That portion of the contents of the can which is not needed for analysis may be dried, extracted with gasoline, which boils below 60°, the gasoline allowed to evaporate, the last traces expelled by heating on a steam bath for a short time, and the fat reserved for further examination. (See p. 1412.) The majority of the samples described hereafter were prepared for analysis by Mr. Chace.

DETECTION OF INDOLS, SKATOLS, PHENOLS, AND AROMATIC OXYACIDS.[a]

Distill in a current of steam[b] from 50 to 100 grams of the finely divided meat until about 300 cc of distillate are collected. Make the distillate strongly alkaline with sodium hydroxid and distill again. In the distillate thus obtained indol may be detected by the formation of the red color on the addition of nitric acid containing a small amount of nitrous acid, while skatol yields a violet or red color when heated with sulphuric acid.

Saturate with carbon dioxid the residue from the second distillation and distill again. The addition of Millon's reagent and gentle heating produces a red color in the presence of phenol. Filter the residue

[a] Baumann and Hoppe-Seyler, Hoppe-Seyler und Thierfelder, Handbuch der phys. und path. chem. Anal., 6th ed., p. 157.

[b] Owing to the extreme readiness with which some decomposition products of meat are destroyed on one hand, and with which analogous compounds are formed from normal meat on the other hand, it is probable that more reliable results may be obtained by distilling in vacuo and at low temperature, as directed by Gautier and Etard. (Vaughan & Novy, Ptomaines, Leucomaines, etc., 3d ed., p. 270.)

It is also advisable to test for animal parasites and vegetable micro-organisms before making an examination for decomposition products. The meat may also be fed to small animals, and cold water extracts injected hypodermically, before and after filtration through porcelain. (See F. G. Novy, Bull. 65).

from the first distillation, evaporate it to small volume on the water bath, acidify with sulphuric acid, avoiding a great excess, and extract with several portions of ether. Remove the ether from the extract by means of distillation or evaporation and test the nonvolatile residue with Millon's reagent. The formation of the red color, either in the cold or on gentle warming, indicates the presence of aromatic oxyacids. In applying the above method the following precautions must be observed: First, it is not practicable in the presence of aromatic preservatives, such as salicylic acid; second, great care must be taken, especially with fish, that no intestinal contents be present in the sample under examination; third, in examining meat that is exposed to the air the surface should be rejected, since it is possible that decomposition may have begun at the surface without rendering the meat unwholesome.

DETECTION OF PTOMAINES.[a]

The material is divided as minutely as possible, placed in a large flask, and treated with twice its volume of 90 per cent alcohol, and acidulated with tartaric acid in the proportion of 0.5 gram to 100 cc of the mixture, taking care from time to time that the reaction is permanently acid. The flask, which is connected with a reflux condenser, is now placed on the water bath and kept at the constant temperature of 70° for twenty-four hours. While yet warm the liquid is transferred to a special apparatus for filtration by the aid of atmospheric pressure. The liquid is poured upon a wet cloth, supported upon a perforated porcelain funnel, which is connected below with a receiver exhausted by a vacuum pump. In this way rapid filtration is secured, and by repeated washing the extraction is made thorough. The acid alcoholic liquid is now transferred to a special distillation apparatus.

A large tubulated retort of 10 liters capacity is connected by means of a cork to a large tubulated receiver. The tubulure of the retort is provided with a small perforated cork, which carries a glass tube finely drawn out and extending to the bottom of the retort. The tubulure of the receiver is connected with Leibig's bulbs containing dilute sulphuric acid (1 to 10), and the bulbs in turn are connected with a vacuum pump.

In order to prevent the passage of air through the corks they are covered with animal membrane which has been freed from fat. By means of the aspirator a fine current of air is drawn through the liquid and suffices to keep it constantly agitated. The retort is kept on the water bath at a temperature of from 28° to 30°. The receiver is kept cold by a current of water. In this manner the distillation of the alcohol goes on rapidly and conveniently. Moreover, decomposition is so far prevented that volatile bases are never found in the bulbs.

The aqueous residue, after the removal of the alcohol by distillation, is filtered and extracted with ether as long as anything is dissolved. It is then mixed with powdered glass and evaporated to dryness in vacuo. This residue is repeatedly extracted with absolute alcohol. The alcohol is distilled again in the apparatus already described. The residue is taken up with sodium bicarbonate and repeatedly extracted with ether, benzin, and chloroform.

In order to obtain the base from the solvent the greater part may be evaporated on the water bath and the remainder allowed to evaporate spontaneously, or the remainder may be treated with dilute hydrochloric acid and the evaporation continued on the water bath or in vacuo.

---

[a] The Stas-Otto method modified by Selmi and Marino-Zuco; Vaughan and Novy, Ptomaines, Leucomaines, etc., 3d edition, p. 265.

The ptomaines thus separated are dissolved in water and detected by precipitation with platinum chlorid, gold chlorid, phospho-molybdic acid, and phospho-tungstic acid. They also yield prussian blue on being treated with potassium ferrocyanid and ferric chlorid.

DETERMINATION OF WATER.

About 2 grams of the macerated meat are weighed into a tared flat-bottomed dish and dried to constant weight at the temperature of boiling water. A flat-bottomed aluminum dish answers admirably for this purpose. On account of the oxidation of the fat, meats may be dried with advantage in a current of hydrogen or in vacuo, although satisfactory results are obtained in the open air. The drying usually requires about five hours.

DETERMINATION OF ASH.

Dry about 2 grams at the temperature of boiling water. Thoroughly carbonize, exhaust the charred mass with water, filter and wash without transferring more than necessary of the char to the filter. The filter paper and contents are placed in the dish and ignited at bright red heat. The color of the fully ignited ash of meat or meat preparations will, usually, vary from light gray to dark gray. The ash of canned meat preparations is often colored by iron from the tin plate.

The filtrate containing the soluble ash is then returned to the dish, evaporated to dryness after the addition of a few drops of ammonium carbonate solution, heated to very low redness, and weighed.

Satisfactory results may often be obtained without extracting, by igniting at low redness a very thin layer of the preparation on a porcelain crucible cover.

DETERMINATION OF FAT.

DETERMINATION.

The residue from the determination of moisture is transferred to the extraction tube as completely as possible, with the assistance of a glass rod. The fat adhering to the dish is washed into the extraction tube by means of ether. The tube is placed over a weighed flask in the apparatus which is to be employed, and the substance extracted with anhydrous alcohol-free ether for at least sixteen hours. In case the meat is not finally divided, the operation may be interrupted with advantage, the meat ground in a mortar with sand, and again transferred to the extraction tube, with the assistance of ether. It has repeatedly been demonstrated that the fat of meat can not be completely extracted by ether without previous digestion with pepsin. At the same time the method here given is satisfactory for comparative work on commercial samples. The fat was determined in the meats hereafter described by Mr. W. H. Krug.

DETERMINATION OF NITROGEN AND NITROGENOUS SUBSTANCES.[a]

TOTAL NITROGEN

Total nitrogen is determined in about 2 grams of the meat by means of the Kjeldahl or Gunning method. In this laboratory rather better results are obtained with the later method than with the former. The percentage of total nitrogen obtained is multiplied by 6.25 for the percentage of protein.

COAGULATED PROTEIDS.

About 2 grams of meat are boiled with water for fifteen or twenty minutes, filtered, thoroughly washed with boiling water, and the exhausted residue subjected to the Kjeldahl or Gunning method for the determination of nitrogen. The percentage of nitrogen so obtained is multiplied by 6.25 for the percentage of meat fiber or coagulated proteids.

PROTEOSES, PEPTONES, AND GELATIN.

The method employed for this determination is that of Allen and Searle[b] as modified by Dr. Wiley.[c]

The filtrate from the insoluble portions of the meat is received in Kjeldahl flasks and used for the separation of the soluble proteid nitrogen by bromin. The filtrate is first acidulated with two or three drops of strong hydrochloric acid and then about 2 cc of liquid bromin are added and the contents of the flask vigorously shaken. If the bromin be all taken up more is added until finally a globule of $\frac{1}{2}$ cc of liquid bromin is left undissolved and the supernatant liquid is thoroughly saturated with bromin. The mixture is then allowed to stand overnight, by which time the precipitate will have settled. The supernatant liquor is passed through filter paper and the precipitate in the flask washed by decantation with water, the globule of undissolved bromin serving to saturate the wash water so that it is unnecessary to use additional bromin water for the washing. The filter containing the precipitate is returned to the same flask in which the precipitation has taken place and the nitrogen therein determined by the Gunning method. The sum of the nitrogen in the part insoluble in water and the part precipitated by bromin is subtracted from the total nitrogen determined on the original sample, and the difference gives the total nitrogen in the flesh bases.

More recent results in this laboratory indicate that bromin does not precipitate from aqueous solution all the proteoses and peptone present. At the same time, considering the small amount of these bodies

[a] The nitrogen of all samples described in this bulletin was determined by Mr. T. C. Trescot.

[b] The Analyst, 1897, 22, 258–263.

[c] U. S. Dept. of Agr., Div. of Chem. Bul. 54.

contained in meat, it is believed that the results of the method are approximately correct. It is now the practice of this laboratory, however, to precipitate proteoses and gelatin with zinc sulphate, washing the precipitate with a saturated solution of zinc sulphate and determining the nitrogen in the precipitate by means of Gunning's method. The filtrate is then diluted with an equal amount of water and the peptones (including gelatin-peptone) determined by means of bromin, as directed above.

It is found that proteoses and peptones are completely precipitated from a half-saturated solution of zinc sulphate, though, as stated above, the precipitation from aqueous solution is not complete.

GELATIN.

If desired, gelatin may be determined in a portion of the filtrate from the coagulated proteids by the method suggested by Stutzer[a] for the examination of meat extracts. The following modification of this method has proven satisfactory in this laboratory in the hands of Mr. Chace and the writer, and is much simpler:

The portion of the filtrate from coagulated proteids which is to be used for the determination of gelatin is evaporated in a porcelain dish of about 10 cm. diameter, after the addition of about 20 grams of sand which has been freed from dust by sifting and thoroughly ignited. The residue is exhausted with four 50 cc portions of absolute alcohol, and the supernatant liquid, which is somewhat turbid, filtered through an asbestus filter, care being taken to transfer as little as possible of the insoluble residue to the filter. The residue is repeatedly extracted with 50 cc portions of a mixture containing 100 cc of 95 per cent (by volume) alcohol, 300 grams of ice, and 600 grams of cold water, care being taken that the temperature shall not be above 5° at any time. The extraction is continued until the various portions of solvent used are entirely colorless. The extract is passed through an asbestus filter which rests on a porous plate in a funnel of about 7 cm diameter. The funnel is surrounded by pounded ice and attached to an aspirator by which gentle and gradually increasing suction may be applied. Finally the asbestus filter is returned to the beaker which contains the exhausted residue, and the whole thoroughly extracted with boiling water. The hot water extract is placed in a Kjeldahl flask, evaporated to dryness, and used for the determination of nitrogen by the Kjeldahl or Gunning method.

MEAT BASES.

The sum of the nitrogen contained in coagulated proteids, proteoses, peptones, and gelatin deducted from the total nitrogen and multiplied by 3.12 gives the percentage of meat bases.

---

[a] Ztschr. anal. Chem., 1895, **34**, 568.

DETERMINATION OF STARCH.

A small amount of starch is often added to varieties of sausage which are to be boiled to prevent a shrunken appearance. The amount of starch necessary for this purpose, however, does not exceed 2 or at the most 3 per cent. Starch is often added to sausage in considerable amount, both because of its own weight and to permit the addition of a relatively large amount of water, or the use of meat which would otherwise be too fat.

QUALITATIVE DETERMINATION.

Five or six grams of sausage are stirred with boiling water for a moment, and the mixture cooled and tested with iodin solution. In using this test it must be remembered that a small amount of starch may be present as a result of the use of spices. If the blue color developed indicates the presence of starch in a larger quantity than would be accounted for by the spices present, the sample may be examined microscopically to determine the variety of starch employed and the quantity estimated.

QUANTITATIVE DETERMINATION.

Mayrhofer's Method.[a]

From 10 to 20 grams of the sample under examination (according as the iodin reaction shows a small or large amount of starch) are treated in a porcelain dish or casserole with 50 cc of an 8 per cent aqueous[b] solution of potassium hydroxid, and the mixture heated in the water bath until the meat is entirely dissolved. The operation may be hastened by rubbing the larger pieces with a glass rod. An equal volume of 95 per cent (by volume) alcohol is now added and the mixture filtered (after the precipitate has subsided) through a starch-free filter paper and washed twice with a hot 4 per cent solution of potassium hydroxid in 50 per cent alcohol, and then with 50 per cent alcohol until a small portion of the filtrate does not become turbid on the addition of acetic acid. The precipitate and filter are returned to the original vessel and dissolved with 60 cc of a normal solution of potassium hydroxid with the aid of heat. A somewhat larger volume of alkali is required by sausage that has a high starch content.

The filtrate is transferred to a 100 cc flask, acidified with acetic acid, diluted to a convenient volume, filtered through a ribbed filter, and the starch precipitated from an aliquot part of the filtrate by an

[a] Forsch. ü Lebensm., 1896, **3**, 141, and 1897, **4**, 47.

[b] Mayrhofer directs that the meat be decomposed by heating with a 4 per cent solution of potassium hydroxid in 50 per cent of alcohol. The writer finds the modification here given to be more convenient and to yield more uniform and satisfactory results.

equal volume of 95 per cent alcohol. The precipitate is then transferred to a weighed filter, thoroughly washed with 50 per cent alcohol, with absolute alcohol, and finally with ether, and dried to constant weight at 100°.

The starch determinations for this bulletin were made by Mr. C. H. Vosburgh.

Diastase Method.[a]

The diastase method, as well as Maercker's method, and methods depending on the solubility of the starch in an autoclave, are not applicable according to the experience of this laboratory to the determination of starch in meat. Mr. Munson employed the diastase method in the examination of a series of sausages which were known to contain a small amount of starch (due to the spices present), and obtained less reduced copper than in a blank determination with diastase solution alone. This was undoubtedly due to the presence of interfering substances which prevent the complete precipitation of the suboxid.

Ambühl's Method.[b]

From 2 to 10 grams of the meat under examination, according as it is finely or coarsely subdivided,[c] are thoroughly macerated with fifty times their weight of water, boiled for 30 minutes, and diluted to 100 cc for each gram of meat employed. A portion of the clear liquid is cooled, treated with iodin, and the depth of color compared with solutions containing a known amount of the same kind of starch boiled for the same length of time.

This method gives results that are only roughly approximate, but it is of value because of its convenience.

DETERMINATION OF GLYCOGEN.[d]

Niebel[e] has recommended that the percentage of glycogen be used as the criterion in the detection of horse meat. He suggests that meat which is found to contain more than 1 per cent of glycogen in the dry fat-free substance be considered horse meat. Later investigations go to show that this determination can not be used alone for the detection of horse meat, since immediately on the death of the animal the glycogen begins to decompose, owing to the ferments present. At the

[a] Amthor, Rep. Anal. Chem., **2**, 356; U. S. Dept. of Agric., Chem. Div. Bul. 46, p. 25.

[b] Pharm. Centralhalle, 1881, **22**, 438; abs. Ztschr. anal. Chem., 1882, **21**, 436.

[c] Two grams are sufficient where the entire sample is thoroughly macerated as directed under Preparation of Sample, p. 1393.

[d] By far the larger part of the glycogen determinations given in the tables were made by Mr. Haywood by the method described on page 1401. The others were made by the writer, using the modification of the method of Pflüger and Nerking described on page 1402.

[e] Ztschr. der Fleisch-u. Milch. Hyg., **185**, 210.

same time a quantitative or qualitative determination of the glycogen may be of value as confirmatory.

BRAÜTIGAM AND EDELMANN'S METHOD.[a]

Boil the finely divided meat with four times its weight of water, treat the resulting broth with dilute nitric acid to precipitate proteids, and filter. Now add a small amount of saturated solution of hydriodic acid so that the two liquids remain in distinct layers. In the presence of glycogen a red or violet ring is formed at the plane of contact of the two liquids. It is also suggested that in case extraction by water be found inadequate a solution containing an amount of potassium hydroxid equal to 3 per cent of the weight of the meat may be substituted as solvent.

COURLAY AND COREMONS' METHOD.[b]

This method is a simplification of the preceding. Grind 50 grams of the material as finely as possible and boil with 200 cc of water for from fifteen to thirty minutes. Filter the broth through a moistened filter paper or piece of fine linen. To a portion of the filtrate in a test tube add a few drops of a reagent composed of 2 grams of iodine, 4 grams of potassium iodid, and 100 cc of water. In the presence of glycogen a dark brown color is formed, which is dissipated by heat and reappears on cooling. In case starch is present, as indicated by the blue color of the solution, it may be precipitated by 2 volumes of concentrated acetic acid, separated by filtration, and the test for glycogen repeated in the filtrate.

BRÜCKE'S METHOD.[c]

Although this method has been largely supplanted, it is given here because all methods that have proved at all satisfactory have been, to a large extent, modifications of that proposed by Brücke.

Extract the glycogen from the meat by boiling with water and separate from proteids by precipitating the latter by the alternate addition of double iodid of mercury and potassium and a drop or two of hydrochloric acid. To the filtrate from this precipitate add alcohol until a marked precipitation of glycogen occurs. Allow the mixture to stand until the precipitate has settled to the bottom, separate the glycogen by filtration, and wash first with dilute and then with strong alcohol or with a mixture of alcohol and acetic acid, and finally with ether.

R. Külz follows Brücke's method, except that he decomposes the meat with potassium hydroxid in preference to extracting it with

---

[a] Pharm. C. H. 1873, **14**, 557.

[b] Ztschr. Nahr. Hyg. Waar., 1896, **10**, 173–174.

[c] Sitzungsber. Acad. Wissensch., Wien, Bd. 63, II abth., 1871, p. 214.

water. He employs 400 cc of water, containing 3 to 4 grams of potassium hydroxid, to 100 grams of meat and heat for several hours on a water bath. Any undissolved pieces are then removed with a porcelain spoon, macerated with a pestle, and the heating continued until solution is complete. The time required for the complete solution of the meat may vary from four to eight hours. The solution is then slightly acidified with hydrochloric acid and the proteids precipitated with double iodid of potassium and mercury. In case the last portions of the precipitate do not settle to the bottom, Külz obtains a satisfactory clarification by almost neutralizing with alkali and again acidifying with hydrochloric acid.[a] The proteid precipitate is finally separated by filtration, transferred to a porcelain dish containing water to which a few drops of hydrochloric acid and double iodid of mercury and potassium have been added, and the whole stirred and again filtered. Four such washings are found to be sufficient. The combined filtrate is treated with twice its volume of 96 per cent (by volume) alcohol, allowed to stand twelve hours in a cool place, the supernatant liquid poured or siphoned off, and the glycogen transferred to a filter and washed first with 62 per cent and finally with 96 per cent alcohol.

HAYWOOD'S METHOD.[b]

From 50 to 60 grams of meat, after having been run through a sausage grinder, are treated in an evaporating dish with 300 cc of a 1 per cent potassium hydroxid solution, and heated on the steam bath for about six hours, water being added from time to time so that the volume never becomes less than 150 cc. Finally the water is removed by evaporation until about 150 cc remain. This is made slightly acid with hydrochloric acid (1–5), and hydrochloric acid and double iodid of mercury and potassium[c] added alternately until all proteid matter is precipitated. The hydrochloric acid is added about 2 cc at a time, and the double iodid of mercury and potassium about 10 cc at a time. Usually about 20 to 25 cc are necessary. When the proteid matter separates, and leaves a clear liquid layer above, a small amount of this is carefully poured off and tested by further addition of the reagent. If the precipitation be not complete the liquid is returned, and the proteid precipitant added until the clear liquid above the proteid matter gives no precipitate with hydrochloric acid and the double

[a] Pflüger, on the other hand, states that clarification can not be obtained in this way. He finds it necessary to filter, dissolve the precipitate in sodium or potassium hydroxid, acidify with hydrochloric acid, and reprecipitate with Brücke reagent.

[b] Jour. Am. Chem. Soc., 1900, **22**, 85.

[c] The double iodid of potassium and mercury is prepared by first precipitating a solution of mercuric chlorid with potassium iodid, washing the precipitated mercuric iodid till free of chlorids, then saturating a 10 per cent potassium iodid solution with the mercuric iodid at boiling temperature.

iodid solution. Sometimes, not often, the proteid matter will not separate. In this case follow Külz's method of nearly neutralizing with potassium hydroxid and adding again hydrochloric acid, and the precipitate will usually flocculate. The proteid matter being now precipitated as completely as possible, the whole is transferred to a 500 cc flask, made to the mark with water, well shaken, and an aliquot portion (say 250 cc) filtered through a fluted filter. A drop or two of phenolphthalein is now added and the solution titrated to exact neutrality with a concentrated solution of potassium hydroxid, noting the amount used. If a slight amount of flaky-looking matter separates at this point the liquid is again passed through a fluted filter, and such a volume taken as will correspond to two-fifths of the original material, of course taking into consideration the number of cubic centimeters of potassium hydroxid used to neutralize the hydrochloric acid. Three or four drops of concentrated hydrochloric acid are now added, and twice the volume of from 93 to 95 per cent alcohol. After standing two or three hours the precipitated glycogen is filtered off through a paper filter, washed with dilute alcohol (2 parts 95 per cent alcohol and 1 part water), then with 95 per cent alcohol, then with ether; dried at from 80° to 100°, then at 115°, and weighed in a weighing tube. The filter is then extracted thoroughly with boiling water, dried again at 115°, and again weighed in a weighing tube, the difference in weight representing glycogen.

METHOD OF PFLÜGER AND NERKING.[a]

Fifty grams of finely macerated meat are digested on the water bath with 200 cc of 2 per cent potassium hydroxid until solution is practically complete.

The solution is cooled, diluted with water to exactly 200 cc, shaken, and filtered. One hundred cubic centimeters of the filtrate are treated with 10 grams of potassium iodid and 1 gram of potassium hydroxid, and stirred until solution is complete. Fifty cubic centimeters of 96 per cent (by volume) alcohol are now added and the mixture allowed to stand until the following day. The precipitated glycogen is then removed by filtration and washed with a solution containing 1 cc of 73 per cent potassium hydroxid, 10 grams of potassium iodid, 100 cc of water, and 50 cc of 96 per cent (by volume) alcohol.

The glycogen is then washed with a mixture of 2 parts 96 per cent alcohol and 7 parts water (containing 7 mg of sodium chlorid per liter), dissolved in water, and the remaining traces of proteids removed by the addition of double iodid of mercury and potassium.

It is often found that the proteids are so completely removed that no precipitate is formed with the double iodid. In such case filtration is not necessary.

---

[a] Arch. ges. Physiol., 1899, **76**, 531–542.

The glycogen is once more precipitated by means of 2 volumes of 96 per cent (by volume) alcohol, filtered, washed with 96 per cent alcohol containing a small amount of salt, then with absolute alcohol, finally with ether, dried to constant weight, and weighed.

As a control the precipitated glycogen is hydrolized by boiling with a 2.2 per cent solution of hydrochloric acid and the reducing sugar determined..

Satisfactory results have been obtained by the writer by hydrolizing with hydrochloric acid the precipitate obtained with potassium iodid and alcohol from the potassium hydroxid solution of the proteids without further purification.

DETERMINATION OF REDUCING SUGAR.

Boil 100 grams of the finely divided meat for fifteen or twenty minutes in a 500 cc graduated flask with a convenient volume (200 or 300 cc) of water. Add a few cubic centimeters of a saturated solution of normal lead acetate solution, cool to room temperature, make up to the mark with water, and filter through a fluted filter. Evaporate to a small volume as large an aliquot portion of the filtrate as practicable, add a saturated solution of sodium sulphate, make up to a definite volume, and filter through a fluted filter. Determine reducing sugar in an aliquot portion of the filtrate by the Allihn method. The percentage of reducing sugar thus found is multiplied by 0.9 and the result added to the percentage of glycogen.

DETERMINATION OF NITRATES.

Saltpeter is usually used in the preparation of corned meat and of meat that is cured for smoking. Potted meats and similar preparations often contain relatively large amounts of cured and smoked meat.

QUALITATIVE DETECTION OF NITRATES.

One or two grams of the meat are treated in a porcelain dish with 2 or 3 cc of a 1 per cent solution of diphenylamin in strong sulphuric acid. In presence of even a minute trace of nitrate, a deep blue color is formed instantly, and may be readily seen in spite of the charring produced by the sulphuric acid.

Method of Schlösing-Wagner.[a]

A flask (fig. 1) of about 250 cc capacity is provided with a rubber stopper with two holes. Through one of them is passed the stem of a funnel carrying a glass stopcock. The other carries a delivery tube leading to the receiving vessel. The end of the delivery tube is

[a] Agr. Chem. Vers. Stat. Halle, p. 50; Wiley, Principles and Practice of Agricultural Analysis, vol. 2, p. 228.

bent so as to pass easily under the mouth of the measuring burette, and is covered with a piece of rubber tubing.

Fifty cubic centimeters of saturated ferrous chlorid solution and the same quantity of 10 per cent hydrochloric acid are placed in the flask. The ferrous chlorid solution is obtained by dissolving nails or other small pieces of iron in hot hydrochloric acid, and is kept in glass-stoppered flasks of about 50 cc capacity, entirely filled. The content of one flask is enough for about twelve determinations, and by using the whole content of a flask as soon as possible after opening all danger of oxidation which would take place in a large flask frequently opened is avoided.

The contents of the flask are boiled until all the air is expelled. The boiling is continued for some time, and when no more air escapes the end of the delivery tube is brought into a measuring tube which

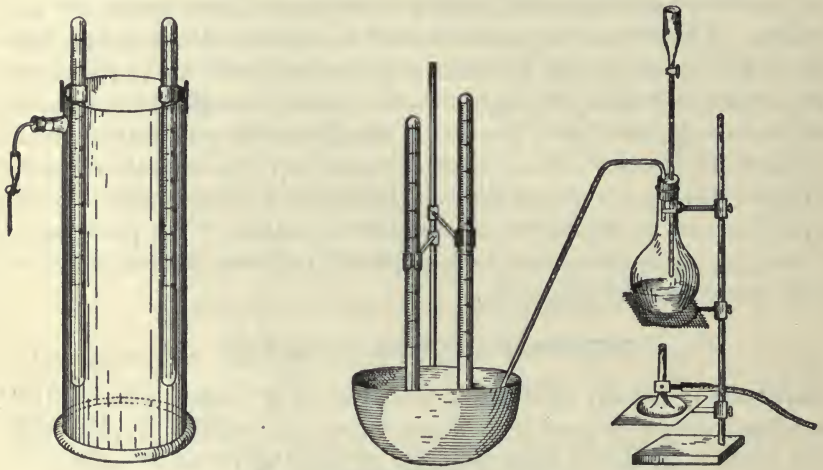

FIG. 1. Schlösing-Wagner Apparatus.

is filled with 40 per cent potassium hydroxid and the estimation is commenced.

One hundred grams of the finely macerated meat are extracted by boiling repeatedly with successive small volumes of water, and the aqueous extract concentrated to a small volume transferred to the funnel, and with continued boiling allowed to pass drop by drop into the flask. When almost all has run out the funnel is washed with three 10 cc portions of 10 per cent hydrochloric acid, and these portions are allowed to pass drop by drop into the flask. The temperature of surrounding water will soon be imparted to the contents of the tube, and the volume of nitric oxid is read with the tube in such position that the level of the water within and without the tube coincide.

The amount of nitric oxid present and the corresponding percentage of nitrate may be calculated in the usual way for the given tempera-

ture and barometric pressure, or to avoid computation the amount of nitrate may be determined by comparison of the volume of nitric oxid with that evolved by a definite volume (5 or 10 cc) of normal sodium nitrate solution.

Picric Acid Method.[a]

Weigh 1 gram of the sample into a 100 cc flask, add from 20 to 30 cc of water, and heat on the water bath for fifteen or twenty minutes. Add 3 cc of a saturated solution of silver sulphate[b] for each per cent of sodium chlorid present, then add 10 cc of lead subacetate and 5 cc of alumina cream, shaking after each addition. Make up to mark with water, and filter through a fluted filter, returning the filtrate to the filter until it runs clear. Evaporate to dryness 25 cc of the filtrate, add 1 cc of phenol-sulphonic acid,[c] mix thoroughly with a glass rod, add 1 cc of water and 3 or 4 drops of concentrated sulphuric acid and heat on a steam bath for two or three minutes, being careful not to raise the temperature sufficiently to char the material. Now add about 25 cc of water and an excess of ammonium hydroxid, pour into a 100 cc flask, and dilute to mark with water. Compare depth of color in a Nessler cylinder with an equal volume of a solution prepared by drying in a similar manner 5 cc of a solution of potassium nitrate which contains 0.1 gram of nitrogen or 0.72 gram potassium nitrate per liter and dilute to 200 cc.

Prepare a number of 50 cc Nessler tubes, preferably the long, narrow tubes, placing in the first 1 cc of this solution, in the second 2 cc and so on to 10 cc, then 12 cc, 15 cc, 18 cc, and 20 cc; the comparison of the solution under examination with these tubes will show directly if it comes within this range, in which case it can be read by direct comparison with the various tubes till the one of the exact shade is found. If the color of the solution is darker than any of the tubes prepared as above it is preferable to dilute as many times as may be necessary to bring the color within this range by removing 25 cc of the solution with a pipette and filling up to the mark again with distilled water. In this case the reading of the diluted solution in cubic centimeters standard solution should be multiplied by 2, 4, 6, etc., according as it has been diluted once, twice, or three times, etc.

---

[a] The determinations of nitrates for this bulletin were made by Mr. A. Given, who adapted the method to the examination of meats.

[b] Silver sulphate free from oxids of nitrogen was prepared by fuming the ordinary salt for some time with sulphuric acid. The mass, containing an excess of sulphuric acid, is allowed to solidify, is crushed in a mortar, and used directly; excess of sulphuric acid does not interfere. In examining a small number of samples it is often more convenient to proceed without separating the chlorin, and add an equal amount of salt to the standard solution of potassium nitrate.

[c] Prepare by mixing together 550 grams of concentrated sulphuric acid, 25 cc of distilled water, and 25 grams of phenol.

More exact comparisons can be made looking sidewise through the tubes at a window covered with white paper and shaded from direct sunlight.

The following table prepared by Mr. Given enables one to determine at a glance the percentage of potassium nitrate in a given sample from the number of cubic centimeters of standard solution employed, if the above directions are followed in detail:

TABLE 9.—*Per cent potassium nitrate.*

Cubic centimeters standard solution.	Per cent potassium nitrate.	Cubic centimeters standard solution.	Per cent potassium nitrate.	Cubic centimeters standard solution.	Per cent potassium nitrate.	Cubic centimeters standard solution.	Per cent potassium nitrate.	Cubic centimeters standard solution.	Per cent potassium nitrate.	Cubic centimeters standard solution.	Per cent potassium nitrate.
0.7	0.01	7.7	0.11	14.7	0.21	21.7	0.31	28.7	0.41	35.7	0.51
1.4	.02	8.4	.12	15.4	.22	22.4	.32	29.4	.42	36.4	.52
2.1	.03	9.1	.13	16.1	.23	23.1	.33	30.1	.43	37.1	.53
2.8	.04	9.8	.14	16.8	.24	23.8	.34	30.8	.44	37.8	.54
3.5	.05	10.5	.15	17.5	.25	24.5	.35	31.5	.45	38.5	.55
4.2	.06	11.2	.16	18.2	.26	25.2	.36	32.2	.46	39.2	.56
4.9	.07	11.9	.17	18.9	.27	25.9	.37	32.9	.47	39.9	.57
5.6	.08	12.6	.18	19.6	.28	26.6	.38	33.6	.48	40.6	.58
6.3	.09	13.3	.19	20.3	.29	27.3	.39	34.3	.49	41.3	.59
7.0	.10	14.0	.20	21.0	.30	28.0	.40	35.0	.50	42.0	.60

DETECTION OF BORAX OR BORIC ACID.[a]

Fifty grams of the meat are moistened with water, a sufficient quantity of milk of lime added to ensure an alkaline reaction, and the whole is evaporated to dryness and ignited. It is not necessary that the carbon should be entirely oxidized, but the ignition should be at so high a temperature that a colorless extract may be obtained from the ash with water. The ignited product is extracted with water, to which sufficient acetic acid to decompose carbonates has been added, and filtered. The insoluble portion contains all fluorids and silico-fluorids present, and may be tested as directed hereafter. Neutralize the filtrates with hydrochloric acid and add about 1 cc of concentrated hydrochloric acid for each 15 cc of liquid. A strip of turmeric paper dipped into the solution and dried on the water bath is changed in the presence of boric acid to a deep cherry red, which is converted first into dark purple, then green, and finally greenish black on being made alkaline with ammonium or sodium hydroxid. If the hydrochloric acid is not present in sufficient quantity, the reaction loses in delicacy, while if present in too great a quantity the turmeric paper takes on a dirty brown color which masks the reaction given by a small amount of boric acid. In the latter case, however, the addition of alkali will produce the change of colors mentioned above when boric acid is present.

[a] The determinations of preservatives for this bulletin were made by Mr. Munson.

QUANTITATIVE DETERMINATION OF BORIC ACID.

In the absence of iron, Thompson's method[a] gives satisfactory results. This method, however, is not applicable to canned meats, since it is usually found that more or less iron has been taken up from the can. Mr. Munson attempted to separate the iron by precipitation with ammonium hydroxid, ammonium sulphid, and ammonium acetate, but in all cases some boric acid was carried down with the precipitates. A modification of Gooch's method[b] was finally adopted.

About 50 grams of the meat under examination are incinerated (complete combustion is not essential), transferred to a short-necked flask and acidified with hydrochloric acid. The flask is connected with a condenser and four or five 20 cc portions of methyl alcohol are added and distilled over a calcium chlorid bath into sodium hydroxid.[c] The distillate is evaporated to dryness (to expel the methyl alcohol), care being taken that it is distinctly alkaline, the residue dissolved in from 15 to 20 cc of water acidified with hydrochloric acid, heated just to the boiling point to expel carbon dioxid, and titrated by Thompson's[d] method.

The mineral acid is exactly neutralized to methyl orange with sodium hydroxid (which leaves only the boric acid in the free state), 2 volumes of glycerol and a little phenolphthalein added, and the boric acid titrated with decinormal sodium hydroxid. Each cubic centimeter of decinormal alkali employed is equivalent to 0.0062 grams of H_3BO_3.

DETECTION OF FLUORIDS AND SILICO-FLUORIDS.

The insoluble residue which results from the extraction of the ignited sample used in the detection of boric acid will contain the calcium salt of any fluorids and silico-fluorids present in the original sample. It was found impossible to detect fluorids by warming with sulphuric acid in a dish covered with a watch glass coated with wax through which a character had been marked. This is probably owing to the presence of silica in the ash of all meat products. It therefore seems necessary to employ a method suitable for the detection of silico-fluorids, and no method is suggested for distinguishing whether the preservative employed is a simple fluorid or a silico-fluorid.

The insoluble residue referred to under boric acid (p. 1406) should be ignited, the resulting ash mixed with precipitated silica, and the presence of fluorin determined by one of the following methods, of which the first has been found to give the most satisfactory results in this laboratory.

---

[a] Jour. Soc. Chem. Ind., 1893, **12**, 432.

[b] Amer. Acad. Arts and Sci., 1886–87, p. 167; abs. Ztschr. anal. Chem., 1887, **26**, 364.

[c] The residue in the distilling flask should be tested with turmeric paper, and the distillation repeated as long as any boric acid remains.

[d] Jour. Soc. Chem. Ind., 1893, **12**, 432.

FIRST METHOD.

The mixture of ash and precipitated silica is placed in a platinum crucible and about 1 cc of concentrated sulphuric acid is added. The crucible is covered with a watch glass (which is not coated with wax or paraffin) to whose under side a drop of water is suspended, and heated one hour at a temperature of 70° to 80°. The silicon fluorid formed is decomposed by this drop of water, leaving a gelatinous deposit of silica.

SECOND METHOD.[a]

The mixture of ash and precipitated silica is placed, with the addition of 1 or 2 cc of concentrated sulphuric acid, in a short test tube which is attached to a small U-tube containing a few drops of water. The test tube is now placed in a beaker of water, which is kept hot on the steam bath for a few minutes. If any fluorid be present the silicon fluorid generated will be decomposed by the water in the U-tube and will form a gelatinous deposit on the walls of the tube.

The filtrate is now tested as directed under boric acid. If both hydrofluoric and boric acids be present, it is probable that they were combined as borofluorid.

DETECTION OF SALICYLIC ACID.

This substance is not well adapted to the preservation of meat, but nevertheless is sometimes added to meat products. For its detection, 50 grams of the sample are heated in about 50 cc of water, about 10 cc of a concentrated solution of glacial phosphoric acid added to coagulate proteids, and the mixture strained through a cotton bag and the filtrate extracted in a separatory funnel with about 50 cc of ether. The ether is allowed to evaporate spontaneously and the residue is taken up with 2 or 3 cc of water and tested with 1 or 2 drops of one-half per cent solution of ferric chlorid. The presence of salicylic acid is indicated by the formation of a characteristic purple color.

DETECTION OF BENZOIC ACID.[b]

Like the preceding, benzoic acid is not well adapted to the preservation of meat preparations, but is sometimes used for this purpose. For its detection about 50 grams of meat are digested in hot water, treated with glacial phosphoric acid, and strained as directed under salicylic acid. It is found convenient to treat a somewhat larger weight of meat and divide the filtrate into different portions for the two determinations. The filtrate is transferred to a short-necked

[a] Nevière and Hubert, Mon. sci., 1895 (4), **9**, 324.

[b] The methods given for the detection of benzoic acid can not be employed in the presence of saccharin.

flask and subjected to distillation.[a] The first portions of the distillate are used in the detection of sulphurous acid as directed hereafter. The last portion is employed in the detection of benzoic acid according to one of the following methods:

MOHLER'S METHOD.[b]

The filtrate described above is neutralized with sodium hydroxid, evaporated to dryness, treated with 2 or 3 cc of strong sulphuric acid, and heated until white fumes appear. By this means benzoic acid is converted into sulphobenzoic acid. A few crystals of potassium nitrate are added and the heating continued until the solution is almost or quite colorless. This causes the formation of meta-dinitro-benzoic acid. When cool the acid is diluted with water, ammonia added in excess, and the mixture transferred to a test tube. A drop or two of ammonium sulphid is now added, taking care that the liquids shall not mix. The nitro compound is converted into ammonium meta-diamido-benzoate, which possesses a peculiar red color. This reaction takes place immediately, and is seen at the surface of the liquid without stirring. Salicylic acid will sometimes give the same reaction, but only after waiting some minutes. The benzoic acid must first be separated in a state of approximate purity before this test can be applied. Half a milligram of the acid can be detected in the absence of interfering bodies. This reaction is also given by saccharin. This reaction is very delicate, and all but distinct and characteristic tests should be disregarded. It is well to confirm it by one of the other methods described, using a larger quantity of the sample.

OTHER METHODS.

The presence of benzoic acid may be confirmed by neutralizing the aqueous solution of the extracted benzoic acid with sodium hydroxid, evaporating to a very small volume, and acidifying with sulphuric acid, when the presence of a large amount of benzoic acid is indicated by the formation of a white flocculent precipitate.

The concentrated solution of the sodium salt may be further tested by making it exactly neutral and adding a drop of a dilute ferric chlorid solution, when ferric benzoate is precipitated in the presence of a large amount of benzoic acid. The appearance of ferric benzoate is markedly different from that of ferric hydroxid in that it is almost white when viewed by transmitted light, whereas ferric hydroxid has a brown color under the same conditions.

---

[a] If it is desired the filtrate may be made slightly akaline with sodium hydroxid, the fat extracted with ether or petroleum ether, and the aqueous solution acidified with sulphuric acid and extracted with ether as directed under salicylic acid. The ether extract is then allowed to evaporate spontaneously and benzoic acid detected by one of the methods described.

[b] Bul. soc. chim., 1890, (3) **3**, 414.

A portion of the residue, supposed to contain benzoic acid, may also be treated with dilute sodium hydroxid and sodium amalgam, when the presence of benzoic acid will be detected by the smell of bitter almond oil.

DETECTION OF SACCHARIN.

Extract with ether as directed under salicylic acid. Allow the ether extract to evaporate to dryness. Saccharin may be detected in the residue by the taste. Also add from 1 to 2 grams of sodium hydroxid, and fuse at about 250° for fifteen minutes. The saccharin is thus completely converted into salicylic acid, which may be detected as directed above.

DETECTION OF SULPHITES.

The first portion of distillate obtained in the detection of benzoic acid is received in a solution of iodin, boiled, and barium chlorid added to precipitate the sulphuric acid formed by the oxidation of sulphurous acid. The formation of more than a trace of barium sulphate may be regarded as proof that the original sample was preserved with sulphite.

According to Kämmerer a sample of the meat under examination should be placed on paper impregnated with potassium iodate moistened with dilute sulphuric acid (1:8) free from nitric oxid. In the presence of sulphurous acid a deep blue color is immediately produced. A trace of blue may be formed after some time with meat that is not entirely fresh. This method is of little value, however, in the examination of canned meat, since it is not applicable in the presence of either nitrates or chlorids. The microscope is also of value in the detection of sulphites, since characteristic crystals of sodium and calcium sulphate (owing to the oxidation of the original sulphite) may often be detected.

DETECTION OF COLORING MATTER.

Sausages and other preparations in which chopped meat is employed rapidly become discolored on exposure to the air. This change does not take place to a marked extent with meat that has been cured in a pickle containing saltpeter. With fresh chopped meat, and sometimes with corned meat, especially that cured without saltpeter, coloring matter is sometimes added to prevent the change of color which would naturally take place. Aniline dyes and cochineal carmin are ordinarily employed for this purpose, though in some instances vegetable colors have been detected in the form of lakes. The coloring matter may often be extracted by heating for some time with 50 per cent alcohol, 50 per cent glycerol slightly acidified, a mixture of alcohol and glycerol,[a] ammonium hydroxid, or a 5 per cent aqueous solution of sodium salicylate.[b]

---

[a] Klinger and Bujard, Ztschr. ang. Chem., 1891, 515.

[b] Spaeth, Pharm. Centralh., 1897, 38, 884.

In case the filtered extract by any of these methods is colored red or deep yellow, it should be evaporated nearly to dryness, slightly acidified with hydrochloric acid, and boiled a few minutes after the addition of a thread of fat-free wool. If the wool is dyed, it may be examined as directed under coloring matter in Bulletin 65. If the wool is not dyed, the solution is examined spectroscopically.

If too dilute it may often be concentrated by precipitating the coloring matter as a lake,[a] allowing it to settle, decanting off the water, dissolving in hydrochloric acid, and making alkaline with ammonia.

In extracting with 50 per cent alcohol the proteids of the meat are coagulated with the formation of a pale, almost white, color. If the meat is not discolored during this extraction, it is probable that some foreign color is present.[b]

Marpmann[b] examines sausages miscroscopically for the presence of coloring matter after dehydrating with alcohol and zylol consecutively, removing the zylol with carbon tetra chlorid and immersing in cedar oil until the natural color of the meat has disappeared.

DETERMINATION OF HEAVY METALS.[c]

Allen's[d] method for the qualitative detection of tin, copper, lead, and zinc and adapted to their quantitative determination by Bigelow and Munson,[e] was used in this work. Twenty-five grams of the dried, fat-free meat are thoroughly mixed in a porcelain dish with from 4 to 5 cc of sulphuric acid, heated upon the water bath, and 2 cc of nitric acid gradually added, with constant stirring until red fumes cease to be evolved; 3 grams of finely powdered magnesia are then added and the mixture ignited in a muffle furnace at low redness. To insure complete combustion the ash may be moistened with nitric acid and reheated. The ash is then taken up with water and several cubic centimeters of hydrochloric acid, evaporated to expel a greater part of the acid, and then transferred, without filtering, to a beaker. The solution should now measure about 100 cc. The solution is saturated with hydrogen sulphid and then heated upon the water bath for several minutes until the precipitated sulphids collect and settle to the bottom. The sulphids and insoluble residue, which may contain some tin oxid, are filtered, the filter ignited, and the mass fused in a porcelain crucible with 3 grams of a mixture of equal parts of potassium carbonate, sodium carbonate, and sulphur. The fused mass is then taken up with water and filtered. Lead and copper, if present, will remain as sulphids upon the filter. The filtrate is acidified with acetic acid when the tin sulphid is precipitated. This may be collected, washed, ignited,

[a] Bremer, Forschungsber., 1897, **4**, 45.

[b] Marpmann, Ztschr. ang. Mikr., 1895, **1**, 12.

[c] The determinations of heavy metals for the bulletin were made by Mr. Munson.

[d] Com. Org. Anal. 2d ed., vol. 4, p. 299.

[e] Jour. Am. Chem. Soc., Proc., 1900, **22**, 32.

and weighed as tin oxid, or, as it was found more convenient, the sulphid was washed free from hydrogen sulphid and sulphids, dissolved in a saturated solution of ferric chlorid, and the resulting ferrous salt titrated with potassium bichromate.[a]

$$SnS_2+4FeCl_3=SnCl_4+4FeCl_2+2S.$$

Any residue left upon filtering the soluble tin salt after fusion is dissolved in nitric acid and made alkaline with ammonia. A blue color indicates copper, which may be titrated with potassium cyanid, or, in absence of lead, may be determined electrolytically. Lead is indicated by yellow precipitate with potassium chromate in acetic acid solution, and may be determined quantitatively as lead chromate.

The filtrate from the original hydrogen sulphid precipitate may contain iron, zinc, and phosphates. Bromin water is added and the solution boiled to destroy hydrogen sulphid and to oxidize the ferrous iron, and, unless the solution has a distinct yellow color, sufficient iron is added to give it that color, and then ammonium acetate is added to the slightly acid solution to precipitate phosphate of iron and excess of iron. The material is filtered, the precipitate washed, and from 2 to 3 cc of acetic acid added to the filtrate, which is treated with hydrogen sulphid for precipitation of zinc. The zinc sulphid is collected, ignited, and weighed as zinc oxid. Results are expressed in milligrams of the metal per kilo of the original sample.

EXAMINATION OF FATS.

The methods employed for this purpose were those prepared by Mr. Tolman for the association of official agricultural chemists. They are incorporated here without change. They do not include the determination of chilling point, which was done by setting a narrow bottle of melted fat in cold water and stirring till a turbidity set in. Although this method is widely used technically in comparing fats of some uniformity, it is found of little value here, owing to the impurity of the separated fats.

In addition to Mr. Tolman, credit is due to Messrs. Chace and Skinner for assistance in the examination of the fats. The microscopical examination was made by Mr. Munson.

DETERMINATION OF SPECIFIC GRAVITY.

Determination at 15.5°.

Determine the specific gravity of oils at 15.5° by the use of pycnometer, Westphal balance,[b] or accurately graduated hydrometer.[c]

---

[a] Sutton's Volumetric Analysis, 8th ed., p. 373.

[b] C. A. Crampton, U. S. Dept. Agr., Div. Chem. Bul. 13, pt. 4, p. 438.

[c] Accurately made hydrometers reading from sp. gr. 0.900 to 0.940 at 15.5° will satisfy every requirement of accuracy and speed.

If determined at room temperature, the following formula may be used to calculate the specific gravity at 15.5°:[a]

$G = G' + .00064\ (T - 15.5)$.
G = sp. gr. at 15.5°.
G' = sp. gr. at T.
0.00064 = mean correction for 1° C.

This is only approximately correct, as the correction varies for different oils, but will satisfy ordinary requirements. If a higher degree of accuracy is desired, the factors given in the following table may be employed, but to obtain the best results the determination must be made at standard temperature.

Factors for calculating specific gravity.[b]

Oil.	Correction for 1° C.	Observer.
Cod-liver oil	0.000646	A. H. Allen.
Lard oil	.000658	C. M. Wetherill.
Olive oil	.000629	C. M. Stillwell.
Arachis oil	.000655	A. H. Allen.
Rape oil	.000620	Do.
Sesame oil	.000624	Do.
Cotton-seed oil	.000629	Do.
Cocoanut olein	.000665	Do.

The following table gives correction for solid fats.[c]

Factors for calculating specific gravity.

Fats.	Correction for 1° C.
Cocoa butter	0.000717
Tallow	.000675
Lard	.000650
Butter fat	.000617
Cocoanut stearins	.000674
Cocoanut oil	.000642
Palmnut oil	.000657

Determination at the Temperature of Boiling Water.[d]

STANDARDIZATION OF FLASKS.

First method.—Use a small specific gravity flask of from 25 to 30 cc capacity. The flask is to be thoroughly washed with hot water, alcohol, and ether, and then dried. After cooling in a desiccator, the weight of the flask and stopper is accurately determined.

[a] Allen, Com. Org. Anal., 3d ed., vol. 2, pt. 1, p. 33; Winton, Conn. Expt. Sta. Rept., pt. 2, 1900, p. 149.
[b] Allen, Com. Org. Anal., 3d. ed., vol. 2, pt. 1, p. 33.
[c] Allen, Com. Org. Anal., 3d ed., vol. 2, pt. 1, p. 32.
[d] U. S. Dept. Agr., Div. Chem. Bul. 46, revised, p. 51.

The flask is filled with freshly boiled and still hot distilled water and placed in a bath of distilled water. The water of the bath is kept in brisk ebullition for thirty minutes, any evaporation from the flask being replaced by the addition of boiling distilled water. The stopper, previously heated to 100°, is then inserted, the flask removed, wiped dry, and after it has nearly cooled to room temperature placed in the balance, and weighed when balance temperature is reached.

Second method.[a]—The following formula may be used for calculating the weight of water ($W^{T°}$) which a given flask will hold at T° (weighed in air with brass weights at the temperature of the room) from the weight of water (W^{t}) (weighed in air with brass weights at the temperature of the room) contained therein at $t°$:

$$W^{T°} = W^{t°} \frac{d^{T°}}{d^{t°}} [1 + \gamma\ (T - t)]$$

d^{T} = the density of water at T°.
d^{t} = the density of water at $t°$.
γ = the coefficient of cubical expansion of glass.[b]

DETERMINATION.

Weight of fat at the temperature of boiling water.—The flask is rinsed with alcohol and ether, and dried for a few minutes at the temperature of boiling water. It is filled with the dry, hot, fresh-filtered fat, which should be entirely free from air bubbles, replaced in the water bath, and kept for thirty minutes at the temperature of boiling water. The stopper, previously heated to 100°, is inserted, the flask removed, wiped dry, placed in the balance after it has nearly cooled to room temperature, and weighed when the balance temperature is reached. The weight of fat having been determined, the specific gravity is obtained by dividing it by the weight of water previously found.

Example:	Grams.
Weight of flask, dry	10.0197
Weight of flask, plus water	37.3412
Weight of water	27.3215
Weight of flask, plus fat	34.6111
Weight of fat	24.5914

Specific gravity = 24.5914 ÷ 27.3215 = 0.90008.

The weight of the flask dry and empty may be used constantly if great care be taken in handling and cleaning the apparatus.

Example:	Grams.
Weight of flask, dry and empty	10.0028
Weight of flask after three weeks' use	10.0030

[a] E. E. Ewell, U. S. Dept. Agr., Div. Chem. Bul. 62, p. 125.

[b] This factor is commonly given as 0.000026, but it varies considerably. Schulze (Ztschr. anal. Chem., 1882, **21**, 167–177) found the glass used by him varied from 0.0000288 to 0.0000305; an average of these is 0.0000296. Ewell has used 0.000028 in his work, U. S. Dept. Agr., Div. Chem. Bul. 62, p. 121.

DETERMINATION OF INDEX OF REFRACTION.

Determine the index of refraction with any standard instrument, oils being read at 15.5° and fats at 40°.

The temperature must be controlled with great care, and in accurate work the readings should be taken at standard temperature. The readings of the Zeiss butyro-refractometer can be reduced to standard temperature by following formula:[a]

$R = R' + .55\ (T' - T)$.
R is the reading reduced to T.
R′ reading at Temp. T.
T is standard temperature.

To calculate to standard temperature the readings of the instruments which give index of refraction directly the factor 0.000176 may be used. As the temperature rises the refractive index falls. Example: Refractive index of a butter fat determined at 32.4°=1.4540, reduced to 25°, as follows: $32.4 - 25 = 7.4$; $0.000176 \times 7.4 = 0.0013$; then $1.4540 + 0.0013 = 1.4553$.

The instrument used should be set with distilled water at 25°, the theoretical refractive index of water at that temperature being 1.3330. In the determination above given the refractive index of pure water measured 1.3300; hence the above numbers should be corrected for theory by the addition of 0.0030, making the corrected index of the butter fat mentioned at the temperature given 1.4583.

The index of refraction varies greatly with the specific gravity, increasing as it increases. In abnormal results it is often well to see if the specific refractive power[b] is different from the normal. Calculate the specific refractive power from the formula $\frac{N-1}{D}$,[c] in which N equals the refractive index and D the specific gravity. Always state temperature at which the determinations were made.

ABBE'S REFRACTOMETER.

A later and much improved model of the Abbe instrument in which arrangements are made for controlling the temperature, the weakness of the older form,[d] is described in Benedickt.[e]

---

[a] Wiley, Prin. and Prac. of Agri. Anal., vol. 3, p. 341; Winton, Conn. Expt. Sta. Rept., 1900, pt. 2, p. 142.

[b] Landolt., Ber., 1882, **15**, 1031; C. A. Browne, Jour. Am. Chem. Soc., 1899, **21**, 991.

[c] H. R. Procter, Jour. Soc. Chem. Ind., 1898, **17**, 1021–1026, has shown that the Lorenz formula, $\frac{N^2-1}{(N^2+2)D}$, gives much more satisfactory results than $\frac{N-1}{D}$, and gives table for calculation.

[d] For a description of the older form of the Abbe instrument see U. S. Dept. Agr., Div. Chem. Bul. 46, revised, p. 49.

[e] Anal. der Fette u. Wach., 3d ed., p. 105.

ZEISS BUTYRO-REFRACTOMETER.[a]

Place the instrument upon a table where diffuse daylight or any form of artificial light can be readily admitted for illumination. Supply through nozzle D a stream of water of constant temperature. Then open the prism casing by giving to the pin F a half turn. The surfaces of the prism must now be cleaned with the greatest care, which is best done by applying soft linen moistened with ether. Now melt the sample of fat and pour the clear fat through a filter, allowing

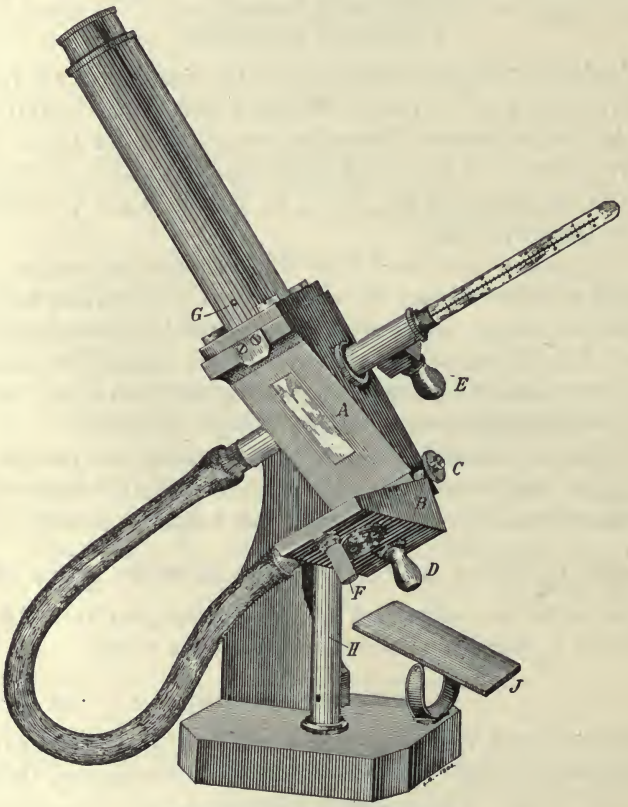

FIG. 2.—Zeiss's butyro-refractometer.

the first two or three drops to fall on the surface of the prism contained in casing B. For this purpose the apparatus should be raised with the left hand, so as to place the prism surface in a horizontal position. Then press B against A and bring F back into its original position by turning it in the opposite direction. Adjust the mirror until it gives the sharpest reading. If the reading be not distinct

[a] Wiley, Prin. and Prac. Agr. Anal., vol. 3, pp. 339–341. Also description by manufacturer.

after running water of a constant temperature through the instrument for some time, the fat is not evenly distributed on the surfaces of the prism and the process must be repeated. The instrument should be carefully adjusted by means of the standard fluid which is supplied. As the index of refraction is greatly affected by temperature, care must be used to keep it constant. (See fig. 2.)

The following table can be used to convert the degrees of the instrument into refractive indices:

TABLE I.[a]

Reading.	Refraction index.	Reading.	Refraction index.	Reading.	Refraction index.	Reading.	Refraction index.
40.0	1,4524	50.0	1,4593	60.0	1,4659	70.0	1,4723
40.5	1,4527	50.5	1,4596	60.5	1,4662	70.5	1,4726
41.0	1,4531	51.0	1,4600	61.0	1,4665	71.0	1,4729
41.5	1,4534	51.5	1,4603	61.5	1,4668	71.5	1,4732
42.0	1,4538	52.0	1,4607	62.0	1,4672	72.0	1,4735
42.5	1,4541	52.5	1,4610	62.5	1,4675	72.5	1,4738
43.0	1,4545	53.0	1,4613	63.0	1,4678	73.0	1,4741
43.5	1,4548	53.5	1,4616	63.5	1,4681	73.5	1,4744
44.0	1,4552	54.0	1,4619	64.0	1,4685	74.0	1,4747
44.5	1,4555	54.5	1,4623	64.5	1,4688	74.5	1,4750
45.0	1,4558	55.0	1,4626	65.0	1,4691	75.0	1,4753
45.5	1,4562	55.5	1,4629	65.5	1,4694	75.5	1,4756
46.0	1,4565	56.0	1,4633	66.0	1,4697	76.0	1,4759
46.5	1,4569	56.5	1,4636	66.5	1,4700	76.5	1,4762
47.0	1,4572	57.0	1,4639	67.0	1,4704	77.0	1,4765
47.5	1,4576	57.5	1,4642	67.5	1,4707	77.5	1,4768
48.0	1,4579	58.0	1,4646	68.0	1,4710	78.0	1,4771
48.5	1,4583	58.5	1,4649	68.5	1,4713	78.5	1,4774
49.0	1,4586	59.0	1,4652	69.0	1,4717	79.0	1,4777
49.5	1,4590	59.5	1,4656	69.5	1,4720	79.5	1,4780

DETERMINATION OF IODIN ABSORPTION BY HÜBL'S METHOD.[b]

PREPARATION OF REAGENTS.

Iodin solution.—Dissolve 25 grams of pure iodin in 500 cc of 95 per cent alcohol. Dissolve 30 grams of mercuric chlorid in 500 cc of 95 per cent alcohol. The latter solution, if necessary, is filtered, and then the two solutions mixed. The mixed solution should be allowed to stand twelve hours before using.

Decinormal sodium thiosulphate solution.—Dissolve 24.8 grams of chemically pure sodium thiosulphate freshly pulverized as finely as possible and dried between filter or blotting paper, and dilute with water to 1 liter at the temperature at which the titrations are to be made.

Starch paste.—One gram of starch is boiled in 200 cc of distilled water for ten minutes and cooled to room temperature.

Solution of potassium iodid.—One hundred and fifty grams of potassium iodid are dissolved in water and made up to 1 liter.

[a] Winton, Conn. Expt. Sta., Rept., 1900, pt. 2, p. 143.

[b] U. S. Dept. Agr., Div. Chem. Bul. 46, revised, p. 50.

Solution of potassium dichromate.—Dissolve 3.874 grams of chemically pure potassium dichromate in distilled water and make the volume up to 1 liter at the temperature at which the titrations are to be made and standardized against pure iron wire.

Determination.

Standardizing the sodium thiosulphate solution.

Place 20 cc of the potassium dichromate solution, to which has been added 10 cc of the solution of potassium iodid, in a glass-stoppered flask. Add to this 5 cc of strong hydrochloric acid. Allow the solution of sodium thiosulphate to flow slowly into the flask until the yellow color of the liquid has almost disappeared. Add a few drops of the starch paste, and with constant shaking continue to add the sodium thiosulphate solution until the blue color just disappears. The number of cubic centimeters of thiosulphate sulution used multiplied by 5 is equivalent to 1 gram of iodin.

Example: Twenty cubic centimeters $K_2Cr_2O_7$ solution required 16.2 cc sodium thiosulphate; then $16.2 \times 5 = 81$ = number cubic centimeters of thiosulphate solution equivalent to 1 gram of iodin. Then 1 cc thiosulphate solution = 0.0124 gram of iodin. Theory for decinormal solution of sodium thiosulphate, 1 cc = 0.0127 gram of iodin.

Weighing the sample.

Weigh about 1 gram of fat or 0.500 gram of oil[a] on a small watch crystal or any light weighing glass. The fat is first melted, mixed thoroughly, poured onto the crystal, and allowed to cool.

Introduce the watch crystal into a wide-mouth 16-ounce bottle with ground-glass stopper.

Absorption of iodin.

The fat or oil in the bottle is dissolved in 10 cc of chloroform. After complete solution has taken place, 30 cc of the iodin solution are added in the case of fats, or from 40 to 50 cc[b] in the case of oils. Place the bottle in a dark place and allow to stand, with occasional shaking for three hours.[c] There must be a large excess of iodin or the results will not be satisfactory.

---

[a] With drying oils which have a very high absorbent power 0.100 to 0.200 gram should be taken.

[b] F. Ulzer, Jour. Soc. Chem. Ind., 1898, **17**, 276, says iodin should be in excess about twice the amount that is absorbed. The solution loses strength with age, but can be used so long as 35 cc of decinormal thiosulphate neutralize 25 cc iodin solution. R. Henriques, Ztsch. Anal. Chem., 1901, **40**, 429, says iodin should be in excess at least 60 per cent of amount added.

[c] The time allowed does not give the complete iodin absorption power of an oil or fat and can not be compared with determinations where six to twelve hours have been used. It gives very satisfactory comparative results, but the time factor must be very closely adhered to.

TITRATION OF THE UNABSORBED IODIN.

Add 20 cc of the potassium iodid solution and then 100 cc of distilled water to the contents of the bottle. Wash any iodin which may be noticed upon the stopper of the bottle back into the bottle with the potassium iodid solution. Titrate the excess of iodin with the sodium thiosulphate solution, which is run in gradually, with constant shaking, until the yellow color of the solution has almost disappeared. Add a few drops of starch paste, and continue the titration until the blue color has entirely disappeared. Toward the end of the reaction stopper the bottle and shake violently, so that any iodin remaining in solution in the chloroform may be taken up by the potassium iodid solution. The excess of sodium thiosulphate solution should be sufficient to prevent a reappearance of any blue color in the flask for five minutes.

SETTING THE VALUE OF IODIN SOLUTION BY THIOSULPHATE SOLUTION.

At the time of adding the iodin solution to the fat, two bottles of the same size as those used for the determination should be employed for conducting the operation described above, but without the presence of any fat. In every other respect the performance of the blank experiments should be just as described. These blank experiments must be made each time the iodin solution is used.

Example blank determinations: Thirty cubic centimeters iodin solution required 46.55 cc of sodium thiosulphate solution. Thirty cubic centimeters iodin solution required 46.65 cc of sodium thiosulphate solution. Mean, 46.6 cc.

Per cent of iodin absorbed:

Weight of fat taken	grams	1.0479
Quantity of iodin solution used	cubic centimeters	40.0
Thiosulphate equivalent to iodin used	do	62.1
Thiosulphate equivalent to remaining iodin	do	30.2
Thiosulphate equivalent to iodin absorbed	do	31.9

Per cent of iodin absorbed, $31.9 \times 0.0124 \times 100 \div 1.0479 = 37.75$.

DETERMINATION OF SAPONIFICATION NUMBER AND SOLUBLE AND INSOLUBLE ACIDS.[a]

The saponification number, soluble and insoluble acids, were determined in one sample by the following method:

PREPARATION OF REAGENTS.

Standard sodium hydroxid solution.—A decinormal solution of sodium hydroxid is used. Each cubic centimeter contains 0.0040

[a] U. S. Dept. Agr., Div. Chem. Bul. 46, revised, p. 47.

gram of sodium hydroxid and neutralizes 0.0088 gram of butyric acid ($C_4H_8O_2$).

Alcoholic potash solution.—Dissolve 40 grams of good potassium hydroxid in 1 liter of 95 per cent alcohol that has been boiled for 2 days with potassium hydroxid in a flask with reflux condenser attached, and redistilled. The solution must be clear and the potassium hydroxid free from carbonates.

Standard acid solution.—Prepare accurately a half normal solution of hydrochloric acid.

Indicator.—Dissolve 1 gram of phenolphthalein in 100 cc of 95 per cent alcohol.

Weighing of Sample.

The saponification is carried on in a wide-mouth Erlenmeyer flask holding from 250 to 300 cc. These are cleaned by thoroughly washing with water, alcohol, and ether, wiped perfectly dry on the outside, and heated for one hour at the temperature of boiling water. The flasks are then placed on a tray, covered with a silk handkerchief, and allowed to cool. They must not be wiped with a silk handkerchief within fifteen or twenty minutes of the time they are weighed.

About 5 grams of the melted fat, which has been filtered, is run in by means of a pipette, and after cooling the flask and contents are again weighed.

Koetstorfer or Saponification Number.[a]

Measure 50 cc of the alcoholic potash solution into the flask by means of a burette or pipette, which is allowed to drain a definite time. Connect the flask with a reflux condenser and boil for thirty minutes, when the fat is completely saponified. Cool the flask and titrate with half normal hydrochloric acid, using phenolphthalein as indicator. The Koetstorfer number (milligrams of potassium hydroxid required to saponify 1 gram of fat) is obtained by subtracting the number of cubic centimeters of hydrochloric acid used to neutralize the excess of alkali after saponification from number of cubic centimeters necessary to neutralize the 50 cc of alkali added, multiplying the result by 28.06 (milligrams potassium hydroxid per cubic centimeter) and dividing by the number of grams of fat used.

To calculate the saponification equivalent[a] divide 56,100 by the saponification number, the saponification equivalent being the number of grams of fat saponified by one equivalent of potassium hydroxid, or 56.1 grams. There is no advantage in stating it in this way, and for sake of uniformity the Koetstorfer number being more generally used, it would seem advisable to adopt it.

---

[a] Chiefly of value in oil work in the detection of rape oil, resin oil, and paraffin products.

[b] Allen, Com. Org. Anal., 3d ed., vol. 2, pt. 1, pp. 53–55.

Soluble Acids.

Place the flask on a water bath and evaporate the alcohol. Add such an amount of half-normal hydrochloric acid that its volume plus the amount used in titrating for the saponification number will be 1 cc in excess of the amount required to neutralize the 50 cc of alcoholic potash added. Connect the flask with a condensing tube 3 feet long made of small glass tubing and place it on the steam bath until the separated fatty acids form a clear stratum on the upper surface of the liquid. Fill the flask to the neck with hot water and cool it in ice water until the cake of fatty acids is thoroughly hardened. Pour the liquid contents of the flask through a dry, weighed filter into a liter flask, taking care not to break the cake. Fill the flask again with hot water, set on steam bath until the fatty acids collect at the surface, cool by immersing in ice water, and filter the liquid again into the liter flask. Repeat this treatment with hot water, followed by cooling and filtration of the wash water three times, collecting the washings in the liter flask, and titrate with decinormal alkali, using phenolphthalein as indicator.

The number of cubic centimeters of decinormal alkali used in this titration diminished by 5 (corresponding to the excess of 1 cc of half-normal acid) and multiplied by 0.0088 gives the weight of butyric acid in the amount of fat saponified; dividing this by the weight of fat taken gives the percentage of soluble acids.

Insoluble Acids or Hehner Number.

Allow the flask containing the cake of insoluble acids and the filter paper through which the soluble acids have been filtered to drain and dry for twelve hours in the air. Transfer the filter paper to the flask and dry the flask and contents for three hours in a water-jacketed oven, cool, and weigh. Then dry for another two hours, cool, and weigh. If there be any considerable decrease in weight, repeat the drying. The weight obtained less the weight of the filter paper gives weight of insoluble acids, from which the percentage can be easily calculated.

DETERMINATION OF FREE FATTY ACIDS.[a]

Weigh 20 grams of fat or oil into a flask, add 50 cc of 95 per cent alcohol which has been neutralized with weak caustic soda, using phenolphthalein as indicator, and heat to boiling point. Agitate the flask thoroughly in order to dissolve the free fatty acids as completely as possible. Titrate with decinormal alkali, agitating thoroughly until the pink color persists after vigorous shaking.

Express results either as percentage of oleic acid, as acid degree (cubic centimeters of normal alkali required to neutralize the free acids

[a] Allen, Com. Org. Anal., 3d ed., vol. 2, p. 105.

in 100 grams of oil or fat), or as acid value (milligrams of potassium hydroxid required to saturate the free acids in 1 gram of fat or oil).

1 cc decinormal alkali=0.0282 gram oleic acid.

DETERMINATION OF VOLATILE ACIDS.

See methods for dairy products, Bulletin 64.

DETERMINATION OF ACETYL VALUE.[a]

Benedikt proposed to determine the hydroxy acids and alcohols by the use of acetic anhydrid $(C_2H_3O)_2O$, as illustrated in the following reaction:[b]

$$C_{17}H_{32}(OH)COOH+(C_2H_3O)_2O=C_{17}H_{32}(OC_2H_3O)COOH+HC_2H_3O_2$$

He proposed to work on the fatty acids, but the process was modified by Lewkowitsch,[c] in that he works on the oils or fats directly, which gives more exactly the true content of hydroxy acids.[d]

The procedure is as follows:

Boil the oil or fat with an equal volume of acetic anhydrid $(C_2H_3O)_2O$ for two hours and pour the mixture into a large beaker containing 500 cc of water and boil for half an hour. To prevent bumping, a slow current of carbonic acid is passed into the liquor through a finely drawn-out tube reaching nearly to the bottom. Allow the mixture to separate into two layers, siphon off the water, and boil the oily layer with fresh portions of water until it is no longer acid to litmus paper.

The acetylated fat is then separated from the water and dried and filtered in a drying oven.

Weigh from 2 to 4 grams of the acetylated fats into a flask and saponify with alcoholic potash, as in the determination of saponification equivalent. If the distillation process is adopted, it is not necessary to work with a standardized alcoholic potash solution. In case the filtration method is used, which will be found much shorter, it is necessary that the alcoholic potash should be measured exactly.

In either case evaporate the alcohol after saponification and dissolve the soap in water. Now, two procedures are possible—either distillation or filtration.

Distillation Process.

Acidify with dilute sulphuric acid (1–10) and distill the liquid as in the Reichert test. As several hundred cubic centimeters must be distilled, either a current of steam is run through or portions of water

[a] Lewkowitsch, Jour. Soc. Chem. Ind., 1897, **16**, 503–506; Benedikt, Analyse der Fette u. Wach, 3d ed., p. 146; Allen, Com. Org. Anal., 3d ed., 2, pt. 1, pp. 66–67.

[b] Benedikt and Lewkowitsch, Oils, Fats, and Waxes, p. 127.

[c] Jour. Soc. Chem. Ind., 1897, **16**, 503.

[d] J. Lewkowitsch, Jour. Soc. Chem. Ind., 1890, **9**, 846.

added from time to time. From 500 to 700 cc of distillate will be found to be sufficient. Filter the distillates to remove any insoluble acids carried over by the steam, and titrate the filtrate with decinormal potassium hydroxid, using phenolphthalein as indicator. Multiply the number of cubic centimeters of alkali employed by 5.61 and divide by the weight of substance taken. This gives the acetyl value.

Filtration Process.

Add to the soap solution a quantity of standard sulphuric acid exactly corresponding to the amount of alcoholic potash added, warm gently, and the free fatty acids will collect on top.

Filter off the liberated fatty acids, wash with boiling water until the washings are no longer acid, and titrate the filtrate with decinormal potash, using phenolphthalein as indicator. Calculate the acetyl value as before.

DETERMINATION OF PHYTOSTEROL AND CHOLESTEROL.[a]

Boil 50 grams of fat or oil in a flask with reflux condenser with 75 cc of 95 per cent alcohol for five minutes and separate alcoholic solution. Repeat with another portion of alcohol and separate. Mix the alcoholic solution with 15 cc of 30 per cent sodium hydroxid and boil in a flask with a condensation tube until one-fourth of the alcohol is evaporated. Evaporate nearly to dryness in porcelain dish and shake the residue with ether. The ethereal solution is evaporated to dryness, taken up with a little ether, filtered, again evaporated, dissolved in hot 95 per cent alcohol, and allowed to crystallize.

Cholesterol can easily be distinguished from phytosterol by the form and grouping of the crystals, also by its melting point, which is 146°,[b] while phytosterol is from 130° to 137.5°.[c]

Phytosterol is found in most vegetable oils, with the notable exception of olive and palm oils. The crystals as separated from hot alcohol appear in tufts of needles.

Cholesterol is characteristic of animal fats. It crystallizes in small, thin, colorless rhombic plates from alcoholic solution.

DETERMINATION OF THE UNSAPONIFIABLE RESIDUE.[d]

Saponify 5 grams of oil or fat with alcoholic potassium hydroxid and remove the alcohol by evaporation. Wash into separatory funnel

---

[a] Forster and Reichelmann, Analyst, 1897, **22**, 131; E. Salkowski, Ztsch. anal. Chem., 1887, **26**, 557; E. Von Raumer, Ztsch. angew. Chem., 1898, **13**, 555–556; Jour. Soc. Chem. Ind., 1898, **17**, 774; H. Kreis and O. Wolf, Jour. Soc. Chem. Ind., 1898, **17**, 1075.

[b] E. Salkowski, Ztschr. anal. Chem., 1887, **26**, 557.

[c] Bömer, Ztschr. Unter. d. Nahr u. Genuss, 1898, **1**, 81.

[d] Allen. Com. Org. Anal., 3d ed., vol. **2**, pp. 1 and 113.

with from 70 to 100 cc of water and extract with from 50 to 60 cc of ether. In case the two liquids do not separate, a few cubic centimeters of alcohol may be added. Separate the water solution and wash the ether with water containing few drops of sodium hydroxid. Again extract the soap solution and washings with ether and evaporate the combined extracts to dryness. In most cases it is advisable to add a little alcoholic potassium hydroxid to the residue and heat in order to saponify any traces of fats left unsaponified and extract again with ether. Transfer to a weighed dish and dry as quickly as possible in water oven.

Many of the hydrocarbon oils are volatile at 100°, so that the drying should not be carried any further than necesary. With resin oil, paraffin wax, and the denser mineral oils there is little danger of loss at 100°.

On account of the solubility of soap in ether and petroleum ether it is well to wash with warm water containing a little phenolphthalein. If it shows alkaline reaction there is soap present.

DETERMINATION OF MELTING POINTS OF FATS.

Wiley's Method.[a]

PREPARATION OF REAGENTS.

(*a*) A piece of ice floating in distilled water that has been recently boiled.

(*b*) A mixture of alcohol and water of the same specific gravity as the fat to be examined. This is prepared by boiling distilled water and 95 per cent alcohol for ten minutes to remove the gases which they may hold in solution. While still hot, the water is poured into the test tube described below until it is nearly half full. The test tube is nearly filled with the hot alcohol, which is carefully poured down the side of the inclined tube to avoid too much mixing. If the alcohol is not added until the water has cooled, the mixture will contain so many air bubbles as to be unfit for use. These bubbles will gather on the disk of fat as the temperature rises and finally force it to the top.

APPARATUS.

The apparatus for determining the melting point consists of an accurate thermometer reading easily tenths of a degree; a cathetometer for reading the thermometer (but this may be done with an eyeglass if held steadily and properly adjusted); a thermometer; a tall beaker 35 cm high and 10 cm in diameter; a test tube 30 cm long and 3.5 cm in diameter; a stand for supporting the apparatus; some method of stirring the water in the beaker (for example, a blowing

[a] U. S. Dept. Agr., Div. Chem. Bul. 46, revised, p. 52.

bulb of rubber and a bent glass tube extending to near the bottom of the beaker). (See fig. 3.)

DETERMINATION.

The disks of fat are prepared as follows: The melted and filtered fat is allowed to fall from a dropping tube from a height of from 15 to 20 cm on a smooth piece of ice floating in distilled water that has been recently boiled. The disks thus formed are from 1 to 1.5 cm in diameter and weigh about 200 mg. By pressing the ice under the water

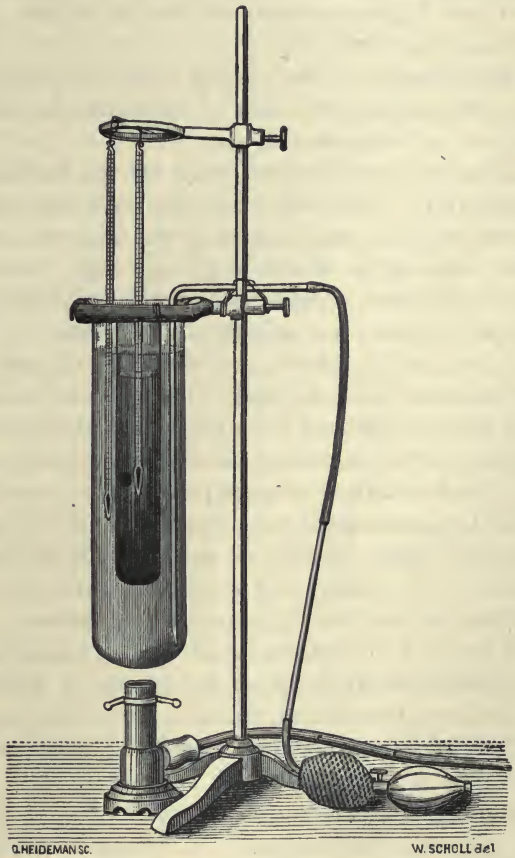

FIG. 3.—Apparatus for the determination of the melting point.

the disks are made to float on the surface, whence they are easily removed with a steel spatula, which should be cooled in the ice water before using.

The disks must be allowed to stand for two or three hours, in order to obtain the normal melting point.

The test tube containing the alcohol and water is placed in a tall beaker containing water and ice until cold. The disk of fat is then dropped into the tube from the spatula, and at once sinks until it

reaches a part of the tube where the density of the alcohol water is exactly equivalent to its own. Here it remains at rest and free from the action of any force save that inherent in its own molecules.

The delicate thermometer is placed in the test tube and lowered until the bulb is just above the disk. In order to secure an even temperature in all parts of the alcohol mixture in the vicinity of the disk, the thermometer is moved from time to time in a circularly pendulous manner.

The disk having been placed in position, the water in the beaker is slowly heated and kept constantly stirred by means of the blowing apparatus already described.

When the temperature of the alcohol-water mixture rises to about 6° below the melting point, the disk of fat begins to shrivel and gradually rolls up into an irregular mass.

The thermometer is now lowered until the fat particle is even with the center of the bulb. The bulb of the thermometer should be small, so as to indicate only the temperature of the mixture near the fat. A gentle rotatory movement should be given to the thermometer bulb. The rise of temperature should be so regulated that the last 2° of increment require about ten minutes. The mass of fat gradually approaches the form of a sphere, and when it is sensibly so the reading of the thermometer is to be made. As soon as the temperature is taken the test tube is removed from the bath and placed again in the cooler. A second tube, containing alcohol and water, is at once placed in the bath. The test tube (ice water having been used as a cooler) is of low enough temperature to cool the bath sufficiently. After the first determination, which should be only a trial, the temperature of the bath should be so regulated as to reach a maximum of about 1.5° above the melting point of the fat under examination.

The edge of the disk should not be allowed to touch the sides of the tube. This accident rarely happens, but in case it should take place and the disk adhere to the sides of the tube, a new trial should be made.

Triplicate determinations should be made, and the second and third results should show a close agreement.

Example—Melting point of sample of butter:	Degrees.
First trial	33.15
Second trial	33.05
Third trial	33.00

DETERMINATION OF MELTING POINT OF FATTY ACIDS.[a]

Draw up the melted fatty acid into a very thin-walled capillary tube 1 or 2 inches long, according to the length of bulb of the thermometer used. Seal one end of the tube and allow the fatty acid to cool on ice

[a] U. S. Dept. Agr., Div. of Chem. Bul. 13, pt. 4, p. 448; Benedikt and Lewkowitsch, Oils, Fats, and Waxes, p. 97; Wiley, Prin. and Prac. Agr. Anal., vol. 3, p. 321.

for from twelve to fifteen hours. Then attach to the bulb of a delicate thermometer graduated to one-fifth degree, immerse in a beaker of water, and warm up very slowly. The point where the acid becomes transparent is taken as the melting point.

DETERMINATION OF MAUMENÉ NUMBER.[a]

A beaker, 5 inches by 1½ inches, is placed inside of another, 6 inches by 3 inches, and a wet mixture of asbestus and plaster of paris tightly packed around the inner beaker.[b] This, when dried, makes a hard, solid packing, which radiates heat very slowly.

Remove the inner beaker, weigh into it 50 grams of fat, and note the temperature carefully. Then, from a pipette which will deliver it in approximately one minute, add 10 cc of the strongest sulphuric acid, which is at the same temperature as the oil.

While the acid is being introduced, stir the oil and acid with the bulb of an accurate thermometer. Then hold the thermometer carefully in the center of mixture, and when the mercury reaches the highest point, note the reading. It is easy to determine this point, as the column of mercury remains stationary for some time. It is necessary to take care not to read the temperature too soon, as some oils take considerable time to reach their maximum point.

The difference between the initial reading and the final reading, expressed in degrees centigrade, give the Maumené number.

Great care must be taken to have the acid of the highest strength. It is always best to test the apparatus and acid by use of water and oils of known purity. With 50 grams of water and 10 cc of 99 per cent sulphuric acid, Thomson and Ballantyne[c] obtained a rise of 46.5°. Working with acid of specific gravity of 1.844 the average of a number of determinations in this laboratory was 45°, but this will vary with the apparatus and manipulator.

The acid which is used in testing the apparatus should be used in all the determinations and care taken that it does not lose its strength. When this test is conducted with care, it is one of the most valuable in detection of adulteration in fats and oils.

In reporting results obtained, the rise of temperature with water should be stated, otherwise no comparative value can be attached to the results.

DETERMINATION OF RESIN OIL.

Take the pure oil or a definite dilution with petroleum ether and polarize in a 200 mm tube.

---

[a] Allen, Com. Org. Anal., 3d ed., vol. 2, pt. 1, p. 76.

[b] The apparatus described is one used by the writer in working with a large number of oils and fats, and was found to give very satisfactory results.

[c] Jour. Soc. Chem. Ind., 1891, **10**, 234.

Resin oil has a polarization of from +30 to +40 on the sugar scale (Schmidt and Haensch) in a 200 mm tube, while other oils read between +1° and −1°.

HALPHEN[a] REACTION FOR COTTON-SEED OIL.

Carbon disulphid, containing about 1 per cent of sulphur in solution, is mixed with an equal volume of amyl alcohol. Mix equal volumes of this reagent and the oil under examination and heat in a bath of boiling brine for fifteen minutes. If no red or orange tint is produced, 1 cc more of reagent is added and the mixture again heated for fifteen minutes. The presence of 1 per cent of cotton-seed oil will be shown by this treatment.

At the same time it must be remembered that lard and lard oil from animals fed on cotton-seed meal will give a faint reaction; also the fatty acids from the same.

This test is more sensitive than the Bechi test and less liable to give unsatisfactory results in the hands of an unexperienced person. It is not affected by rancidity. The depth of color is proportional, to a certain extent, to the amount of oil present, and by making comparative tests with cotton seed some idea as to the amount present can be obtained, but it must be remembered that different oils react with different intensities, and oils which have been heated to 200° to 210° react with greatly diminished intensity.[b] Heating ten minutes at 250° renders cotton-seed oil incapable of giving the Halphen reaction.[c]

BECHI OR SILVER NITRATE TEST FOR COTTON-SEED OIL.

Reagent.[d]—Dissolve 2 grams of silver nitrate in 200 cc of 95 per cent alcohol and 40 cc of ether, adding 1 drop of nitric acid.

Mix 10 cc of oil or melted fat, 5 cc of reagent, and 10 cc of amyl alcohol[e] in a test tube. Divide, heat one-half in a boiling water bath for ten minutes, and then compare with portion not heated. Any blackening due to reduced silver shows presence of cotton-seed oil.

Other oils which have become rancid,[f] and lards which have been steamed or heated at high temperature, contain decomposition prod-

[a] G. Halphen, Jour. Pharm. Chim., 1897, **6**, 390–391; Analyst, 1897, **22**, 326; Allen, Com. Org. Anal., 3d ed., vol. 2, pt. 1, p. 143; Winton, Conn. Exp. Sta. Rept., 1900, pt. 2, p. 144.

[b] Allen, Com. Org. Anal., 3d ed., vol. 2, pt. 1, p. 143.

[c] Holde and R. Pelgry, Jour. Soc. Chem., Ind., 1899, **18**, 711.

[d] Pearman and Moor, Allen, Com. Org. Anal., 3d ed., vol. 2, pt. 1, p. 143. Wesson, Jour. Am. Chem. Soc., 1895, **17**, 724.

[e] The addition of amyl alcohol is not necessary, but the writer finds it very convenient, as it dissolves the oils or fats and enables one to mix the oil and reagent much better.

[f] Wesson Jour. Am. Chem. Soc., 1895, **17**, 724; A. L. Winton, Conn. Expt. Sta. Rept., 1900, pt. 2, p. 143.

ucts, which have a reducing action on silver nitrate. Hence the oils[a] or fats should be purified before testing.

To purify the oils and fats, heat from 20 to 30 grams on water bath for a few minutes with 25 cc of 95 per cent alcohol,[b] shake thoroughly, decant as much of the alcohol as possible, and wash with 2 per cent nitric acid,[c] and finally with water. The oil or lard thus purified will give no reduction at all if it contains no cotton-seed oil. Heating the oils or fats to 100° or simple washing with 2 per cent nitric acid is not sufficient, except in a few cases.

With oils the use of the Halphen and Bechi tests will be found to be useful as a means of approximately determining the amounts of adulteration present. If Halphen gives a reaction and Bechi does not, the adulteration with cotton-seed oil is probably less than 20 per cent.

SEPARATION OF ARACHIDIC ACID.[d]

Saponify 10 grams of oil with alcoholic potash[e] in flask connected with reflux condenser; then add dilute solution of acetic acid to very slight excess. Add enough 95 per cent alcohol to dissolve the free fatty acids, if any separate; then add excess of a saturated solution of lead acetate in 50 per cent alcohol, filter off precipitate of lead soap, wash the soap into a flask by means of a stream of ether, add 100 cc of ether to flask, cork and agitate, and allow to stand for some hours; then filter and wash with ether. The lead soap can be easily washed from the filter paper into a flask by means of a stream of hot water.

Add an excess of dilute hydrochloric acid, fill up the flask with hot water, allow the free fatty acids to harden and separate from the precipitated lead chlorid, wash, drain, dry, and dissolve the fatty acids in 50 cc of boiling 90 per cent (by volume) alcohol. The crystals of arachidic acid separate out as the liquid cools. Cool to 15° to 20° and allow to stand some time. Filter, wash the precipitate twice with 10 cc 90 per cent (by volume) alcohol, and then with alcohol of 70 per cent (by volume). Dissolve off the filter with boiling absolute alcohol or ether; evaporate to dryness in weighed dish, dry, and weigh; add to this weight

[a] The writer found, in testing a large number of salad oils, which, according to the Halphen test, contain no cotton-seed oil, that nearly all gave a brown coloration with Bechi reagent, and in some cases reduced silver. These same oils on being purified gave no reaction.

[b] Used by the writer and found to be much more convenient and just as satisfactory as dilute alkali.

[c] Wesson, Jour. Am. Chem. Soc., 1895, **17**, 724.

[d] Renard, Cr., 1871, **73**, 1330; Benedikt and Lewkowitsch, Oils, Fats, and Waxes, p. 365.

[e] This modification of Renard's method was suggested by Tolman (Bull. 65). The use of alcohol in the saponification and precipitation enables one to more readily extract with ether.

0.0025 gram for each 10 cc of 90 per cent alcohol used in the crystallization and washing if done at 15°; if done at 20°, 0.0045 gram for each 10 cc.

The melting point of arachidic acid obtained in this way is between 71° and 72°. Twenty times the weight of arachidic acid will give the approximate amount of peanut oil present.

Another method which gives as satisfactory an approximation of the amount of peanut oil present is to allow the arachidic[a] acid to crystallize in a 100 cc graduated cylinder and measuring the volume of the precipitate. This volume will have to be determined for the working temperature and the length of time by use of known mixtures of peanut oil. Cotton-seed and lard oil give slight precipitates when treated by this method.

Arachidic acid has a characteristic structure and can be detected by the microscope.

No examination of olive oil is complete without making the test for peanut oil, which probably is the most common adulterant, especially in French and Italian oils.

BAUDOUIN TEST FOR SESAME OIL.

Dissolve 0.1 gram of finely powdered sugar in 10 cc hydrochloric acid of sp. gr. 1.20, and add 20 cc of the oil to be tested, shake thoroughly for aminute, and allow to stand.

The aqueous solution separates almost at once. In the presence of a very small admixture of sesame oil this is colored crimson. Some olive oils give a pink coloration with this reagent, but they are not hard to distinguish if comparative tests with sesame oil are made.

VILLIVECCHIA[b] TEST FOR SEASAME OIL.

Mix 2 grams of furfural with 100 cc 95 per cent alcohol; add 0.1 cc of this solution and 10 cc hydrochloric acid, sp. gr. 1.20, to 10 cc of oil and mix thoroughly by shaking in a test tube; the same color is developed as when the sugar is used.

The author of this method attributed the Baudouin test to the formation of furfural from the action of levulose and hydrochloric acid and so substituted the furfural for the sucrose.

As furfural gives a violet tint with hydrochloric acid it is necessary to use the very dilute solution given in the method.

---

[a] As the solubility of arachidic acid in 90 per cent alcohol increases very rapidly with the temperature, care must be taken to keep the temperature of crystallization down to between 15° and 20°, and to obtain satisfactory results the temperature must be same as used in the standards.

[b] Villivecchia and Fabris, Journ. Soc. Chem. Ind., 1893, **12**, 97 and 1894, **13**, 69; Benedikt and Lewkowitsch, Oils, Fats, and Waxes, p. 318.

TOCHER[a] TEST FOR SESAME OIL.

Dissolve 1 gram pyrogallol in 15 cc of concentrated hydrochloric acid. Mix this solution with 15 cc of oil in a separatory funnel and allow to stand for a minute. Draw off the aqueous layer and boil for five minutes. In the presence of sesame oil it becomes colored—red by transmitted light and blue by reflected light.

MICROSCOPICAL EXAMINATION.[b]

Dissolve in a test tube from 2 to 5 grams of oil or fat in about 10 cc of ether, plug the test tube lightly with cotton, and allow to stand fifteen or more hours in a moderately cool place.

The most characteristic crystals are obtained when the crystallization proceeds slowly and at temperature of from 22° to 24°. The first crop of crystals may be examined and the mother liquor separated and set aside for further crystallization.

In order to get rid of the oleins Gladding[c] has suggested the following:

Dissolve in an Erlenmeyer flask 5 grams of melted fat in 10 cc of absolute alcohol and 5 cc of ether, stopper with cotton and place in ice water for about one-half hour, until the more crystallizable portions of the fat have separated. The crystalline part is separated by filtration through a filter paper moistened with alcohol and washed with the alcohol-ether mixture. After drying in the air for some time the crystals are dissolved from the paper by means of ether and then treated in the same way as described in the first method. When the crystals are ready to examine a drop is removed with a pipette, placed on a slide, a drop of cotton oil or olive oil added, and a cover slip pressed gently down.

COMPOSITION AND CHARACTERISTICS OF CANNED MEAT.

Owing to the high temperature to which this product is exposed in processing (see page 1376) the addition of chemical preservatives is not necessary to prevent decomposition, and it is improbable that they are ever used for that purpose in canned meats put up in sterilized packages. At the same time, preservatives were detected in a number of samples, especially in chipped beef, canned beef, sausage, potted and deviled goods, and pâtés.

The reason for using preservatives in these goods is mentioned in

---

[a] Pharm. journ. and trans., 1891, 639; Chem. Zeit., Rep., 1891, **5**, 15–33; Benedikt and Lewkowitsch, Oils, Fats, and Waxes, p. 319; Winton, Conn. Expt. Sta. Rept., 1900, pt. 2, p. 153.

[b] U. S. Dept. Agr., Div. Chem. Bul. 13, pt. 4, p. 449; Gladding, Jour. Am. Chem. Soc., 1896, **18**, 189; Wiley Prin. and Prac. Agri. Anal., vol. 3, pp. 345–346; Winton, Report Conn. Expt. Sta., 1900, pt. 2, p. 145.

[c] Jour. Am. Chem. Soc., 1896, **18**, 189.

the description of the various classes of meats, but it may be of interest to repeat them here.

In the preparation of corned beef, some packers state that they find it necessary to add some preservative to the curing brine in order to obtain a uniform and satisfactory product. It is said that such addition is especially advantageous in warm, damp weather.

Packers who prepare canned corned beef commonly employ for canning the same product which they put on the market in bulk.

The canners who do not cure their own meat, but purchase it already prepared, often secure, without intending it, a product cured with the aid of borax of sulphites.

Preservatives found in dried or smoked beef may be due to one of two causes—first, to the use of a preservative in the curing brine which is employed preliminarily to smoking it; second, to the addition of a preservative directly to the meat before canning. We are informed that it is impossible to preserve chipped dried beef in cans in its own color without adding a small amount of some preservative, such as boric acid. Meat without such addition, it is claimed by the packers, will become darker and of inferior appearance. For this reason it is claimed that this article is not a commercial possibility without such addition.

In regard to sausages, it may be said that exactly the same article is canned that is sold in bulk, and it is claimed by manufacturers that a small amount of some chemical preservative is necessary to keep sausage which is not put up in hermetically sealed receptacles from decay for the length of time demanded by commerce.

The presence of preservatives in potted meats, deviled meats, and pâtés is due, in most cases, to the use in their preparation of either pork or beef cured in brine containing chemical preservatives.

Of the samples reported in this bulletin 290 were of American preparation, and 69 were imported from abroad. Of the total number 12.8 per cent were artificially preserved.

Of the 290 meats of American manufacture, 18 samples, or 6.2 per cent, were preserved, while 28 samples, or 40.6 per cent, of the imported meats contained chemical preservatives.

It should be said in this connection that the amount of preservative found was not excessive in any instance.

We recognize the commercial importance of securing a harmless preservative for certain kinds of food, but the evidence concerning the physiological properties of the preservatives most commonly employed is very conflicting, and until further investigations are made we do not feel warranted in expressing an opinion favorable to any of them. They certainly should only be added to foods that are plainly marked in such a way as to inform the purchaser as to the preservative contained.

The Secretary of Agriculture has been empowered by Congress to cause a systematic test of preserved substances to be made in the Bureau of Chemistry with a view to determining their physiological properties. Unfortunately it has been impossible to undertake this work on account of the lack of an appropriation to carry it out.

CANNED ROAST BEEF.

For the sake of comparison the composition of 5 samples of fresh beef is given in Table 11. Four of these samples are of interest because of the fact that they were used in the preparation of canned roast beef (see p. 1377, *et seq.*), and the composition of the latter has also been determined. Unfortunately, with the exception of No. 18968, the fats in these samples were not separated, and no data regarding them are given. It will be observed that the percentage of meat bases is materially higher in fresh beef than in the various canned products. This is to be expected, since in the preparation of roast beef the meat receives a preliminary boiling for a period lasting from fifteen minutes to one hour, while corned meat in its preparation is soaked continuously for three or four weeks in a brine and then boiled with repeated portions of water before canning. The meat bases, being soluble in water, are to some extent removed in this manner. For further information on this subject see pages 1377 to 1390.

The figures obtained in the examination of the fats separated from roast and boiled beef (Table 30) differ in some respects from the figures ordinarily published for beef fat. This is probably due to the manner of preparing the fat and is not altogether unexpected. The melting point is somewhat lower and the iodin number in several cases higher than might be expected. These peculiarities must be considered in using the results of the fat examination for the purpose of distinguishing the variety of meat present. It is to be regretted that the amount of fat obtained was often insufficient for as complete an examination as might be desired.

The extremes of the samples examined are as follows:

MEAT.

	Maximum.	Minimum.	Average.
	Per cent.	*Per cent.*	*Per cent.*
Water	66.39	45.35	58.89
Fat	31.78	5.89	13.99
Protein	34.44	21.19	25.95
Coagulated proteids	27.94	12.38	19.29
Proteoses, peptones, gelatin	7.25	1.50	3.59
Meat bases	3.21	.62	1.58
Glycogen (in dry fat-free material)	.70	.36	.50
Ash	3.51	.65	1.28

FAT.

	Maximum.	Minimum.	Average.
	Per cent.	*Per cent.*	*Per cent.*
Specific gravity at $\frac{100}{100}$	0.9046	0.8925	0.8953
Iodin number	50.61	36.10	45.64
Refraction (degrees butyro-refractometer)	55.5	47.0	52.8
Maumené value	36.0	35.6	35.8
Melting point	43.9	36.5	40.1

Working with intra-muscular beef fat obtained by extracting with petroleum ether muscular tissue from which the fatty tissue had been trimmed away as completely as possible, Hasterlik[a] obtained an iodin number of from 49.74 to 58.45.

CANNED CORNED BEEF.

(See Tables 13 and 31.)

Corned beef contains relatively less water and correspondingly more protein than canned roast or boiled beef. This is largely due to the longer boiling it receives before canning.

The long period of time during which corned beef is submerged in a brine in the course of its preparation might be expected to reduce the relative amount of meat bases and glycogen, and the repeated boiling with water, to which it is subjected before canning for the purpose of removing the salt, would naturally work in the same direction. As a matter of fact, the percentage of meat bases and glycogen found in the samples of corned beef examined was found to be materially lower than in the case of the so-called roast beef, as will be seen by the following:

	Roast or boiled beef.	Corned beef.
	Per cent.	*Per cent.*
Meat bases	0.62 to 3.21	0.62 to 1.47
Glycogen	.36 to .70	.11 to .42

The results obtained in the examination of fat (see Table 22) are very similar to those obtained with the fats of canned roast beef, the melting point being somewhat lower in some cases and the iodin number somewhat higher than the published results for beef tallow. The melting point is found to vary from 37.2 to 43.4 and the iodin number from 37.9 to 48.6.

The Maumené value was found to vary from 35.5 to 37.0°. No preservative was found in any instance.

The loss suffered by meat in the curing process has been well illus-

[a] Forsch ü. Lebensm., 1894, **1**, 127–130.

trated by Polenske,[a] who found that 7.77 per cent of the protein and 34.72 per cent of the phosphoric acid were extracted by the brine in three weeks' curing, while in six months the loss was 13.78 per cent of the protein and 54 per cent of the phosphoric acid.

CANNED DRIED AND SMOKED BEEF.

(See Tables 14 and 32.)

Smoked beef is commonly cured by the dry process and is not subjected to the leaching and consequent loss of meat bases, glycogen, and other soluble material as corned beef is. This fact is strikingly illustrated by comparing the figures of Tables 13 and 14. It will be observed that the percentage of glycogen and meat bases, as well as other soluble material, such as salt, is materially higher in dried and smoked beef than in corned beef. This is well illustrated by the following comparative statement:

	Canned smoked beef.	Canned corned beef.
	Per cent.	*Per cent.*
Glycogen	0.25 to 0.54	0.11 to 0.42
Meat bases	1.59 to 4.02	.62 to 1.47
Salt	7.15 to 11.33	2.56 to 4.68

The variation in water content of the various samples of this class is greater than might be expected; it is well known, however, that the water content of canned dried beef is considerably higher than of the same article when sold in bulk. Meat that is smoked for canning is exposed to the action of smoke and heat for a shorter time than that which is to be put on the market in bulk. The smoking is only continued long enough to give the desired flavor and insure the necessary keeping qualities, and when that point is reached is stopped in order that as much moisture as possible may be left in the meat.

Unfortunately, the samples of fat obtained from smoked beef were small and their examination less extensive than with many other classes.

The iodin number of the fats obtained from samples of dried and smoked beef was markedly higher than of the meats prepared by other methods. From this it was at first supposed that the process of smoking meat tended to increase the iodin number of its fat.

At the same time, according to Ballantyne[b] and Benedikt,[c] heating and oxidation lower the iodin number, and of course during the smoking process the meats are subjected to both heat and oxidation to a moderate extent for a considerable time.

[a] Arb. kais. Ges. Amt., 1891, 7, 471–74.

[b] J. Soc. Chem. Ind., 1891, 10, p. 31.

[c] Benedikt and Lewkowitsch, Oils, Fats, and Waxes, p. 250.

To test this matter several cured hams, both beef and pork, were cut in two and one-half of each smoked. The separated fat from both smoked and unsmoked portions was then examined, and it was found that the results obtained from the smoked sample were practically identical with those of the unsmoked.

No explanation is offered, therefore, for the high iodin numbers of the fats separated from the canned smoked meats.

HORSE MEAT.

In many European countries horse flesh is a common article of food. There can be no objection to its use on hygienic grounds, though it is somewhat tougher than the flesh of the animals more commonly employed as food, and for that reason its digestibility may be proportionally lower. At the same time it is undoubtedly nutritious, and the habits and diet of the horse are not such as to detract from its wholesomeness.

Owing to its toughness, horse meat is ordinarily regarded as inferior to pork, beef, and mutton, and is sold at a lower price. This is partly due to the fact that young horses in good condition are too valuable for other purposes to be killed for food, and the animals which are selected for that purpose are often either old or emaciated.

In this country horse meat is practically unknown as an article of human food. Over 2,000 horses are killed annually for this purpose, but it is believed that the meat is all cured and exported. The only well-authenticated case of the sale of horse meat as beef which has come to the writer's notice of recent years occurred in Wisconsin, where a man who combined the vocations of veterinary surgeon and butcher was convicted of purchasing old and crippled horses at a distance from his home and selling a portion of the meat in the form of sausage.

In the fresh state it is often possible to detect horse meat by a macroscopic examination. The muscular fiber is much coarser than that of beef and its color is a dull, reddish brown, very different from the clear red that characterizes the beef. Its flavor is pleasant and of a slightly sweetish taste, but its odor is not altogether appetizing, and becomes decidedly disagreeable long before the beginning of decomposition.

When sold in large pieces horse meat may be readily detected by the size and shape of the bones, and the tongue, heart, and liver are markedly different in shape from those of beef.

Occasional rumors regarding the sale of canned horse meat have appeared in the newspapers, but we have been unable to confirm them in any instance, and are of the opinion that this article has never been placed on the market in this country. It seems entirely fitting, however, that data regarding the composition of horse meat should be

included in this bulletin, and with this in view a number of samples were obtained and subjected to the usual examination.

Nos. 18961 to 18967, inclusive, were obtained from a horse which was killed by a runaway in the District of Columbia. Samples were taken within a short time after the death of the horse, which died without bleeding.

Samples 19016 to 19024, inclusive, were taken from horses which were slaughtered for food. These samples were taken, through the courtesy of Dr. D. E. Salmon, by Dr. Julius Huelson, an inspector of the Bureau of Animal Industry, from horses which he had inspected both before and after their slaughter, and found to be in a healthy condition. The carcasses were allowed to cool about six hours, when the samples were taken and expressed to Washington. The analyses were begun the following morning.

The results of their examination are given in Tables 15 and 33. Mixtures of horse meat with beef and pork were also prepared, and their analyses are given in Tables 16 and 34. The only characteristic feature in the composition of the muscular fiber of horse meat is its high percentage of glycogen. It has been suggested [a] that meat which contains as much as 1 per cent of glycogen calculated to the dry, fat-free material be pronounced horseflesh. It has been found, however, that it is not a safe criterion for two reasons: In the first place, certain sausages often contain an appreciable amount of liver, which contains a relatively high per cent of glycogen; second, because of the fact that glycogen begins to decompose immediately after the death of the animal, and it may readily happen that meat which originally contained a large amount of glycogen is entirely free from it after being kept a number of days. The percentage of glycogen, therefore, when applied to the detection of horse meat, is only valuable as a confirmatory test.

It will be observed that the glycogen found in the flesh of the horse killed by accident is much lower than that found in any of the three horses slaughtered, and much below the normal amount for horse meat. At the same time it is interesting to note that the percentage of glycogen in Tables 15 and 16 are uniformly higher than was found in the beef preparations. The results obtained from analysis of fats separated from the above samples afford a much better means of distinguishing the variety of meat employed.

It will be observed (see Tables 33 and 34) that these fats have a lower melting point, a higher iodin number, and a higher Maumené value than was found with beef fat. Indeed, these differences are so marked as to afford a ready means of distinction. Even in the mixtures with other meats the factors mentioned are widely different from

[a] Niebel., Ztschr. der Fleisch. und Milchhyg., 185, 210.

those obtained with the flesh of other animals. At the same time it must be remembered that the difficulty is greatly increased by smoking. The following comparative statement is of interest in this connection.

Fat from beef and horse meat.

Source of fat.	Melting point.	Chilling point.	Iodin number.	Maumené number.	Degrees butyro-refractometer.
Canned roast beef	36.5 to 43.9	27.8 to 37.0	36.1 to 50.6	35.6 to 36.0	47.0 to 55.5
Canned corned beef	37.2 to 43.4	29.0 to 34.5	37.9 to 48.6	35.5 to 37.0	52.7 to 56.0
Canned smoked beef	37.7 to 41.8	22.0 to 29.0	50.9 to 57.5	.....	51.0 to 58.5
Horse meat	27.2 to 32.5	12.0 to 25.0	61.4 to 77.0	46.2 to 56.5	55.2 to 76.5

Hasterlik[a] obtained an iodin number of from 79.71 to 85.57 in working with intra-muscular horse fat, prepared by extracting with petroleum ether muscular tissue from which the fatty tissue had been trimmed away as completely as possible.

CANNED HAM AND BACON.

(Tables 17 and 35.)

Canned ham is characterized by having a much higher percentage of fat and correspondingly lower percentage of protein than any products previously considered. It is therefore of less value for the production of muscle and of greater value for the production of heat and energy.

Of the 14 samples examined 3 were preserved with boric acid. It is probable that this preservative was added to the brine in which the ham was cured previous to smoking, as it would seem entirely unnecessary to preserve the contents of a can. In such a case a canning establishment which is not in connection with a packing house, and which cans material cured by other establishments, may unwittingly turn out a product which is artificially preserved.

The figures obtained in the examination of the fat separated from these samples (Table 35) are within the range of published analyses of lard, with the exception of the melting point, which is considerably lower. A low melting point, however, may be expected from the methods employed in preparing the sample. The iodin number is also somewhat higher than that of lard, thus carrying out the principle mentioned under smoked beef. The high iodin number and low melting point are markedly different from those obtained with beef fat, and, taken in connection with the characteristic appearance of the fat crystals obtained by evaporating the ether solution, afford a ready means of distinguishing pork in the presence of beef. This determination may be found to be of value in the examination of sausage and cheap meat.

[a] Forsch. ü. Lebensm., 1894, **1**, 127–130.

CANNED TONGUE.

In the trade canned tongue is known as ox tongue, lamb's tongue, and luncheon tongue, according as it is taken from cattle, sheep, or hogs. The figures obtained in the examination of samples of this class (Table 18) are of little interest, except that one sample was found to contain boric acid. It is probable that this preservative was used in the brine in which the tongue was cured before canning, since its addition to the canned article would seem to be unnecessary. The results of the examination of the fat separated from canned tongue (Table 36) are of interest in illustrating the value of these figures in determining the character of the meat employed.

CANNED FOWL.

The term "fowl" is here employed to include both the wild and domestic varieties. The numerous preparations supposed to be made entirely of fowl, either wild or domesticated, afford ample opportunities for the use of low-priced meats, such as beef and pork, in place of those of much greater value which are represented to be present. This is especially true of macerated meats, such as potted and deviled goods. In such articles as roast chicken, or roast turkey where the meat is left in pieces of sufficient size to permit of a macroscopic examination, these coarser meats are not used, as their presence could be readily detected. At the same time it is easily possible to replace turkey with chicken, or pheasant, woodcock, grouse, and meats of similar value with that of the common domestic fowl, which brings a much lower price under its true name. This species of fraud is probably not as far-reaching or as objectionable as is the employment of the cheaper meats under the label of those of a widely different type.

In Tables 19 and 37 are given the analyses of a series of fowl of known origin and the fat separated from the same. In some cases the whole fowl was purchased and the raw meat examined, while other samples were canned in the presence of the writer. As in the case of the meats already considered, the examination of fat affords criteria which are of considerable value in distinguishing the variety of meat employed. It does not appear to be possible to distinguish the variety of fowl, but the fats from all the samples of this class examined are markedly different from those obtained from the fats of the coarser meats which are commonly used for their adulteration. The iodin number is always much higher and the index of refraction is also usually higher if the specific gravity be taken into account. These two points added to the result of the microscopic examination often make it possible to determine with certainty the presence of beef or pork in canned fowl.

Comparison of fats from different sources.

Source of fat.	Melting point.	Chilling point.	Iodin number.	Maumené number.	Degrees butyro-refractometer.
Canned roast beef	36.5 to 43.9	27.8 to 37.0	36.1 to 50.6	35.6 to 36.0	47.0 to 55.5
Canned smoked beef	37.7 to 41.8	22.0 to 29.0	50.9 to 57.5	.....	51.0 to 58.5
Canned ham and bacon	23.6 to 30.5	17.5 to 24.0	48.5 to 68.2	39.8 to 43.5	49.0 to 58.2
Fowl	28.0 to 34.0	12.0 to 36.5	67.0 to 86.4	38.9 to 52.0	49.0 to 62.5

In Tables 37 and 38 the characteristics of the fat of canned fowl mentioned above and the features which distinguish it from the fat of beef and pork are strongly emphasized.

The crystals deposited by the evaporation of the ether solution of chicken fat resemble beef stearin in shape, but are much smaller and more delicate, and to an experienced eye are characteristic. In two of the samples examined preservatives were detected. These could not be detected, however, in other samples of the same brands obtained in the open market, and for that reason it was decided that the antiseptic substances had been added without the manufacturer's knowledge. Chicken and turkey are always canned fresh, and the presence of preservatives in hermetically sealed packages is undoubtedly superfluous.

Some light on the source of these preservatives is afforded by the fact that manufacturers and dealers in commercial preservatives recommend that dressed poultry be dipped in solutions of their wares before being placed on the market. Unfortunately there are those who are not averse to following such directions.

POTTED BEEF.[a]

(Tables 21 and 38.)

Potted beef, unlike other varieties of potted goods, is ordinarily true to its label. Of the four samples examined, but one appeared to contain any other meat than beef, and one contained boric acid as a preservative.

POTTED CHICKEN AND TURKEY.[a]

(Tables 22 and 40.)

There is no field in canned meats which offers more opportunities for adulteration than the potted meats of the more expensive grades.

[a] It is apparently understood among manufacturers that the labels of potted goods are not intended to indicate the variety of meat employed. This being true and in the absence of any established standards on the subject it is difficult to criticise goods of this nature. A certain consistency is desired by each manufacturer, and to obtain this it is often necessary to add some fat or fat meat. It may thus be found more convenient to add fat pork than fat beef. It is held by many manufacturers that the flesh of a single species does not give the flavor desired in potted and deviled goods. The fact that the smoked beef and pork is added to potted and deviled fowl instead of the cheaper fresh meat confirms this claim. At the same time there are some manufacturers who do not appear to find such mixtures advantageous. In this field, as in many others, authoritative standards are greatly needed.

As shown in Table 36, the iodin number of the fat obtained from chicken and turkey is very high. The lowest found in the fats derived from meat of known origin was 67. The iodin number of the fats separated from potted chicken and turkey, however, are quite low. Of the ten samples of potted chicken and turkey examined but three had an iodin number higher than 50, and foreign fat was detected by the microscope in one of these three. As before stated, it is difficult to criticise samples of this nature because of the absence of standards relating to them. The presence of saltpeter in the majority of the samples examined and their odor and taste would indicate that smoked meat had been employed. Even if it be argued that smoked meat is added because it is necessary to produce the desired flavor, the addition of so much as to bring the iodin number down to the normal iodin number of beef fat, indicating that the sample contained a very small admixture of fowl, would seem to be inexcusable. At the same time it must be assumed that the articles are in every case what their manufacturers have found to be acceptable to their customers and are a suitable commercial article. The question then comes as to whether any change should be required in the label. It seems unjust that a firm whose potted chicken consists almost entirely of beef or pork should be permitted to compete with one in whose goods it is apparent only enough foreign fat or fat meat has been employed to give the desired consistency.

POTTED HAM.[a]

The figures obtained in the examination of fats separated from potted ham (Table 41) are normal in all respects, except that beef was detected in 5 of the samples examined. From the odor, taste, and the presence of saltpeter it would appear that at least a portion of the meat employed was smoked. Of the 17 samples examined (Table 23) 3 were preserved with boric acid. This preservative was probably used in the brine in the preparation of the cured and smoked meat employed, since it would seem to be an unnecessary addition to the canned article. The amount of heavy metals found in these goods was higher than in most of the other classes of meats examined.

POTTED TONGUE.[a]

(Tables 24 and 42.)

Of the 21 samples examined 4 were found to be preserved with boric acid. It is probable this preservative was added to the curing brine, since the preservation of the hermetically sealed article of this nature would seem to be unnecessary. The practice of different manufacturers does not seem to be uniform as to the source of the tongues employed. An examination of the fats would indicate beef tongues in

[a] See footnote, p. 1440.

some cases and pork in others. It appears that the practice of using cured tongue in the preparation of the potted article is practically universal.

MIXED AND MISCELLANEOUS POTTED GOODS.[a]

(Tables 25 and 43.)

In view of the fact that many manufacturers seem to regard it as entirely unnecessary to make their labels conform to the contents of the can in the preparation of potted meats, the use of labels indicating such mixtures as veal and ham or turkey and tongue is somewhat unexpected. Under this heading are classed mixtures of this nature and also goods represented to be potted fowl and game. The character of these goods is quite similar to the potted meats previously mentioned. In most cases the percentage of high-priced meats appears to be quite small, and a large amount of beef and pork is evidently employed even where such admixture is not represented on the label. Here, as in the potted goods previously mentioned, considerable smoked meat is employed. In one sample, No. 18135, boric acid was detected.

DEVILED MEAT.[a]

(Tables 26 and 44.)

Deviled meats, like potted goods, are mixtures of such a nature that it is possible that they are not expected to be true to their name. At the same time, among the samples examined the amount of substitution of meats not supposed to be present is not large. In the absence of standards it is questionable whether it ought to be required that a small amount of meat other than that supposed to be present should be stated on the label. In two of the samples examined, however, the percentage of beef, as indicated by the microscopic examination and iodin number, is quite high. Of the 12 samples examined 3 were found to contain boric acid. It is evident that canned and smoked meat is used in the preparation of potted meat, and, as in the case of the class of canned meats previously mentioned, it would seem that this boric acid must have been used in the curing process.

CANNED SAUSAGE.

(Tables 27 and 45.)

Twenty-five samples of miscellaneous sausage were examined, of which only 10 were free from preservatives. Both boric acid and sulphite are used commonly for the preservation of sausage. Saltpeter was found wherever the test was made, and it would appear that

[a] See footnote, p. 1440.

the samples examined were all similar in their preparation to those sold in bulk. In European countries about 2 per cent of starch is added to boiled sausage in order to prevent the shrunken appearance of the finished product. In some of the samples examined the amount of starch present was found to be excessive.

PÂTÉS AND PURÉES.

(Tables 28 and 46.)

It would appear from the results of the examination that the fat contained in samples examined was chiefly derived from beef or pork. It is something of a surprise to find that even in a high-priced imported pâté de foie gras the traditional diseased goose livers have been replaced by beef and pork. There can certainly be no objection to such a substitution on hygienic grounds, but as a matter of interest and fair dealing it is most reprehensible

At the same time, it is not the writer's intention to criticise goods of this class, other than pâté de foie gras, on account of the fact that pork and beef fat were used in their preparation. There are manufacturers who do not use fat pork as a basis for pâtés, but the practice is almost universal. The ordinary pâtés are admitted by their manufacturers to consist largely of pork, and in the absence of official standards to guide us it would seem wise to place them in the same class as sausages, where all that is expected is that only sound, wholesome meat shall be employed.

Aside from this, the results of the analytical work reveal the presence of no objectionable substances, except that of the 43 samples examined 12 were found to be artificially preserved.

MISCELLANEOUS MEATS.

(Tables 29 and 47.)

The meats described in this class are miscellaneous in their nature, and for the most part of such a character as not to indicate the variety of meat employed in their manufacture. Of the 20 samples examined, 1 contained benzoic and 3 boric acid.

DESCRIPTIVE AND ANALYTICAL TABLES.

The tables following give in detail the results obtained in the examination of the canned meats covered by this bulletin.

TABLE 10.—*Description of samples.*

Serial No.	Description.	Manufacturer.	From whom received.	Price per can.	Weight of contents of can.
					Ounces.
18000	Roast beef	Armour Canning Co., Chicago [a]			29.1
18003	Roast beef	Libby, McNeill & Libby, Chicago [a]			30.0
18004	Extra choice roast beef	Wilson Packing Co., New York [b]	Received from court of inquiry		29.2
18005	Prime roast beef	Armour Packing Co., Kansas City, Mo	do		
18006	Prime roast beef	Armour & Co., Chicago	do		26.9
18007	Prime roast beef	Libby, McNeill & Libby, Chicago	do		28.6
18008	Fresh boiled beef	Armour Canning Co	do		13.1
18009	Prime roast beef, Premier brand	The Emery Provision Co. [c]	do		30.7
18011	Roast beef	The Cudahy Canning Co. [a]			28.6
18013	Roast beef	Armour Packing Co., Kansas City [a]			12.7
18014	Roast beef	The G. H. Hammond Co., Hammond, Ind. [a]			30.6
18018	Extra choice roast beef, Lion brand	Fairbank Canning Co., Chicago [b]			30.7
18028	Prime roast beef, Prize Winner brand	Prairie State Packing Co. [d]	Received from court of inquiry		27.4
18029	Prime roast beef	Armour Canning Co., Chicago	do		26.0
18030	Roast beef	Armour & Co., Chicago	do		29.1
18031	Prime roast beef	Armour Canning Co., Chicago	do		28.8
18102	Chicken tamale	Armour Packing Co., Kansas City	N. W. Burchell, Washington, D. C	$0.20	5.6
18103	Camp pie, Glencairn brand	Cunningham & De Fourier Co., London	do	.50	11.9
18104	Vienna sausage	National Pure Food Co., Boston and Cincinnati	do	.25	11.1
18105	Sliced Star ham	Armour & Co., Chicago	do	.25	11.4
18106	Peck's Gold Medal Cambridge sausages	Harry Peck & Co., Snow Hill, London	do	.70	24.8
18107	Finest foie gras truffé liver sausage	Henry Auerbach, Gotha, Germany	do	.50	7.9
18108	Sliced Star bacon	Armour & Co., Chicago, Ill	do	.25	10.3
18109	Irish sausages, Napier brand	Cunningham & De Fourier Co., London	do	.25	12.3
18110	Veal and ham pâté, Chandos brand	Harry Peck, London	do	.20	5.4
18111	Potted beef	Richardson & Robbins, Dover, Del	do	.20	6.6
18112	Potted game	do	do	.35	6.5
18113	Potted chicken	do	do	.35	6.6

18114	Potted turkey	....do	....do	.35	6.5
18115	Potted ham	....do	....do	.20	6.4
18116	Potted tongue	....do	....do	.20	6.2
18117	Chicken livers	....do	....do	.40	.....
18118	Boned chicken	....do	....do	.50	13.3
18119	Boned turkey	....do	....do	.50	13.6
18120	Armour's sliced dried beef, Star brand	Armour & Co., Chicago	....do	.25	11.7
18121	Cooked ox tongue	Armour Canning Co., Chicago	....do	.80	28.8
18122	Original deviled ham	Wm. Underwood & Co., Boston, Mass	....do	.30	7.0
18123	Boned turkey, Blue label	Curtice Brothers Co., Rochester, N. Y	....do	.50	12.
18124	Potted tongue, Blue label	....do	....do	.20	7.4
18125	Potted turkey, Blue label	....do	....do	.35	7.5
18126	Potted chicken, Blue label	....do	....do	.35	7.6
18127	Potted ham, Blue label	....do	....do	.20	7.6
18128	Purée de foie gras truffée	J. B. Rilhac, Brive, France	G. G. Cornwell & Son, Washington, D. C	.20	7.5
18129	Mortedella sausages	Fratelli Nanni, Bologna, Italy	....do	.30	3.6
18130	Cooked ox tongue, Yellow seal brand	E. H. Vestey Canning Co., Chicago	....do	.75	29.0
18131	Beech-nut sliced bacon	Imperial Packing Co., Canajoharie, N. Y	....do	.25	11.5
18132	Rillettes	French Delicacies and Preserve Co., New York	....do	.25	.....
18133	Rillettes truffees	....do	....do	.35	.....
18134	Potted tongue	Maconochie Brothers, London, England	....do	.18	3.4
18135	Potted ham and chicken	....do	....do	.18	3.5
18136	Potted ham	....do	....do	.18	3.4
18137	Potted mixed game	....do	....do	.18	3.4
18138	Potted ham, chicken, and tongue	....do	....do	.18	3.5
18139	Potted veal and ham	....do	....do	.05	1.5
18140	Potted Strasbourg beef	....do	....do	.05	1.4
18141	Potted ham and tongue	....do	....do	.05	1.9
18142	Potted beef	....do	....do	.05	1.8
18143	Potted turkey and tongue	....do	....do	.18	1.8
18144	Boned chicken, Blue label	Curtice Brothers Co., Rochester, N. Y	....do	.50	11.6
18145	Whole rolled ox tongue, Blue label	....do	....do	.85	23.7
18146	Select cooked lunch tongue, Helmet brand	Armour Packing Co., Kansas City	....do	.30	14.5

[a] Canned in the presence of the writer for the court of inquiry to investigate food furnished by the Subsistence Department to troops in the field, 1899.
[b] Same as Nelson Morris & Co., Chicago. [c] Same as Libby, McNeill & Libby, Chicago. [d] Same as Armour & Co., Chicago.

TABLE 10.—*Description of samples*—Continued.

Serial No.	Description.	Manufacturer.	From whom received.	Price per can.	Weight of contents of can.
					Ounces.
18147	Lunch tongue	Armour Canning Co., Chicago	G. G. Cornwell & Son, Washington, D. C.	$0.30	15.1
18148	Compressed cooked corned beef	do	do	.15	11.2
18149	Cooked compressed luncheon beef	Armour Packing Co., Kansas City	do	.15	10.8
18150	Whole boneless ham	Curtice Brothers Co., Rochester, N. Y	do	.60	24.6
18151	Galantine of wild boar's head	Cunningham & De Fourier Co., London	do	.30	7.5
18153	Potted game, extra quality	Curtice Brothers Co., Rochester, N. Y	do	.20	6.2
18154	Oxford roast turkey	Burnham & Morrill Co., Portland, Me	do	.35	13.7
18155	Oxford potted sausage	do	do	.25	14.4
18156	Frankfort sausages	C. G. Hartmann, Frankfort, Germany	do	.30	10.7
18157	Lambs' tongues	H. C. Derby & Co., New York	do	.50	20.8
18162	Smoked beef, sliced, Carmen brand	Francis H. Leggett & Co., New York	Jackson & Co., Washington, D. C	.25	9.7
18163	Compressed cooked corn beef, Lion brand	Fairbank Canning Co., Chicago	do	.25	28.0
18203	Sliced ham, Gold brand	Armour Packing Co., Kansas City	C. C. Bryan, Washington, D. C	.25	10.1
18204	Wild boar's head	Harry Peck, Snow Hill, London	do	.50	13.1
18205	Rolled tongue	Richardson & Robbins, Dover, Del	do	1.10	28.9
18206	Boneless cooked ham	do	do	1.00	35.6
18207	Original deviled turkey	Wm. Underwood Co., Boston, Mass	do	.40	7.7
18208	Original deviled chicken	do	do	.40	7.5
18209	Original deviled tongue	do	do	.30	7.4
18210	Pâté de poulet aux truffes	G. Dumontier, Brussels, Belgium	do	.30	4.2
18211	Pâté de bécasse aux truffes	do	do	.30	4.1
18212	Pâté de perdreau aux truffes	do	do	.30	4.1
18213	Peck's pâté à la diable, Archer brand	Harry Peck, London	do	.25	4.8
18214	Peck's chicken truffles, Archer brand	do	do	.25	5.0
18215	Chicken and ham pâté, Chandos brand	do	do	.25	5.2
18216	Turkey and tongue pâté, Chandos brand	do	do	.25	5.4
18217	Chicken and tongue pâté, Chandos brand	do	do	.25	5.2
18218	Potted ham, Helmet brand	Armour Packing Co., Kansas City	do	.10	3.6
18219	Vienna sausage, extra quality	do	do	.10	6.0

18220	Chicken, ham, and tongue	Cunningham & De Fourier Co., London	do	.20	6.6
18221	Delicatess frankfurter	The German-American Provision Co., New York, Chicago, and Hamburg.	do	.20	16.7
18230	Potted tongue, Pheasant brand	The Cincinnati Abattoir Co., Cincinnati, Ohio	Wilton Harvey, Washington, D. C	.05	3.5
18231	Potted ham, Pheasant brand	do	do	.05	3.4
18232	Sauerkraut, Vienna sausage, extra quality, Helmet brand.	Armour Packing Co., Kansas City	do	.10	14.3
18233	Cooked corned beef, Pheasant brand	The Cincinnati Abattoir Co., Cincinnati	do	.15	12.5
18234	Potted ham	Armour Canning Co., Chicago	Browning & Middleton, Washington, D. C	.05	3.4
18235	Chipped dried beef	do	do	.25	10.9
18236	Spiced breakfast bacon	Kingan & Co., Indianapolis, Ind	do	.25	11.2
18237	Potted ham	do	do	.05	3.8
18238	Compressed cooked corn beef	Libby, McNeill & Libby, Chicago	do	.25	23.6
18263	Potted ham, Rex brand	The Cudahy Canning Co., Omaha, Nebr	The J. C. Ergood Co., Washington, D. C	.05	3.0
18264	Sliced smoked beef, Monument brand	The J. C. Ergood Co., Washington, D. C	do	.25	9.4
18265	Potted ox tongue	Armour Canning Co., Chicago	do	.05	3.2
18266	Potted chicken, Star brand	do	do	.10	3.3
18267	Prime roast beef	do	do	.20	14.2
18268	Spiceless brawn	do	do	.20	20.4
18342	Vienna sausage	The German-American Provision Co., New York and Chicago.	E. Youngs Co., Washington, D. C	.20	9.2
18343	Potted ham	Cunningham & De Fourier Provision Co., London.	do	.20	3.3
18344	Strasbourg meats	do	do	.20	3.2
18345	Pâté ham, tongue, and chicken, Glencairn brand.	do	do	.55	14.3
18346	Purée de foies gras truffée	Louit Frères & Co., Bordeaux, France	do	.30	3.4
18347	Terrine de foies gras aux truffes, du Périgord.	"Beaumarchant," Strasbourg, Germany	do	.85	3.7
18356	Potted tongue	Cunningham & De Fourier Co., London	The J. C. Ergood Co., Washington, D. C	.25	3.3
18357	Lunch paté, Napier brand	do	do	.30	10.4
18358	Potted tongue	Libby, McNeill & Libby, Chicago	do	.25	6.6
18359	Prosciutto scelto in fette	Fratelli Lanzarini, fabr. di saliomi, Bologna, Italia.	do	.40	7.6
18363	Crêtes et rognons de coq	Paris	do	1.00	4.6
18364	Terrine de foies gras	Mosser Frères, Nancy, France	do	.65	2.4

[a] Same as Nelson Morris & Co., Chicago.

TABLE 10.—*Description of samples*—Continued.

Serial No.	Description.	Manufacturer.	From whom received.	Price per can.	Weight of contents of can.
					Ounces.
18365	Chicken sausage	Gotha Preserved Meat and Sausage Co., Gotha, Germany.	The J. C. Ergood Co., Washington, D. C.	$0.45	5.7
18368	Potted tongue	Kingan & Co., Indianapolis, Ind	Richard H. Gaskins, Washington, D. C.	.10	3.4
18369	Boned turkey, Star brand	Armour Canning Co., Chicago	do	.25	6.6
18370	Sliced breakfast bacon, Gold brand	Armour Packing Co., Kansas City	do	.25	11.8
18375	Paté de bécasse au foie gras	"Beaumarchand," Strassburg, Germany	do	.30	3.3
18386	Van Camp's Vienna sausage	Van Camp Packing Co., Indianapolis	Frank E. Altemus, Washington, D. C.	.15	17.6
18391	Vienna sausage, extra quality	Armour & Co., Chicago	Birch & Co., Washington, D. C.	.10	6.8
18392	Deviled ham	Armour Canning Co., Chicago	do	.10	3.3
18393	Deviled tongue	Armour Packing Co., Kansas City	John H. Magruder, Washington, D. C.	.05	3.2
18394	Deviled ham	do	do	.05	3.5
18395	Peck's Strassburg meats, Archer brand	Harry Peck, Snow Hill, London	do	.25	2.3
18396	Curried fowl, Glencairn brand	Cunningham & De Fourier Co., London	do	.45	13.1
18397	Quail paté, truffled	Franco-American Food Co., New York	do	.25	4.2
18398	Grouse paté, truffled	do	do	.25	4.1
18399	Chicken liver paté, truffled	do	do	.35	5.6
18400	Chicken curry à l'Indienne	Franco-American Food Co., Jersey City, N. J	do	.35	6.9
18401	Chicken paté, truffled	Franco-American Food Co., New York	do	.25	3.8
18402	Pheasant paté, truffled	do	do	.25	3.9
18403	Wild duck paté, truffled	do	do	.25	4.0
18404	Chicken sauté à la Marengo	Franco-American Food Co., Jersey City, N. J	do	.35	7.2
18405	Partridge paté, truffled	Franco-American Food Co., New York	do	.25	4.0
18406	Woodcock paté, truffled	do	do	.25	4.1
18408	Beef à la mode	Franco-American Food Co., Jersey City, N. J	do	.35	8.2
18409	Braised beef à la jardinière	do	do	.35	8.0
18410	Veal and green peas	do	do	.35	7.7
18411	Calf's tongue, sauce piquante	do	do	.35	8.2
18412	Vienna sausage	National Pure Food Co., Boston and Cincinnati	do	.20	10.6

18413	Purée de foies gras truffée	L. Hafner, Strassburg, Germany	do	.20	4.2
18414	Lunch ham	Richardson & Robbins, Dover, Del	do	.40	12.1
18415	Potted duck	do	do	.35	6.5
18416	Lunch ox tongue	do	do	.40	10.8
18417	Cooked compressed corned beef	Armour Packing Co., Kansas City, Mo	do	.15	11.6
18422	Terrine de foies gras aux truffes du Périgord	L. Henry, Strassburg, Germany	do	.65	2.0
18423	Frankfurter	Heinrich Bauer, Frankfurt a. M., Germany	do	.50	20.1
18424	Conservirte leber-wurst	Columbia Wurstfabrik	do	.50	17.9
18425	Rognons de coq		do	1.00	4.9
18427	Galatine of chicken and ham, Archer brand	Harry Peck, Snow Hill, London	do	.75	25.8
18436	Boned chicken, Star brand	Armour Canning Co., Chicago	Woodward & Lothrop, Washington, D. C	.25	6.7
18437	Vienna sausage	Armour Packing Co., Kansas City	do	.10	5.7
18438	Selected dried chipped beef, Helmet brand	do	do	.15	5.0
18439	Potted chicken, White label	do	do	.10	3.3
18441	Potted turkey, White label	do	do	.10	3.3
18446	Cooked corned beef, Fountain brand	J. & F. Schroth Packing Co., Cincinnati	Johnson's, Seventh street, Washington, D. C	.12	12.2
18447	Columbia potted chicken	Mullen-Blackledge Co., Indianapolis	do	.25	4.2
18448	Potted ham	Libby, McNeill & Libby, Chicago	do	.10	10.6
18450	Potted tongue, Rex brand	Cudahy Canning Co., Omaha, Nebr	G. W. Offutt, Washington, D. C	.05	2.8
18451	Potted tongue	Reid Bros. Packing Co., Kansas City	do	.05	3.6
18453	Sliced smoked beef, Acme brand	J. W. Beardsley's Sons, New York	M. Brashear, Washington, D. C	.25	10.5
18454	Boned turkey, first quality	A. Brakeley, Bordentown, N. J	do	.50	12.1
18455	Potted ham, Buffalo brand	Jacob Dold Canning Co., Buffalo, N. Y	do	.05	3.2
18456	Potted tongue, Buffalo brand	A. Weber & Co., St. Louis, Mo	do	.05	3.2
18457	Potted ham, first quality	do	S. F. Smith, Berwyn, Md	.05	3.1
18458	Potted tongue, first quality	do	do	.05	3.3
18459	Vienna sausage, extra quality	Kingan & Co., Indianapolis	B. B. Earnshaw & Bro., Washington, D. C	.05	11.4
18460	Corned beef	do	do	.10	12.7
18461	Van Camp's potted ham	Van Camp Packing Co., Indianapolis	do	.08	3.8
18462	Van Camp's potted tongue	do	do	.08	3.7
18463	Van Camp's potted chicken	do	do	.12	3.7
18465	Chipped dried beef	Libby, McNeill & Libby, Chicago	H. I. Meader, Washington, D. C	.25	10.4
18466	Potted tongue, Lion brand	Fairbank Canning Co., Chicago[a]	do	.10	6.8
18467	Potted ham, Lion brand	do	do	.10	6.5

[a] Same as Nelson Morris & Co., Chicago.

TABLE 10.—*Description of samples*—Continued.

Serial No.	Description.	Manufacturer.	From whom received.	Price per can.	Weight of contents of can.
					Ounces.
18527	Roast beef, Pheasant brand	Cincinnati Abattoir Co., Cincinnati	Steele & Co., New York	.....	15.4
18528	Sliced smoked beef, Eagle brand	C. D. Butt, Brooklyn, N. Y.	Tappan Bros., New York	.....	5.8
18530	Potted tongue	Eastman's Co., New York	Steele & Co., New York	.....	3.3
18532	Potted tongue	Libby, McNeill & Libby, Chicago	Evers & Ressmeyer, New York	.....	3.5
18533	Vienna sausage	.....do	.....do	.....	8.0
18538	Original deviled ham	Wm. Underwood Co., Boston	Steele & Co., New York	.....	6.9
18539	Frankfort sausages	C. G. Hartmann, Frankfort a. M., Germany	G. P. Eupher, New York	.....	30.8
18540	Pâté de perdreau au truffe	G. Dumontier, Brussels, Belgium	.....do	.....	4.1
18541	Purée de foie gras truffée	Amieux Fréres, Paris	.....do	.....	4.4
18553	Purée de faisan de Strassburg aux truffes du Périgord.	Georges Brück, Strassburg, Germany	John M. Mathews, Baltimore, Md	$0.20	2.2
18554	Purée de tungen de Strassburg aux truffes du Périgord.	.....do	.....do	.20	2.2
18555	Purée de perdreaux de Strassburg aux truffes de Périgord.	.....do	.....do	.20	2.0
18556	Purée de grives de Strassburg aux truffes de Périgord.	.....do	.....do	.20	2.6
18557	Purée de foie gras aux truffes du Périgord	L. A. Price, Bordeaux, France	.....do	.25	7.1
18558	Paté façon foie gras aux truffes	Cunningham & De Fourier Co., London	.....do	.20	10.5
18559	Turkey and tongue paté	.....do	.....do	.15	7.8
18560	Potted tongue	.....do	.....do	.20	4.1
18561	Paté de foie gras truffé	Amieux Fréres, Paris	.....do	1.00	4.2
18562	Paté de foie gras truffé, extra	L. A. Price, Bordeaux, France	.....do	1.25	6.0
18564	Conservirte Frankfurter bratwurst	Gustav Amandus, Frankfurt a. M	.....do	.50	19.9
18566	Paté de foie gras truffé du Périgord	Gabriel Triat & Co., Bordeaux	Percy M. Reese, Baltimore, Md	1.25	6.7
18567	Paté de foie gras truffé, Excelsior brand	.....do	.....do	.75	3.3
18573	Huckins's sandwich ham	J. H. W. Huckins & Co., Boston, Mass	Lewis M. Reitz & Co., Baltimore, Md	.25	12.4
18574	Huckins's sandwich chicken	.....do	.....do	.25	12.5

18575	Huckins's sandwich tongue	do	do	.25	13.4
18576	Huckins's sandwich turkey	do	do	.20	3.2
18577	Columbia potted ham	Mullen-Blackledge Co., Indianapolis	Bryant & Clarvoe, Baltimore, Md	.10	4.4
18578	Columbia potted tongue	do	do	.10	4.4
18579	Potted ham and tongue	Maconochie Bros., London, England	Geo. E. French & Co., Baltimore, Md	.15	3.5
18580	Chipped dried beef, Shield brand	Armour Canning Co., Chicago	do	.25	10.1
18581	Cooked ox tongue. Fountain brand	J. & F. Schroth Packing Co., Cincinnati	Edward Reese & Son, Baltimore, Md	.75	28.7
18586	Potted turkey, extra quality	Curtice Bros. Co., Rochester, N. Y	Jordan & Stabler, Baltimore, Md	.30	7.0
18587	Potted game, extra quality	do	do	.30	6.5
18588	Potted tongue, extra quality	do	do	.20	7.0
18589	Boned chicken, extra quality	do	do	.30	4.7
18590	Potted tongue, Helmet brand	Armour Packing Co., Kansas City	do	.10	3.5
18606	Oxford roast beef	Burnham & Morrill Co., Portland, Me	Geo. K. McGaw & Co., Baltimore, Md	.25	18.7
18607	Oxford roast veal	do	do	.25	19.2
18608	Oxford roast chicken	do	do	.25	19.5
18609	Oxford roast duck	do	do	.25	20.6
18610	Oxford roast goose	do	do	.25	18.4
18611	Rolled tongue, extra quality	Richardson & Robbins, Dover, Del	do	1.00	29.6
18612	Superior curried fowl	do	do	.45	16.9
18613	Terrine de foie gras aux truffes du Périgord	B. Laforest, Périgueux	do	1.50	8.8
18614	Purée de foie gras truffée	do	do	.25	.....
18615	Echte Frankfurter würste	Türk & Papst, Frankfurt a. M	do	.50	19.8
18616	Finest foie gras truffle sausage	Henry Auerbach, Gotha, Germany	George K. McGraw & Co., Baltimore, Md.	1.00	15.2
18617	Calf s tongue, tomato sauce	Franco-American Food Co., New York	do	.40	21.2
18618	Deviled ham, Blue label	Curtice Bros. Co., Rochester, N. Y	do	.25	10.5
18621	Lambs' tongues	George D. Brown & Co., Boston, Mass	do	.60	21.0
18639	Potted ham, Thistle brand	T. E. Wells Co., Chicago	Geo. W. McPherson, Washington, D. C	.45	6.9
18640	Cooked lunch tongue, Lion brand	Fairbank Canning Co., Chicago [a]	Emrich Beef Co., Washington, D. C.	.28	14.9
18645	Potted ham, Queen City brand	Queen City Canning Co., Buffalo, N. Y	C. F. Carr & Bro., Hyattsville, Md	.05	3.2
18646	Sliced smoked beef, Oxford brand	American Beef and Fish Co., New York	do	.25	9.7
18647	Compressed cooked corned beef, Buffalo brand	Jacob Dold Canning Co., Buffalo, N. Y	do	.15	13.4
18648	Plymouth Rock roast chicken	Potter & Wrightington, Boston, Mass	do	.50	22.7
18650	Potted tongue, Thistle brand	T. E. Wells Co., Chicago	Geo. W. McPherson, Washington, D. C	.35	6.9
18658	Martedella sausages	Fratelli Lanzarini, Bologna, Italia	G. G. Cornwell & Son, Washington, D. C.	.30	.....

[a] Same as Nelson Morris & Co., Chicago.

TABLE 10.—*Description of samples*—Continued.

Serial No.	Description.	Manufacturer.	From whom received.	Price per can.	Weight of contents of can.
					Ounces.
18961	Fresh horse meat, second cut, round [a]				
18962	Fresh horse meat, first cut, round [a]				
18963	Fresh horse meat, shoulder clod [a]				
18964	Fresh horse meat, cross ribs [a]				
18965	Fresh horse meat, chuck [a]				
18966	Fresh horse meat, plate [a]				
18967	Fresh horse meat, brisket [a]				
18968	Fresh beef, chuck		A. A. Winfield, Washington, D. C.		
18969	Pork, rib and loin		do		
18970	Equal parts of horse meat (shoulder clod) (18963) and beef chuck (18968).				
18971	Two parts of horse meat (18963) and one part beef chuck (18968).				
18972	Equal parts of pork (rib and loin) (18969) and mixture of horse meat (first cut round) (18962) and shoulder clod (18963).				
18973	One part of pork (rib and loin) (18969) and two parts of horse meat (cross ribs) (18964).				
18974	Equal parts of pork (rib and loin) (18969), beef chuck (18968), and horse meat (cross ribs) (18964).				
18975	One part horse meat (plate) (18966), two parts beef chuck (18968).				
18976	One part horse meat (plate) (18966), two parts pork (rib and loin) (18969).				
18977	Portion of horse meat (cross ribs) (18964) canned in laboratory.				

19016	Horse meat, chuck, horse No. 1		Through Bureau of Animal Industry, from Dr. Julius Huelson, Newark, N. J.		
19017	Horse meat, chuck, horse No. 2				
19018	Horse meat, chuck, horse No. 3				
19019	Horse meat, ribs, horse No. 1				
19020	Horse meat, ribs, horse No. 2				
19021	Horse meat, ribs, horse No. 3				
19022	Horse meat, flank, horse No. 1				
19023	Horse meat, flank, horse No. 2				
19024	Horse meat, flank, horse No. 3				
19378	Canned turkey, white meat (without soup liquor).	Armour & Co., Chicago [b]			
19379	Canned turkey, dark meat (without soup liquor).	do. [b]			
19380	Canned chicken, white meat (without soup liquor).	Libby, McNeill & Libby, Chicago [b]			
19381	Canned chicken, dark meat (without soup liquor).	do. [b]			
19382	Deviled ham, American brand	German-American Provision Co., Chicago		$0.09	7.1
19383	Potted ham, American brand	do		.09	7.1
19384	Deviled tongue, American brand	do		.09	7.0
19385	Deviled tongue, American brand	do		.09	6.9
19386	Coin special compressed cooked corned beef	The G. H. Hammond Co., Hammond, Ind	M. Wolff & Sons, Chicago, Ill	.21	24.5
19387	Coin special extra choice chipped beef	do	do	.19	11.7
19388	Coin special prime roast beef	do	do		29.3
19389	Coin special superior quality brawn, English style.	do	do	.17	24.2
19390	Coin special compressed cooked luncheon ham	do	do	.18	24.7
19391	Coin special selected sugar-cured lunch tongue	do	do	.50	15.1
19392	Coin special extra selected ox tongue	do	do	.68	28.1
19393	Coin special potted beef	do	do	.07	3.3
19394	Coin special potted ham	do	do	.07	3.4
19395	Coin special deviled ham	do	do	.08	3.2

[a] Taken from a horse killed as a result of an accident.

[b] Canned in the presence of the writer.

TABLE 10.—*Description of samples*—Continued.

Serial No.	Description.	Manufacturer.	From whom received.	Price per can.	Weight of contents of can.
					Ounces.
19396	Coin special sliced breakfast bacon	The G. H. Hammond Co., Hammond, Ind	M. Wolff & Sons, Chicago, Ill	$0.18	11.0
19397	Coin special Vienna sausage	do	do	.12	13.9
19441	White meat of chicken		W. M. Moreland, Center Market, Washington		
19442	Dark meat of chicken		do		
19446	Meat of Pekin duck		John T. Rabbitt, Center Market, Washington		
19450	Meat of Mallard duck		W. M. Moreland, Center Market, Washington		
19477	White meat of turkey		Belle C. Saunders, Washington		
19478	Dark meat of turkey		do		

TABLE 11.—*Composi*

Serial No.	Manufacturer.	Composition of original material.										
		Water.	Water in fat-free substances.	Fat.	Nitrogen.				Nitrogenous substances.			
					Total.	Insoluble in hot water.	Precipitated by bromin.	Meat bases.	Protein (N×6.25).	Proteids insoluble in hot water.	Gelatinoids and proteids precipitated by bromin.	Meat bases.
		P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
17985	Armour & Co., Chicago, Ill...	71.17	78.96	9.89	3.00	2.44	0.21	0.35	18.75	15.25	1.31	1.09
17986	Nelson, Morris & Co., Chicago, Ill.	67.71	77.72	12.86	3.04	2.32	.21	.51	19.00	14.50	1.31	1.59
17996	The G. H. Hammond Co., Hammond, Ind.	69.33	77.62	10.68	3.05	2.52	.17	.36	19.06	15.75	1.06	1.12
18036	Armour Packing Co., Kansas City, Kans.	65.81	77.73	15.33	2.83	2.36	.14	.33	17.69	14.78	.87	1.02
18968	A. A. Winfield, Washington, D. C.	66.92	78.05	14.26	3.19	2.42	.24	.53	19.94	15.12	1.50	1.65
	Average	68.19	78.02	12.60	3.02	2.41	.19	.43	18.89	15.08	1.21	1.29
	Maximum	71.17	78.96	15.33	3.19	2.52	.24	.53	19.94	15.75	1.50	1.65
	Minimum	65.81	77.62	9.89	2.83	2.32	.14	.33	17.69	14.50	.87	1.02

TABLE 12.—*Composition of*

Serial No.	Manufacturer.	Composition of original material.										
		Water.	Water in fat-free substances.	Fat.	Nitrogen.				Nitrogenous substances.			
					Total.	Coagulated proteids.	Precipitated by bromin.	Meat bases.	Protein (N×6.25).	Coagulated proteids.	Gelatinoids and proteids precipitated by bromin.	Meat bases.
		P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
18000	Armour Canning Co.	62.47	68.43	9.87	4.35	3.56	0.42	0.37	27.19	22.25	2.63	1.15
18003	Libby, McNeill & Libby	60.24	70.21	14.20	3.93	2.65	.76	.52	24.56	16.56	4.75	1.62
18004	Wilson Packing Co.	64.77	72.43	10.58	3.44	1.98	.95	.51	21.50	12.38	5.94	1.59
18005	Armour Packing Co.	58.17	68.58	15.17	3.98	3.10	.50	.38	24.90	19.38	3.13	1.19
18006	Armour & Co.	62.29	69.14	9.91	4.19	3.13	.56	.50	26.21	19.56	3.50	1.56
18007	Libby, McNeill & Libby	59.88	70.47	15.02	3.88	2.68	.45	.75	24.27	16.75	2.81	2.34
18008	Armour Canning Co.	57.90	65.06	11.00	5.04	3.63	.63	.78	31.53	22.69	3.94	2.43
18009	Libby, McNeill & Libby	66.39	72.70	8.67	3.60	1.98	.59	1.03	22.52	12.38	3.69	3.21
18011	The Cudahy Packing Co.	51.97	68.23	23.83	3.83	2.86	.34	.63	23.96	17.88	2.13	1.97
18013	Armour Packing Co.	56.18	67.67	16.96	4.28	3.37	.41	.50	26.78	21.06	2.56	1.56
18014	The G. H. Hammond Co.	57.58	62.39	7.72	5.51	4.47	.58	.46	34.44	27.94	3.63	1.44
18018	Nelson Morris & Co.	60.80	66.93	9.16	4.52	3.79	.36	.37	28.25	23.69	2.26	1.15
18028	Prairie State Packing Co.	59.36	66.67	10.96	4.54	3.34	.58	.62	28.38	20.88	3.62	1.93
18029	Armour Canning Co.	51.08	69.14	26.12	3.46	2.50	.50	.46	21.63	15.63	3.13	1.43
18030	Armour & Co.	58.09	65.94	11.91	4.60	3.56	.73	.31	28.75	22.25	4.56	.97
18031	do	55.93	69.86	19.94	3.90	2.78	.70	.42	24.38	17.38	4.38	1.31
18033	Unlabeled	58.46	69.54	15.94	3.81	3.02	.39	.41	23.81	18.88	2.38	1.28
18034	do	65.39	72.25	9.49	3.39	2.03	1.16	.20	21.19	12.69	7.25	.62
18267	Armour Canning Co.	45.35	66.47	31.78	3.50	2.81	.26	.43	21.88	17.56	1.62	1.34
18527	Cincinnati Abattoir Co.	60.07	63.80	5.89	5.14	4.45	.24	.45	32.12	27.81	1.50	1.40
18606	Burnham & Morrill Co	63.49	74.49	14.77	3.31	2.55	.28	.48	20.69	15.94	1.75	1.50
19388	The G. H. Hammond Co.	59.80	65.61	8.85	5.11	3.64	.92	.55	31.94	22.75	5.75	1.72
	Average	58.89	68.45	13.99	4.15	3.09	.57	.49	25.95	19.29	3.59	1.58
	Maximum	66.39	74.49	31.78	5.51	4.47	1.16	1.03	34.44	27.94	7.25	3.21
	Minimum	45.35	62.39	5.89	3.31	1.98	.24	.09	20.69	12.38	1.50	.62

tion of fresh beef.

Composition of original material.								Composition of dry material.				Serial No.
Starch.	Glycogen, calculated to dry, fat-free material.	Saltpeter.	Total ash.	Sodium chlorid.	Heavy metals per kilogram.	Preservatives.	Total.	Protein (N×6.25).	Fat.	Ash.	Sodium chlorid.	
P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*Milligrams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	
.....	.....	.....	0.96	0.04	.....	.....	99.67	65.04	34.30	3.33	0.16	17985
.....	.....	.....	.91	.06	.....	.....	98.88	58.84	39.83	2.82	.19	17986
.....	.....	.....	1.13	.24	.....	.....	99.07	62.14	34.84	6.68	.78	17996
.....	.....	.....	1.00	.04	.....	.....	98.81	51.74	44.84	2.92	1.17	18036
.....	0.38	.....	.78	Tr.	.....	.....	100.32	60.28	43.10	2.36	Tr.	18968
.....	.....	.....	.96	.08	.....	.....	99.35	59.61	39.38	3.62	.46	
.....	.....	.....	1.13	.24	.....	.....	100.32	65.04	44.84	6.68	1.17	
.....	.....	.....	.78	Tr.	.....	.....	98.81	51.74	34.30	2.36	Tr.	

canned roast and boiled beef.

Composition of original material.								Composition of dry material.				Serial No.
Starch.	Glycogen, calculated to dry, fat-free material.	Saltpeter.	Total ash.	Sodium chlorid.	Heavy metals per kilogram.	Preservatives.	Total.	Protein (N×6.25).	Fat.	Ash.	Sodium chlorid.	
P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*Milligrams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	
.....	0.36	None	0.91	0.19	.....	.....	99.28	72.44	26.30	2.42	0.51	18000
.....	.41	None	1.43	.74	.....	.....	98.80	61.77	35.72	3.60	1.86	18003
.....	.....	0.06	2.73	2.51	.....	.....	97.99	61.03	30.03	7.75	7.12	18004
.....	.....	None	1.14	.....	.....	.....	98.18	59.50	36.28	2.73	.....	18005
.....	.....	None	.89	.....	.....	.....	97.71	69.44	26.28	2.36	.....	18006
.....	.....	None	1.46	.61	.....	.....	98.26	60.44	37.44	3.64	1.52	18007
.....	.60	None	1.24	.22	.....	.....	99.20	74.88	26.36	2.95	.52	18008
.....	.....	None	2.09	1.09	.....	.....	96.43	66.94	25.80	6.22	3.24	18009
.....	.....	None	1.34	.46	.....	.....	99.12	49.82	49.61	2.79	.96	18011
.....	.....	None	.78	.08	.....	.....	99.10	61.07	38.70	1.78	.18	18013
.....	.45	None	.82	.04	.....	.....	99.13	81.20	18.20	1.93	.09	18014
.....	.....	None	1.11	.19	.....	.....	98.17	72.05	23.37	2.83	.48	18018
.....	.....	None	.78	.05	.....	.....	97.53	69.81	26.97	1.92	.12	18028
.....	.....	None	.79	.17	.....	.....	98.18	44.19	53.40	1.61	.35	18029
.....	.....	None	.86	.09	.....	.....	98.64	68.57	28.41	2.05	.21	18030
.....	.70	None	.65	.07	.....	.....	99.59	55.32	45.25	1.47	.16	18031
.....	.....	0.02	1.64	.85	.....	.....	99.58	57.32	38.37	3.95	2.05	18033
.....	.....	0.05	3.51	1.97	.....	.....	98.95	61.25	27.42	10.14	5.69	18034
.....	.63	None	1.07	.14	.....	.....	98.72	40.00	58.16	1.96	.26	18267
.....	.49	None	.92	.05	.....	.....	97.73	80.44	14.75	2.30	.13	18527
.....	.62	None	.92	.....	.....	.....	98.37	56.67	40.48	2.52	.....	18606
.....	.27	None	1.11	.....	.....	.....	99.98	79.45	22.02	2.76	.....	19388
.....	.50	.....	1.28	.53	.....	.....	.....	63.80	33.15	3.26	1.41	
.....	.70	.....	3.51	2.51	.....	.....	.....	81.20	58.16	10.14	7.12	
.....	.36	.....	.65	.04	.....	.....	.....	40.00	14.75	1.47	.09	

TABLE 13.—*Composition of*

Serial No.	Manufacturer.	Composition of original material.									
		Water.	Water in fat-free substances.	Fat.	Nitrogen.				Nitrogenous substances.			
					Total.	Insoluble in hot water.	Precipitated by bromin.	Meat bases.	Protein (N×6.25).	Proteids insoluble in hot water.	Gelatinoids and proteids precipitated by bromin.	Meat bases.
		P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
17524	The Cudahy Canning Co											
18148	Armour Canning Co	56.39	67.23	16.14	3.72	3.06	0.23	0.43	23.25	19.12	1.44	1.34
18149	Armour Packing Co	58.45	65.95	11.41	4.11	3.29	.48	.34	25.69	20.56	3.00	1.06
18163	Fairbank Canning Co	59.27	63.28	6.33	4.67	4.02	.20	.45	29.19	25.12	1.25	1.40
18233	The Cincinnati Abattoir Co	56.14	60.03	6.48	4.89	4.33	.31	.25	30.56	27.06	1.94	.78
18238	Libby, McNeill & Libby	46.94	60.71	22.68	3.99	3.48	.24	.27	24.94	21.75	1.50	.84
18417	Armour Packing Co	60.10	68.37	12.09	3.90	3.01	.46	.43	24.38	18.81	2.88	1.34
18446	J. & F. Shroth Packing Co	59.92	68.15	6.55	4.83	4.10	.53	.20	30.19	25.62	3.31	.62
18460	Kingan & Co	59.84	64.46	12.19	4.47	3.74	.26	.47	27.94	23.38	1.63	1.47
18647	The Jacob Dold Canning Co	52.99	64.09	17.32	3.82	3.30	.24	.28	23.88	20.62	1.50	.87
19386	The G. H. Hammond & Co	53.50	61.58	13.12	4.20	3.47	.28	.45	26.25	21.69	1.75	1.40
	Average	56.35	64.31	11.43	4.26	3.58	.32	.36	26.63	22.37	2.02	1.11
	Maximum	60.10	68.37	22.68	4.89	4.33	.53	.47	30.56	27.06	3.31	1.47
	Minimum	46.94	60.03	6.33	3.72	3.01	.20	.20	23.25	18.81	1.25	.62

TABLE 14.—*Composition of canned*

Serial No.	Manufacturer.	Composition of original material.									
		Water.	Water in fat-free substances.	Fat.	Nitrogen.				Nitrogenous substances.			
					Total.	Insoluble in hot water.	Precipitated by bromin.	Meat bases.	Protein (N×6.25).	Proteids insoluble in hot water.	Gelatinoids and proteids precipitated by bromin.	Meat bases.
		P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
18120	Armour Canning Co	59.58	62.57	4.78	4.00	3.30	0.06	0.62	25.00	20.62	0.38	2.00
18235	.....do	39.22	42.13	6.92	6.49	4.83	.37	1.29	40.56	30.19	2.31	4.02
18465	Libby, McNeill & Libby	41.95	43.99	4.63	6.07	4.70	.17	1.20	37.94	29.38	1.06	3.74
18580	Armour Canning Co	47.97	53.38	10.13	5.14	3.98	.14	1.02	32.12	24.88	.88	3.18
18162	Francis H. Leggett & Co	52.87	55.53	4.78	4.80	3.89	.07	.84	30.00	24.31	.44	2.62
18264	The J. C. Ergood Co	50.29	54.24	7.31	4.90	4.04	.11	.75	30.62	25.25	.69	2.34
18438	Armour Packing Co	41.40	44.96	7.91	5.62	4.91	.20	.67	35.12	30.69	1.25	1.59
18453	J. W. Beardsley's Sons	49.71	54.69	9.10	4.70	3.75	.11	.84	29.38	23.44	.69	2.62
18528	C. D. Butt	44.44	48.85	9.02	5.34	4.61	.14	.59	33.38	23.81	.88	1.84
18646	American Beef and Fish Co	48.77	55.66	12.37	4.51	3.81	.11	.59	28.19	23.81	.69	1.84
19387	The G. H. Hammond & Co	45.37	47.50	4.59	5.78	4.65	.14	.99	36.12	29.06	.88	3.09
	Average	47.42	51.23	7.46	5.21	4.22	.15	.85	32.59	26.41	.92	2.63
	Maximum	59.58	62.57	12.37	6.49	4.91	.37	1.29	40.56	30.69	2.31	4.02
	Minimum	39.22	42.13	4.59	4.00	3.30	.06	.59	25.00	20.62	.38	1.59

[a] On being notified of the presence of boric acid in this sample, the manufacturers protested that they did not use it. A reexamination of the original sample confirmed the result here given. In new samples of the same brand bought on the market, however, boric acid could not be detected.

canned corned beef.

Composition of original material.								Composition of dry material.				Serial No.
Starch.	Glycogen, calculated to dry, fat-free material.	Saltpeter.	Total ash.	Sodium chlorid.	Heavy metals per kilogram.	Preservatives.	Total.	Protein (N×6.25).	Fat.	Ash.	Sodium chlorid.	
P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*Milligrams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	17524
.....	.....	0.06	3.66	2.60	.....	None	98.09	.....	37.01	8.39	5.96	18148
.....	0.20	.06	3.57	2.82	.....	....do	98.11	.....	27.46	8.59	6.79	18149
.....	.32	.12	4.44	3.91	.....	....do	97.98	.....	15.54	10.90	9.60	18163
.....	.42	.12	5.64	4.13	.....	....do	98.24	.....	14.77	12.86	9.42	18233
.....	.36	.12	4.56	4.00	.....	....do	98.45	.....	42.75	8.59	7.54	18238
.....	.30	.03	3.68	2.56	Tin... 66.6 Zinc.. 58.0	....do	98.93	.....	30.30	9.22	6.42	18417
.....	.11	.....	3.80	2.61	.....	....do	99.82	.....	33.54	9.48	6.51	18446
.....	.20	.11	3.02	.....	.....	....do	98.62	.....	17.90	8.76	7.52	18460
.....	.30	.....	5.48	.....	.....	....do	98.78	.....	36.84	11.65	9.71	18647
.....	.....	.....	7.38	4.68	.....	....do	98.84	.....	28.22	15.87	13.06	19386
.....	.25	.09	4.69	3.37	.....	.....	.....	.....	28.43	10.43	8.25	
.....	.42	.12	7.38	4.68	.....	.....	.....	.....	42.75	15.87	13.06	
.....	.11	.03	3.57	2.56	.....	.....	.....	.....	14.77	8.39	5.96	

dried and smoked beef.

Composition of original material.								Composition of dry material.				Serial No.
Starch.	Glycogen, calculated to dry, fat-free material.	Saltpeter.	Total ash.	Sodium chlorid.	Heavy metals per kilogram.	Preservatives.	Total.	Protein (N×6.25).	Fat.	Ash.	Sodium chlorid.	
P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*Milligrams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	
.....	0.25	0.08	9.77	7.15	Tin.. 193.0	Boric acid .	97.36	61.88	11.82	24.17	20.69	18120
.....	.....	.14	17.30	10.91	Tin.. 116.0 Zinc. 111.0	....do	100.10	59.82	11.38	25.52	22.09	18235
.....	.54	.17	14.00	11.13	Tin.. 240.0	....do[a]	94.93	65.32	7.98	24.12	21.17	18465
.....	.....	.08	9.69	8.96	Tin.. 144.0 Zinc. 136.0	None	96.81	61.38	19.47	18.62	17.22	18580
.....	.43	.14	11.77	10.08	Tin.. 150.9	Boric acid, abundant.	96.93	63.63	11.22	24.97	21.38	18162
.....	.36	.07	11.10	7.62	.....	Boric acid .	97.05	61.63	10.12	22.33	19.33	18264
.....	.....	.17	16.84	11.23	.....	....do	99.85	59.94	13.50	28.73	27.16	18438
.....	.27	.10	10.65	8.62	Tin.. 248.0 Zinc. 138.0	....do[b]	96.31	54.13	18.10	19.62	15.88	18453
.....	.31	.05	12.24	.....	.....	....do	97.18	48.81	16.23	22.03	19.91	18528
.....	.....	.06	9.58	.....	Tin.. 150.0 Zinc. 74.5	.....	97.12	55.00	24.15	18.70	15.89	18646
.....	.....	.03	14.72	11.33	.....	None	97.74	66.14	8.40	26.93	24.73	19387
.....	.36	.10	12.51	9.67	.....	.....	.....	59.79	13.85	23.25	20.50	
.....	.54	.17	17.30	11.33	.....	.....	.....	66.14	24.15	28.73	27.16	
.....	.25	.03	9.58	7.15	.....	.....	.....	48.81	7.98	18.62	15.88	

[b] Manufacturers state that they purchase cured beef and were not aware that it contained a preservative. (See page 1432).

TABLE 15.—*Compo*

Serial No.	Description.	Composition of original material.										
					Nitrogen.				Nitrogenous substances.			
		Water.	Water in fat-free substance.	Fat.	Total.	Insoluble in hot water.	Precipitated by bromin.	Meat bases.	Protein (N×6.25).	Proteids insoluble in hot water.	Gelatinoids and proteids precipitated by bromin.	Meat bases.
		P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
18961	Horse meat, second cut, round.[a]	74.18	76.62	3.18	3.43	2.46	0.12	0.85	21.44	15.38	0.75	2.65
18962	Horse meat, first cut, round[a].	73.36	75.78	3.19	3.56	2.21	.13	1.22	22.25	13.81	.81	3.81
18963	Horse meat, shoulder clod[a] ..	73.40	77.45	5.23	3.21	2.13	.17	.91	20.06	13.31	1.06	2.84
18964	Horse meat, cross ribs[a]	73.17	77.77	5.91	3.00	2.15	.14	.71	18.75	13.44	.88	2.22
18965	Horse meat, chuck[a]	67.10	78.21	14.20	2.54	1.92	.15	.47	15.88	12.00	.94	1.47
18966	Horse meat, plate[a]	52.16	78.63	33.66	2.13	1.33	.18	.62	13.31	8.31	1.12	1.93
18967	Horse meat, brisket[a]	62.25	70.87	18.16	3.15	2.36	.14	.65	19.69	14.75	.88	2.03
19016	Horse meat, chuck, horse No. 1.	70.44	77.25	8.82	3.06	2.49	.25	.32	19.13	15.56	1.56	1.00
19017	Horse meat, chuck, horse No. 2.	73.71	76.65	3.34	3.23	2.69	.22	.32	20.19	16.81	1.38	1.00
19018	Horse meat, chuck, horse No. 3.	76.91	79.46	3.21	3.31	2.61	.20	.50	20.69	16.31	1.25	1.56
19019	Horse meat, ribs, horse No. 1.	65.90	76.44	13.79	3.29	2.43	.20	.66	20.56	15.19	1.25	2.06
19020	Horse meat, ribs, horse No. 2.	72.74	76.20	4.54	3.60	2.97	.20	.43	22.50	18.56	1.25	1.34
19021	Horse meat, ribs, horse No. 3.	76.24	77.20	1.24	3.35	2.92	.21	.22	20.94	18.25	1.31	.69
19022	Horse meat, flank, horse No. 1.	57.62	76.50	24.68	2.67	2.23	.14	.30	16.69	13.94	.88	.94
19023	Horse meat, flank, horse No. 2.	71.37	77.09	7.42	3.29	2.54	.36	.39	20.56	15.88	2.25	1.22
19024	Horse meat, flank, horse No. 3.	76.39	78.48	2.66	3.01	2.52	.34	.15	18.81	15.75	2.12	.47
	Average	69.81	76.91	9.61	3.11	2.37	.20	.55	19.47	14.83	1.23	1.70
	Maximum	76.91	79.46	33.66	3.60	2.97	.36	1.22	22.50	18.56	2.25	3.81
	Minimum	52.16	70.87	1.24	2.13	1.33	.12	.15	13.31	8.31	.75	.47

[a] Meat from horse killed by accident.

sition of horse meat.

Composition or original material.								Composition of dry material.				Serial No.
Starch.	Glycogen, calculated to dry, fat-free material.	Saltpeter.	Total ash.	Sodium chlorid.	Heavy metals per kilogram.	Preservatives.	Total.	Protein (N×6.25).	Fat.	Ash.	Sodium chlorid.	
P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*Milligrams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P ct.*	*P. ct.*	
.....	0.62	.....	1.04	Tr.	.....	.....	97.32	83.00	12.32	4.03	Tr.	18961
.....	1.17	.....	1.10	Tr.	.....	.....	96.33	83.50	11.97	4.13	Tr.	18962
.....	1.17	.....	.97	Tr.	.....	.....	97.06	75.44	19.66	3.65	Tr.	18963
.....	.86	.....	.97	Tr.	.....	.....	96.77	69.88	22.03	3.62	Tr.	18964
.....	.75	.....	1.09	0.01	.....	.....	96.94	48.25	43.16	3.31	0.03	18965
.....	.92	.....	.65	Tr.	.....	.....	97.96	27.81	70.36	1.36	Tr.	18966
.....	.78	.....	1.06	Tr.	.....	.....	99.33	52.13	47.10	1.35	Tr.	18967
.....	1.47	.....	1.16	Tr.	.....	.....	98.84	64.50	29.84	3.92	Tr.	19016
.....	2.14	.....	1.27	.01	.....	.....	98.49	76.82	14.61	4.83	.04	19017
.....	4.32	.....	.63	Tr.	.....	.....	100.73	84.57	13.90	2.73	Tr.	19018
.....	3.00	.....	.92	Tr.	.....	.....	99.72	60.31	40.44	2.70	Tr.	19019
.....	2.38	.....	.98	.01	.....	.....	99.95	82.50	16.65	3.59	.04	19020
.....	3.11	.....	1.03	Tr.	.....	.....	99.55	88.13	5.86	4.33	Tr.	19021
.....	2.37	.....	1.11	.....	.....	.....	99.59	39.37	58.24	2.62	.....	19022
.....	1.49	.....	1.00	.09	.....	.....	99.47	71.82	25.92	3.49	.31	19023
.....	2.53	.....	1.13	.....	.....	.....	99.05	79.69	11.27	4.79	.....	19024
.....	1.82	.....	1.01	.009	.....	.....	98.47	67.98	27.71	3.18	.03	
.....	4.33	.....	1.27	.09	.....	.....	100.73	88.13	70.36	4.13	.31	
.....	.62	.....	.63	Tr.	.....	.....	99.33	27.81	5.86	1.36	Tr.	

TABLE 16.—*Composition of*

Serial No.	Description.	Composition of original material.										
		Water.	Water in fat-free substance.	Fat.	Nitrogen.				Nitrogenous substances.			
					Total.	Insoluble in hot water.	Precipitated by bromin.	Meat bases.	Protein (N × 6.25).	Proteids insoluble in hot water.	Gelatinoids and proteids precipitated by bromin.	Meat bases.
		P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
18968	Fresh beef, chuck	66.92	78.05	14.26	3.19	2.42	0.24	0.53	19.94	15.12	1.50	1.65
18969	Fresh pork, rib and loin	51.80	78.32	33.86	2.15	1.57	.25	.33	13.44	9.81	1.56	1.03
18962	Horse meat, first cut, round	73.36	75.78	3.19	3.56	2.21	.13	1.22	22.25	13.81	.81	3.81
18963	Horse meat, shoulder clod	73.40	77.45	5.23	3.21	2.13	.17	.91	13.06	13.31	1.06	2.84
18964	Horse meat, cross ribs	73.17	77.77	5.91	3.00	2.15	.14	.71	18.75	13.44	.88	2.22
18970	Equal parts horse meat, shoulder clod, and beef chuck.	66.38	71.96	7.76	3.84	3.51	.07	.26	24.00	21.94	.44	.81
18971	One part beef chuck and two parts horse shoulder clod.	67.91	74.25	8.54	3.44	2.87	.13	.44	21.50	17.94	.81	1.37
18972	Equal parts pork, rib and loin, and horse meat.	59.64	76.27	21.80	2.75	1.99	.21	.55	17.19	12.44	1.31	1.72
18973	One part pork, rib and loin, two parts horse meat (cross ribs).	65.24	81.55	20.00	2.18	1.81	.08	.29	13.63	11.31	.50	.90
18974	Equal parts horse meat (cross ribs), beef chuck, and pork, rib and loin.	62.38	76.16	18.09	2.73	2.51	.12	.10	17.06	15.69	.75	.31
18975	One part horse meat (plate), two parts beef chuck.	58.63	69.99	16.23	3.70	3.20	.12	.38	23.12	20.00	.75	1.19
18976	One part horse meat (plate), two parts pork, rib and loin.	51.52	76.17	32.36	2.40	1.92	.14	.34	15.00	12.00	.88	1.06

horse meat mixed with beef and pork.

Composition of original material.								Composition of dry material.				Serial No.
Starch.	Glycogen, calculated to dry, fat-free material.	Saltpeter.	Total ash.	Sodium chlorid.	Heavy metals per kilogram.	Preservatives.	Total.	Protein (N×6.25).	Fat.	Ash.	Sodium chlorid.	
P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*Milligrams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct*	
.....	0.48	.....	0.78	Tr.	.....	.....	100.32	60.28	43.10	2.36	Tr.	18968
.....	.28	.....	.78	Tr.	.....	.....	98.88	27.87	70.25	1.62	Tr.	18969
.....	1.07	.....	1.10	Tr.	.....	.....	96.33	83.50	11.97	4.13	Tr.	18962
.....	1.17	.....	.97	Tr.	.....	.....	97.06	75.44	19.66	3.65	Tr	18963
.....	.86	.....	.97	Tr.	.....	.....	96.77	69.88	22.03	3.62	Tr.	18964
.....	.39	.....	1.38	0.05	.....	.....	98.81	71.42	23.08	4.10	0.15	18970
.....	.33	.....	1.01	Tr.	.....	.....	97.66	67.00	26.61	3.15	Tr.	18971
.....	.32	.....	.92	Tr.	.....	.....	97.89	42.56	54.02	2.28	Tr.	18972
.....	.34	.....	.71	Tr.	.....	.....	98.71	39.19	57.54	2.04	Tr.	18973
.....	.31	.....	1.05	Tr.	.....	.....	98.33	45.38	48.09	2.79	Tr.	18974
.....	.68	.....	1.13	Tr.	.....	.....	98.10	55.87	39.23	2.73	Tr	18975
.....	.31	.....	.81	.01	.....	.....	98.68	30.94	66.75	1.67	.021	18976

TABLE 17.—*Composition*

Serial No.	Description and manufacturer.	Composition of original material.										
		Water.	Water in fat-free substance.	Fat.	Nitrogen.				Nitrogenous substances.			
					Total.	Coagulated proteids.	Precipitated by bromin.	Meat bases.	Protein (N×6.25).	Coagulated proteids.	Gelatinoids and proteids precipitated by bromin.	Meat bases.
		P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
18105	Sliced Star ham, Armour & Co.	43.80	71.84	38.22	2.07	1.62	0.06	0.39	12.94	10.12	0.38	1.22
18150	Boneless ham, Curtice Bros. Co.	53.30	64.09	16.84	3.75	3.15	.10	.50	23.44	19.69	.62	1.56
18203	Gold Band sliced ham, Armour Packing Co.	48.27	68.72	29.78	2.82	1.89	.09	.84	17.62	11.81	.56	2.62
18206	Boneless cooked ham, Richardson & Robbins.	41.53	63.50	34.60	3.03	2.50	.12	.41	18.94	15.62	.75	1.28
18359	Prosciutts Scelto in Fette, Fratelli Lanzarini.	36.77	57.27	35.79	3.05	1.96	.19	.90	19.06	12.25	1.19	2.81
18414	Lunch ham, Richardson & Robbins.	40.74	59.53	31.56	3.68	3.21	.16	.31	23.00	20.06	1.00	.97
18573	Huckins sandwich ham, J. H. W. Huckins & Co.	36.56	72.17	49.34	2.04	1.77	.07	.20	12.75	11.06	.44	.62
19390	Ham. "Coin Special," The G. H. Hammond Co.	50.87	69.12	26.42	2.94	2.55	.34	05	18.38	15.94	2.12	.16
18108	Sliced Star bacon, Armour & Co.	15.34	21.24	27.79	6.68	4.75	.74	1.19	41.75	29.69	4.62	3.72
18131	Beechnut bacon, Imperial Packing Co.	18.59	26.42	29.59	5.74	4.10	.26	1.38	35.88	25.62	1.62	4.31
18236	Sliced breakfast bacon, Kingan & Co.	20.73	67.06	69.07	1.07	.92	.07	.08	6.69	5.80	.44	.25
18370	Gold Band sliced bacon, Armour Packing Co.	19.69	62.99	68.74	1.40	.91	.10	.39	8.75	5.69	.62	1.22
18969	Fresh pork, rib and loin, A. A. Winfield.	51.80	78.32	33.86	2.15	1.57	.25	.33	13.44	9.81	1.56	1.03
	Average	36.77	60.17	37.81	3.11	2.38	.20	.54	19.43	14.86	1.22	1.67
	Maximum	53.30	78.32	69.07	6.68	4.75	.74	1.38	41.75	29.69	4.62	4.31
	Minimum	15.34	21.24	16.84	1.07	.91	.06	.05	6.69	5.69	.38	.16

of canned ham and bacon.

Composition of original material.								Composition of dry material.				
Fat.	Glycogen, calculated to dry, fat-free material.	Saltpeter.	Ash.	Sodium chlorid.	Heavy metals per kilogram.	Preservatives.	Total.	Protein (N×6.25).	Fat.	Ash.	Sodium chlorid.	Serial No.
P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*Milligrams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	
.....	.....	.....	3.86	3.29	Trace lead.	None	97.60	23.00	68.01	6.87	5.85	18105
.....	0.17	0.05	5.43	4.34	.....	Boric acid[a].	97.54	50.19	36.06	11.63	9.29	18150
.....	.....	.....	5.03	4.10	.....	None	98.07	34.06	57.58	9.72	7.93	18203
.....	.17	.10	4.33	3.66	.....	.....do	98.25	32.38	59.17	7.40	6.26	18206
.....	.....	.09	8.37	7.51	.....	Boric acid..	97.38	30.12	56.60	13.24	11.88	18359
.....	.10	.06	3.84	3.08	Tin .. 125.0 Zinc . 63.0	None	98.26	38.81	53.26	6.48	5.19	18414
.....	.....	.02	1.75	.....	.....	.....	99.79	20.13	77.77	2.76	.....	18573
.....	.....	.03	3.55	2.39	.....	None	99.09	37.37	53.77	7.23	4.86	19390
.....	.12	.....	15.02	13.28	.....	.....do	96.28	49.31	32.82	17.74	15.69	18108
.....	.....	.....	19.90	17.84	.....	.....do	99.63	44.06	36.35	24.44	21.91	18131
.....	.58	.....	3.06	2.37	.....	.....do	99.41	8.44	87.13	3.86	2.99	18236
.....	.....	.02	2.57	2.27	.....	.....do	98.55	10.87	85.60	3.20	2.83	18370
.....	.27	.....	.78	Tr.	.....	.....do	98.88	27.87	70.25	1.62	Tr.	18969
.....	.23	.05	5.88	5.34	.....	.....	96.84	31.28	59.56	8.93	7.89	
.....	.58	.10	19.90	17.84	.....	.....	.....	50.19	87.13	24.44	21.91	
.....	.10	.02	.78	Tr.	.....	.....	.....	8.44	32.82	1.62	Tr.	

[a] The manufacturers state, "Most of our hams are purchased from the large producers in Chicago." (See page 1432.)

TABLE 18.—*Composition*

Serial No.	Description and manufacturer.	Composition of original material.										
					Nitrogen.				Nitrogenous substances.			
		Water.	Water in fat-free substance.	Fat.	Total.	Insoluble in hot water.	Precipitated by bromin.	Meat bases.	Protein (N×6.25).	Proteids insoluble in hot water.	Gelatinoids and proteids precipitated by bromin.	Meat bases.
		P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
18411	Calf's tongue; sauce piquante, Franco-American Food Co.	71.80	77.06	6.84	2.46	2.10	0.02	0.34	15.38	13.12	0.12	1.06
18617	Calves' tongue with tomato sauce, Franco-American Food Co.	68.83	74.70	7.87	2.86	2.38	.06	.42	17.88	14.88	.38	1.31
18157	Lambs' tongues, H. C. Derby & Co.	65.41	79.54	17.76	2.21	1.95	.19	.07	13.81	12.19	1.19	.22
18621	Lambs' tongues, Geo. D. Brown & Co.	64.90	80.51	19.39	2.09	1.76	.16	.17	13.06	11.00	1.00	.53
18146	Luncheon tongue, Armour Packing Co.	54.98	68.55	19.79	3.27	2.78	.14	.35	20.44	17.38	.88	2.09
18147	Luncheon tongue, Armour Canning Co.	54.29	66.32	18.14	3.54	3.00	.11	.43	22.12	18.75	.69	1.34
18575	Huckins sandwich tongue, J. H. W. Huckins & Co.	39.58	63.61	38.09	.....	.....	.....	.....	.....	.....	.....	.....
18640	Cooked lunch tongue, Lyon brand, Fairbank Canning Co.	52.95	67.45	21.49	3.13	2.60	.21	.32	19.56	16.25	1.31	1.00
19391	Lunch tongue, "Coin Special," G. H. Hammond & Co.	52.67	68.18	22.74	3.22	2.55	.42	.25	20.13	15.94	2.62	.78
18121	Cooked ox tongue, Armour Canning Co.	53.89	64.45	16.39	3.80	3.06	.25	.49	23.75	19.12	1.56	1.54
18130	Cooked ox tongue, E. H. Vestey Canning Co.	55.69	68.73	18.97	3.23	2.50	.14	.59	20.19	15.62	.88	1.84
18145	Rolled ox tongue, Curtice Bros. Co.	51.24	62.07	17.25	3.95	3.20	.31	.44	24.69	20.00	1.94	1.37
18205	Rolled ox tongue, Richardson & Robbins.	45.44	60.98	25.48	3.55	2.85	.32	.38	22.19	17.81	2.00	1.19
18416	Lunch ox tongue, Richardson & Robbins.	40.38	62.65	35.55	2.95	2.16	.26	.53	18.44	13.50	1.62	1.65
18581	Cooked ox tongue, J. & F. Schroth Packing Co.	64.64	78.21	17.36	2.29	1.82	.11	.36	14.31	11.38	.69	1.12
18611	Whole rolled ox tongue, Richardson & Robbins.	46.41	67.62	31.37	3.76	2.81	.23	.72	23.50	17.56	1.44	2.25
19292	Ox tongue, "Coin Special," G. H. Hammond & Co.	54.83	68.07	19.45	3.44	2.52	.48	.44	21.50	15.75	3.00	1.37
	Average	55.17	68.16	20.23	3.11	2.50	.21	.39	19.43	15.64	1.33	1.23
	Maximum	71.80	80.51	38.09	3.95	3.20	.48	.72	24.69	20.00	3.00	2.25
	Minimum	39.58	60.98	6.84	2.09	1.76	.02	.07	13.06	11.00	.12	.22

of canned tongue.

Composition of original material.								Composition of dry material.				Serial No.
Starch.	Glycogen, calculated to dry, fat-free material.	Saltpeter.	Total ash.	Sodium chlorid.	Heavy metals per kilogram.	Preservatives.	Total.	Protein (N×6.25).	Fat.	Ash.	Sodium chlorid.	
P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*Milligrams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	
.....	0.19	0.02	2.44	1.67	.....	None	97.57	54.63	42.25	8.65	5.92	18411
.....	.....	.....	2.12	.....	.....	.....do.....	95.39	57.38	25.25	6.80	.....	18617
.....	.36	.....	1.04	.37	.....	.....do	97.87	39.94	51.34	3.01	1.07	18157
.....	.....	.....	.78	.....	.....	.....	97.60	37.25	55.24	2.22	.....	18621
.....	.16	.03	3.78	2.40	.....	None	97.97	45.38	43.96	8.39	5.33	18146
.....	.18	.....	4.30	.....	.....	.....do	97.56	48.38	39.69	9.41	.....	18147
.....	.....	.02	6.22	3.27	.....	.....do	.....	.....	63.04	10.29	5.41	18575
.....	.27	.04	4.79	.....	.....	.....do	97.90	41.57	66.92	10.18	.....	18640
.....	.12	.15	4.27	3.27	.....	.....do	99.20	42.50	48.05	9.02	6.91	19391
.....	.....	.10	4.50	3.18	.....	.....do	97.10	51.50	35.55	9.76	6.89	18121
.....	.20	.32	5.07	3.74	.....	Boric acid[a]	98.44	45.57	42.81	11.44	8.44	18130
.....	.22	.08	5.44	4.20	.....	None	97.39	50.63	35.38	11.16	8.61	18145
.....	.34	.05	5.57	4.42	.....	.....do	97.64	40.69	46.70	10.21	8.10	18205
.....	.....	.08	3.25	3.79	.....	.....do	96.03	30.94	59.63	5.45	6.36	18416
.....	.....	.02	.....	1.62	.....	.....do	95.21	40.50	49.10	.....	4.58	18581
.....	.36	.04	.....	.....	.....	.....do	99.17	38.88	58.54	.....	.....	18611
.....	.....	.10	2.14	.....	.....	.....do	96.64	47.63	43.06	4.74	.....	19392
.....	.24	.08	3.71	2.90	.....	.....	.....	44.59	48.62	8.05	6.15	
.....	.36	.32	6.22	4.42	.....	.....	.....	57.38	66.92	11.44	8.61	
.....	.12	.02	.78	.37	.....	.....	.....	30.94	25.25	2.22	1.07	

[a] Manufacturers state that they buy cured meat for canning.

TABLE 19.—*Composition*

Serial No.	Description and manufacturer.	Composition of original material.										
					Nitrogen.				Nitrogenous substances.			
		Water.	Water in fat-free substance.	Fat.	Total.	Coagulated proteids.	Precipitated by bromin.	Meat bases.	Protein (N×6.25).	Coagulated proteids.	Gelatinoids and proteids precipitated by bromin.	Meat bases.
		P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
19380	Canned chicken, white meat, without soup liquor, Libby, McNeill & Libby.[a]	64.59	65.79	1.82	4.89	4.23	0.20	0.46	30.56	26.44	1.25	1.44
19381	Canned chicken, dark meat, without soup liquor, Libby, McNeill & Libby.[a]	64.65	67.90	4.78	5.14	4.09	.76	.29	32.12	25.56	4.75	.90
19441	White meat of chicken[b]	61.38	75.08	18.25	2.73	2.50	.11	.12	17.06	15.62	.69	.37
19442	Dark meat of chicken[b]	59.48	78.44	24.16	2.55	2.02	.20	.33	15.94	12.62	1.25	1.03
19378	Canned turkey, white meat, without soup liquor, Armour & Co.[a]	63.05	68.00	7.41	4.62	4.45	.17	.06	28.87	27.81	1.06	.....
19379	Canned turkey, dark meat, without soup liquor, Armour & Co.[a]	64.30	67.49	4.72	4.56	4.06	.25	.25	28.50	25.38	1.56	.78
19477	White meat of turkey[b]	55.50	74.70	25.71	2.93	2.51	.....	.42	18.31	15.69	.....	1.31
19478	Dark meat of turkey[b]	54.73	75.76	27.76	2.68	2.31	.....	.37	16.75	14.44	.....	1.15
19446	Meat of Pekin duck[b]	47.46	78.20	39.31	2.14	1.77	.22	.14	13.37	11.06	1.38	.43
19450	Meat of mallard duck[b]	69.06	75.98	7.11	3.08	2.56	.31	.21	19.25	16.00	1.94	.65
	Average	60.42	72.73	16.30	3.53	3.05	.22	.26	22.07	19.06	1.39	.81
	Maximum	69.06	78.44	39.31	5.14	4.45	.76	.46	32.12	27.81	4.75	1.44
	Minimum	47.46	65.79	1.82	2.14	1.77	.11	.06	13.37	11.06	.....	.....

[a] Canned in the writer's presence. [b] Prepared in laboratory.

of fowl of known origin.

Composition of original material.								Composition of dry material.				Serial No.
Starch.	Glycogen, calculated to dry, fat-free material.	Saltpeter.	Total ash.	Sodium chlorid.	Heavy metals per kilogram.	Preservatives.	Total.	Protein (N×6.25).	Fat.	Ash.	Sodium chlorid.	
P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*Milligrams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	
.....	.....	.....	0.58	0.13	.....	.....	96.12	86.31	5.14	1.64	0.37	19380
.....	.....	.....	.87	.....	.....	.....	101.51	90.88	13.52	2.46	.....	19381
.....	.....	.....	1.05	.....	.....	.....	97.36	44.12	47.26	2.72	.....	19441
.....	.....	.....	.94	.....	.....	.....	99.48	39.31	59.62	2.32	.....	19442
.....	.....	.....	1.08	.01	.....	.....	100.41	78.13	20.05	2.92	.03	19378
.....	.....	.....	2.61	Trace.	.....	.....	99.35	79.82	13.22	7.31	Tr.	19379
.....	.....	.....	.90	.....	.....	.....	99.11	41.13	57.78	2.02	.....	19477
.....	.....	.....	.90	.....	.....	.....	98.98	37.00	61.32	1.99	.....	19478
.....	.....	.....	.85	.....	.....	.....	100.49	25.44	74.82	1.62	.....	19446
.....	.....	.....	1.15	.....	.....	.....	97.91	62.19	29.44	3.72	.....	19450
.....	.....	.....	1.09	.047	.....	.....	.....	58.43	38.22	2.87	.13	
.....	.....	.....	2.61	.13	.....	.....	.....	90.88	74.82	7.31	.37	
.....	.....	.....	.58	Trace.	.....	.....	.....	25.44	5.14	1.62	Trace.	

TABLE 20.—*Composition of*

Serial No.	Description and manufacturer.	Composition of original material.										
		Water.	Water in fat-free substance.	Fat.	Nitrogen.				Nitrogenous substances.			
					Total.	Coagulated proteids.	Precipitated by bromin.	Meat bases.	Protein (N×6.25).	Coagulated proteids.	Gelatinoids and proteids precipitated by bromin.	Meat bases.
		P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
18118	Boned chicken, Richardson & Robbins.	58.44	65.50	10.76	4.69	3.89	0.37	0.43	29.31	24.31	2.31	1.34
18144	Boned chicken, Curtice Bros. Co.	60.80	69.99	9.24	4.24	2.29	.39	.56	26.50	20.56	2.44	1.75
18436	Boned chicken, Armour Canning Co.	67.62	71.31	5.17	3.78	2.94	.22	.62	23.62	18.38	1.38	1.93
18574	Huckins sandwich chicken, J. H. W. Huckins & Co.	44.95	65.12	30.97	.....	.....	.....	.....	.....	.....	.....	.....
18589	Boned chicken, Curtice Bros. Co.	62.51	66.30	5.72	4.50	3.55	.30	.65	28.12	22.19	1.88	2.03
18608	Oxford roast chicken, Burnham and Morrill Co.	68.48	72.52	5.57	3.20	.....	.....	.....	20.00	.....	.....	.....
18648	Plymouth Rock roast, Potter & Wrightington.	69.43	73.00	4.89	.....	.....	.....	.....	.....	.....	.....	.....
18119	Boned turkey, Richardson & Robbins.	53.99	64.22	15.95	4.51	3.79	.28	.44	28.19	23.69	1.75	1.37
18123	Boned turkey, Curtice Bros. Co.	61.81	67.40	8.29	4.29	3.55	.34	.40	26.81	22.19	2.12	1.25
18369	Boned Turkey, Armour Canning Co.	63.56	64.87	2.02	5.10	4.35	.21	.54	31.87	27.19	1.31	1.68
18154	Oxford roast turkey, Burnham and Morrill Co.	70.60	77.62	9.04	1.60	1.20	.22	.18	10.00	7.50	1.38	.56
18454	Boned turkey, A. Breakley...	67.70	72.24	6.30	3.88	3.22	.27	.39	24.25	20.12	1.69	1.21
18576	Huckins sandwich turkey, J. H. W. Huckins & Co.	45.27	63.68	28.90	3.11	2.60	.31	.20	19.44	16.25	1.94	.62
18609	Oxford roast duck, Burnham & Morrill Co.	65.37	80.50	18.79	2.02	1.41	.12	.49	12.62	8.81	.75	1.53
18610	Oxford roast goose, Burnham & Morrill Co.	56.05	79.21	29.24	2.12	1.53	.15	.44	13.25	9.56	.94	1.37
	Average	62.44	70.23	12.72	3.62	2.86	.26	.44	22.61	18.39	1.66	1.39
	Maximum	70.60	80.50	30.97	5.10	4.35	.39	.65	31.87	27.19	2.44	2.03
	Minimum	44.95	63.68	2.02	1.60	1.20	.12	.18	10.00	7.50	.75	.56

canned fowl and game birds.

Composition of original material.								Composition of dry material.				Serial No.
Starch.	Glycogen, calculated to dry, fat-free material.	Saltpeter.	Total ash.	Sodium chlorid.	Heavy metals per kilogram.	Preservatives.	Total.[a]	Protein (N×6.25).	Fat.	Ash.	Sodium chlorid.	
P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*Milligrams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	
.....	0.37	.....	1.67	0.46	.....	None	98.94	70.50	25.89	4.02	1.11	18118
.....	.33	.....	2.64	1.61	Tin ... 27.2 Zinc .. 19.9	....do	97.52	67.63	23.57	6.76	4.11	18144
.....	.....	.....	2.45	1.22	.....	.....	96.93	72.94	15.97	7.57	3.77	18436
.....	.....	.....	3.67	2.23	.....	None	.....	.....	56.26	6.67	4.05	18574
.....	.....	.....	.....	.....	.....	.....do	94.33	75.00	45.26	.....	.....	18589
.....	.....	.....	1.43	.37	.....	.....do	.....	63.44	17.67	4.54	1.17	18608
.....	.....	.....	3.82	1.57	.....	.....do	.....	.....	16.00	12.49	5.14	18648
.....	.....	.....	2.99	1.17	.....	.....do	99.74	61.25	34.65	6.50	2.54	18119
.....	.....	.....	2.59	1.49	.....	.....	98.25	70.19	21.71	6.78	2.90	18123
.....	.....	.....	1.46	.82	Tin ... 87.3	.....	97.22	87.44	5.54	4.01	2.25	18369
.....	.....	.....	1.24	.60	.....	None	90.32	34.00	30.75	4.22	2.04	18154
.....	.....	.....	2.32	.78	.....	.....do	99.34	75.06	19.50	7.18	2.41	18454
.....	.....	.....	2.45	1.61	.....	.....do	95.43	35.50	52.80	4.48	2.94	18576
.....	.....	0.01	2.65	.....	.....	.....do	97.90	36.44	54.26	7.65	.....	18609
.....	.....	.....	1.00	.....	Tin ... 33.6 Zinc .. 47.1	....do	98.16	30.13	66.33	2.28	.....	18610
.....	.....	.....	2.31	1.16	.....	.....	.....	59.97	32.42	6.08	2.87	
.....	.....	.....	3.82	2.23	.....	.....	.....	87.44	66.33	12.49	5.14	
.....	.....	.....	1.00	.37	.....	.....	.....	30.13	16.00	2.28	1.11	

[a] This does not include the percentage of starch contained in several of the samples.

TABLE 21.—*Composition*

Serial No.	Manufacturer.	Composition of original material.										
		Water.	Water in fat-free substance.	Fat.	Nitrogen.				Nitrogenous substances.			
					Total.	Insoluble in hot water.	Precipitated by bromin.	Meat bases.	Protein (N×6.25).	Proteids insoluble in hot water.	Gelatinoids and proteids precipitated by bromin.	Meat bases.
		P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
18111	Richardson & Robbins	28.24	50.33	43.89	3.76	3.12	0.08	0.56	22.50	19.50	0.50	1.75
18140	Maconochie Bros.	51.80	64.40	19.58	.....	.....	.....	.....	.....	.....	.....	.....
18142	Do	54.92	62.20	12.70	2.87	2.06	.17	.64	17.94	12.88	1.06	2.00
19393	The G. H. Hammond & Co.	65.51	72.92	10.26	3.14	2.41	.31	.42	19.62	15.06	1.94	1.31

TABLE 22.—*Composition of*

Serial No.	Description and manufacturer.	Composition of original material.										
		Water.	Water in fat-free substances.	Fat.	Nitrogen.				Nitrogenous substances.			
					Total.	Insoluble in hot water.	Precipitated by bromin.	Meat bases.	Protein (N×6.25).	Proteids insoluble in hot water.	Gelatinoids and proteids precipitated by bromin.	Meat bases.
		P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
18113	Potted chicken, Richardson & Robbins.	50.10	64.02	21.74	3.86	2.94	0.34	0.58	24.12	18.38	2.12	1.81
18126	Potted chicken, Curtice Bros. Co.	57.65	68.92	16.36	3.08	2.70	.08	.30	19.25	16.88	.50	.94
18266	Potted chicken, Armour Canning Co.	59.46	76.19	21.94	2.49	1.77	.45	.45	15.56	11.06	2.81	.84
18439	Potted chicken, Armour Packing Co.	60.14	74.46	19.23	2.80	1.96	.42	.42	17.50	12.25	2.62	1.31
18447	Columbia potted chicken, Mullen-Blackledge Co.	61.89	72.79	14.97	2.94	2.32	.39	.23	18.38	14.50	2.44	.72
18463	Potted chicken, Van Camp Packing Co.	64.11	75.80	15.41	2.72	2.09	.50	.13	17.00	13.06	3.12	.40
18114	Potted turkey, Richardson & Robbins.	47.33	63.91	25.96	3.69	2.95	.44	.30	23.06	18.44	2.75	.93
18125	Potted turkey, Curtice Bros. Co.	57.37	68.44	16.19	3.13	2.59	.09	.45	19.56	16.19	.56	1.40
18441	Potted turkey, Armour Packing Co.	66.40	76.27	12.93	2.77	2.25	.36	.16	17.31	14.06	2.25	.50
18586	Potted turkey, Curtice Bros. Co.	60.79	71.56	15.04	3.11	2.30	.56	.25	19.44	14.38	3.50	.78
	Average	58.52	71.24	17.98	3.06	2.39	.36	.33	19.12	14.92	2.27	.96
	Maximum	66.40	76.27	25.96	3.86	2.95	.56	.58	24.12	18.44	3.50	1.81
	Minimum	47.33	63.91	12.93	2.49	1.77	.08	.13	15.56	11.06	.50	.40

of potted beef.

Composition of original material.								Composition of dry material.				Serial No.
Starch.	Glycogen, calculated to dry, fat-free material.	Saltpeter.	Total ash.	Sodium chlorid.	Heavy metals per kilogram.	Preservatives.	Total.	Protein (N×6.25).	Fat.	Ash.	Sodium chlorid.	
P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*Milligrams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	
.....	0.32	0.05	3.31	2.43	Tin .. 145.1	None	97.24	32.75	61.19	4.61	3.39	18111
14.26	.....	.....	.....	.....	.....	Boric acid .	.....	.....	40.62	.....	.....	18140
11.56	.22	.....	4.50	.....	.....	.....do	99.69	39.81	28.17	9.98	.....	18142
.....	.25	.....	2.30	.....	.....	None	96.44	36.88	29.75	6.67	.....	19393

potted chicken and turkey.

Composition of original material.								Composition of dry material.				Serial No.
Starch.	Glycogen, calculated to dry, fat-free material.	Saltpeter.	Total ash.	Sodium chlorid.	Heavy metals per kilogram.	Preservatives.	Total.	Protein (N×6.25).	Fat.	Ash.	Sodium chlorid.	
P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*Milligrams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	
Present.	0.21	.....	3.57	1.92	Tin ... 42.6	None	97.78	48.38	43.57	7.15	3.85	18113
Present.	None	.....	.....	.....	.....	.....do	92.33	45.44	38.63	.....	.....	18126
0.63	.....	.....	2.04	2.63	.....	.....do	98.78	38.38	54.12	5.03	6.49	18266
.....	.....	.....	2.67	.16	.....	.....do	98.22	43.88	48.24	6.70	.40	18439
2.66	.30	.....	2.20	.13	.....	.....do	99.45	48.19	39.28	5.77	.34	18447
Present.	.....	.....	2.95	.26	Tin ... 59.8	.....	99.05	47.37	42.94	8.22	.72	18463
Present.	.30	.....	2.94	1.70	Tin ... 41.7	None	98.43	43.81	49.28	5.58	3.23	18114
4.13	.....	.....	3.23	2.39	Tin ... 53.5	.....do	99.07	45.88	37.98	7.58	5.61	18125
Present.	.24	.....	1.66	.05	.....	.....do	97.85	51.50	38.48	4.94	.15	18441
Present.	.25	.....	2.79	.17	.....	.....do	97.34	49.56	38.36	7.12	.43	18586
.....	.26	.....	2.67	1.05	49.4	.....	.....	46.24	43.09	6.45	2.36	
.....	.30	.....	3.57	2.63	59.8	.....	.....	51.50	54.12	8.22	6.49	
.....	.24	.....	1.66	.05	41.7	.....	.....	38.38	37.98	4.94	.15	

TABLE 23.—*Composition*

Serial No.	Manufacturer.	Composition of original material.										
		Water.	Water in fat-free substance.	Fat.	Nitrogen.				Nitrogenous substances.			
					Total.	Insoluble in hot water.	Precipitated by bromin.	Meat bases.	Protein (N×6.25).	Proteids insoluble in hot water.	Gelatinoids and proteids precipitated by bromin.	Meat bases.
		P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
18115	Richardson & Robbins	38.46	59.24	35.08	3.54	3.05	0.05	0.44	22.13	19.06	0.31	1.37
18127	Curtice Bros. Co	51.58	64.69	20.27	3.36	3.08	.06	.22	21.00	19.25	.38	.69
18136	Maconochie Bros	51.19	63.12	18.90	2.48	1.89	.11	.48	15.50	11.81	.69	1.50
18218	Armour Packing Co	51.74	66.56	22.26	2.77	2.21	.39	.17	17.26	13.81	2.44	.53
18231	The Cincinnati Abattoir Co	43.62	67.76	35.63	2.80	2.38	.17	.25	17.50	14.88	1.06	.78
18234	Armour Canning Co	44.26	68.89	35.75	2.44	1.99	.20	.25	15.25	12.44	1.25	.78
18237	Kingan & Co	54.56	73.12	25.38	2.35	1.90	.31	.14	14.69	11.88	1.94	.44
18343	Cunningham & De Fourier Co., Limited.	33.84	60.37	43.95	2.52	1.79	.34	.39	15.75	11.19	2.12	1.22
18448	Libby, McNeill & Libby	60.12	72.93	17.57	2.52	1.93	.25	.34	15.75	12.06	1.56	1.06
18455	Jacob Dold Canning Co	39.27	61.80	36.46	2.94	2.69	.22	.03	18.38	16.81	1.38	.09
18457	A. Weber & Co	39.32	.....	.....	2.74	2.55	.14	.05	17.13	15.94	.88	.16
18461	Van Camp Packing Co	45.20	62.57	27.76	2.55	2.04	.28	.23	15.94	12.75	1.75	.72
18467	Fairbank Canning Co	45.84	66.59	31.16	2.88	2.41	.25	.22	18.00	15.06	1.56	.69
18577	Mullen-Blackledge Co	43.03	72.94	41.01	2.27	1.85	.22	.20	14.19	11.56	1.38	.62
18639	T. E. Wells Co	60.54	77.32	18.72	2.30	1.74	.56	.....	14.38	10.88	3.50	.....
18645	Queen City Canning Co	52.79	75.60	30.17	2.75	1.75	.25	.45	15.31	10.94	1.56	1.40
19383	German-American Provision Co.	66.19	73.15	14.52	2.72	1.76	56	.40	17.00	11.00	3.50	1.25
19394	The G. H. Hammond & Co	47.11	61.48	23.37	3.08	2.38	.39	.31	19.25	14.88	2.44	.97
	Average	48.26	67.54	28.12	2.75	2.23	.25	.25	16.90	13.68	1.61	.79
	Maximum	66.19	77.32	43.95	3.54	3.08	.56	.48	22.13	19.25	3.50	1.50
	Minimum	33.84	59.24	9.52	2.27	1.74	.05	.14	14.19	10.88	.31	.09

[a] Manufacturers admit the use of a preservative, whose composition they do not know, in curing their meats.

of potted ham.

Composition of original material.								Composition of dry material.				Serial No.
Starch.	Glycogen, calculated to dry, fat-free material.	Saltpeter.	Total ash.	Sodium chlorid.	Heavy metals per kilogram.	Preservatives.	Total.	Protein (N×6.25).	Fat.	Ash.	Sodium chlorid.	
P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*Milligrams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	
Present.	0.22	0.03	3.90	2.79	.....	None	98.43	35.94	57.01	6.34	4.53	18115
5.23	.....	.03	2.82	.....	Tin ... 57.5 Zinc .. 49.0	....do	100.25	43.38	41.86	5.82	.....	18127
13.36	.19	.....	3.67	.99	.....	Boric acid.	101.31	31.75	38.72	7.52	2.03	18136
.....	.21	.....	3.78	.60	Tin ...120.0 Zinc .. 76.0	....do	94.77	35.50	46.13	7.83	1.04	18218
.....	.07	.....	2.77	.....	.....	.....	98.81	31.06	63.20	4.91	.....	18231
.....	.....	.....	2.64	.....	Tin ... 70.8	None	97.12	27.38	64.14	4.74	.....	18234
.....	.....	.....	3.11	.....	Tin ... 56.0	.....	97.31	32.31	55.85	6.84	.....	18237
.....	.....	.....	4.09	.....	Tin ... 80.2	.....	96.41	23.81	66.42	6.18	.....	18343
Present.	.13	.02	5.71	.89	Tin ... 94.4	None	98.21	39.50	40.05	14.32	2.23	18448
.....	.....	.....	3.91	.....	Tin ... 88.0	.....	97.92	30.25	60.04	6.44	.....	18455
.....	.31	.....	5.43	.....	Tin ...128.0	Boric acid[a]	.....	28.65	.....	8.95	.....	18457
.....	.....	.04	4.06	.80	Tin ... 42.4	None	92.28	29.06	50.66	7.41	1.46	18461
1.20	.39	.04	3.99	.47	.....	.....do	99.93	33.25	57.54	7.37	.87	18467
.....	.....	.02	2.86	.25	Tin ... 52.4 Zinc .. 49.6	.....do	100.48	24.88	71.99	5.02	.44	18577
.....	.31	.....	3.21	.33	Tin ...142.0 Zinc .. 47.0	.....do	97.16	36.44	47.45	8.14	.87	18639
.....	....	.....	4.09	2.09	Tin ... 38.1 Zinc .. 40.0	.....do	100.95	43.00	63.90	8.66	4.43	18645
.....	.17	.01	3.17	4.16	.....	.....do	99.81	50.25	28.16	9.38	12.30	19383
.....	.21	.042	2.25	1.51	.....	.....do	91.23	36.38	44.18	4.25	2.85	19394
.....	.24	.....	3.64	.....	.....	.....	.....	34.04	49.87	7.23	.....	
.....	.39	.....	5.71	4.1	.....	.....	.....	50.25	71.99	14.32	12.30	
.....	.13	.....	2.25	.25	.....	.....	.....	23.81	28.16	4.25	.44	

TABLE 24.—*Composition*

Serial No.	Manufacturer.	Composition of original material.										
					Nitrogen.				Nitrogenous substances.			
		Water.	Water in fat-free substance.	Fat.	Total.	Insoluble in hot water.	Precipitated by bromin.	Meat bases.	Protein (N×6.25).	Proteids insoluble in hot water.	Gelatinoids and proteids precipitated by bromin.	Meat bases.
		P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
18116	Richardson & Robbins Co	38.02	57.48	33.86	3.41	2.43	0.43	0.55	21.31	15.19	2.69	1.72
18124	Curtice Bros. Co	60.91	73.41	17.03	2.56	2.22	.11	.23	16.00	13.88	.69	.72
18134	Maconochie Bros	50.95	54.69	14.64	2.91	2.20	.02	.69	18.19	13.75	.12	2.15
18230	The Cincinnati Abattoir Co	60.61	72.07	15.90	3.33	2.35	.44	.54	20.81	14.69	2.75	1.69
18265	Armour Canning Co	57.13	69.52	17.82	3.26	2.27	.44	.55	20.38	14.19	2.75	1.72
18356	Cunningham & De Fourier Co., Limited.	45.21	66.46	31.97	2.76	1.95	.39	.42	17.25	12.19	2.44	1.31
18358	Libby, McNeill & Libby	46.93	.....	.....	3.25	2.46	.48	.31	20.31	15.38	3.00	.97
18368	Kingan & Co	42.33	50.79	16.66	2.45	2.10	.24	.11	15.31	13.12	1.50	.34
18450	Cudahy Canning Co	50.22	67.30	25.38	3.07	2.57	.34	.16	19.19	16.06	2.12	.50
18451	Reed Bros. Packing Co. Ltd	44.92	68.43	34.96	2.52	2.02	.28	.22	15.75	12.62	1.75	.69
18456	Jacob Dold Canning Co	52.81	69.49	24.00	2.77	2.32	.42	.03	17.31	14.50	2.62	.09
18458	A. Weber & Co	41.45	62.72	33.91	2.93	2.57	.25	.11	18.31	16.06	1.56	.34
18462	Van Camp Packing Co	63.99	76.21	16.04	2.36	1.79	.36	.21	14.75	11.19	2.25	.65
18466	Fairbank Canning Co	51.63	68.77	24.92	2.89	2.43	.45	.01	18.06	15.19	2.81	.03
18530	Eastman's Co	56.03	.....	22.79	3.00	2.38	.56	.06	18.75	14.89	3.50	.19
18532	Libby, McNeill & Libby	54.15	67.11	19.31	2.80	2.55	.17	.08	17.50	15.94	1.06	.25
18560	The Cunningham & De Fourier Co.	43.80	68.00	35.59	2.64	2.02	.36	.26	16.50	12.62	2.25	.81
18578	Mullen-Blackledge Co	59.63	74.65	20.12	2.60	2.21	.34	.05	16.25	13.81	2.12	.16
18588	Curtice Bros. Co	60.53	71.26	15.06	3.00	2.64	.34	.02	18.75	16.50	2.12	.06
18590	Armour Packing Co	56.22	73.16	23.15	2.69	2.02	.36	.31	16.81	12.62	2.25	.97
18650	T. E. Wells Co	62.49	73.46	14.93	2.80	1.71	.73	.36	17.50	10.69	4.56	1.12
19385	German-American Provision Co.	55.26	68.41	19.22	2.66	2.32	.34	.....	16.63	14.50	2.12	.....
	Average	52.50	67.67	22.99	2.85	2.25	.36	.24	17.80	14.07	2.23	.75
	Maximum	63.99	76.21	35.59	3.41	2.64	.73	.69	21.31	16.50	4.56	2.15
	Minimum	38.02	50.79	14.64	2.36	1.71	.02	.....	14.75	10.69	.12	.....

[a] Manufacturers admit the use of a commercial preservative, whose composition they do not know, in curing their meat.

of potted tongue.

Composition of original material.								Composition of dry material.				Serial No.
Starch.	Glycogen, calculated to dry, fat-free material.	Saltpeter.	Total ash.	Sodium chlorid.	Heavy metals per kilogram.	Preservatives.	Total.	Protein (N×6.25).	Fat.	Ash.	Sodium chlorid.	
P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*Milligrams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	
.....	.....	0.04	5.88	5.09	Tin .. 70.0	None	97.40	34.38	54.63	9.49	8.21	18116
Present.	.....	.02	.....	.....	.....	.....do	93.25	40.94	43.57	.....	.....	18124
11.60	.....	.....	7.47	6.05	.....	Boric acid.	98.68	37.06	29.85	15.23	12.33	18134
.....	1.02 .24	.....	7.60	.....	.....	None	103.35	52.87	40.37	19.37	.....	18230
.....	.....	.....	9.90	.....	Tin .. 30.0	.....do	103.51	47.50	41.57	23.09	.....	18265
.....	.....	.....	6.55	.....	Tin ..185.2 Zinc . 40.0	....do	99.67	31.50	58.35	11.95	.....	18356
.....	.....	.....	9.09	.....	Tin ..100.0 Trace of zinc.	.....	102.96	38.25	51.99	17.13	.....	18358
.....	.....	.....	7.80	.....	Tin ..161.4	.....	.....	26.56	28.89	13.53	.....	18368
.....	.....	.02	3.84	.72	.....	None	98.14	38.56	50.98	7.71	1.45	18450
.....	.....	.....	2.80	.17	.....	Boric acid [a]	97.74	28.63	63.47	5.08	.31	18451
.....	.....	.06	3.20	.26	Tin .. 40.7 Zinc . 45.1	None	97.28	36.69	50.86	6.78	.55	18456
.....	.....	.....	5.76	.55	Tin .. 48.4	Boric acid [a]	99.08	31.25	57.92	9.84	.94	18458
.....	.....	.....	4.65	.36	Tin .. 60.6 Zinc . 47.2	None	98.77	40.94	44.54	12.91	.99	18462
.....	.....	.01	3.94	.55	Tin .. 59.50	.....do	98.53	37.37	51.52	8.15	1.14	18466
.....	.....	.03	2.85	.25	.....	.....do	100.28	43.59	52.75	6.63	.58	18530
1.06	.....	.....	6.31	1.53	.....	.....do	98.08	38.18	42.12	13.76	3.34	18532
1.00	.....	.....	3.16	.29	Tin ..170.0 Zinc . 68.2	Boric acid .	99.23	29.38	63.33	5.62	.52	18560
.....	.....	.....	2.24	.20	Tin .. 58.2 Zinc . 58.4	.....	98.08	40.25	49.84	5.55	.50	18578
.....	.....	.03	2.84	.34	Tin .. 44.0 Zinc . 30.0	None	97.14	47.50	38.16	7.20	.86	18588
.....	.....	.....	5.45	.37	Tin .. 85.4 Zinc . 87.2	....do	100.66	38.38	52.88	12.45	.84	18590
.....	.....	.....	2.90	.23	.....	.....	96.69	46.00	39.80	7.73	.61	18650
.....	.....	.04	10.36	9.97	.....	None	101.50	37.19	42.96	23.16	22.28	19385
.....	.....	.....	5.46	.....	.....	.....	.....	40.82	50.86	12.12	3.48	
.....	.....	.....	10.36	.....	.....	.....	.....	52.87	63.47	23.16	22.28	
.....	.....	.....	2.24	.....	.....	.....	.....	26.56	28.89	4.91	.31	

12249—No. 13—02——8

TABLE 25.—*Composition of mixed*

Serial No.	Description and manufacturer.	Composition of original material.										
		Water.	Water in fat-free substance.	Fat.	Nitrogen.				Nitrogenous substances.			
					Total.	Insoluble in hot water.	Precipitated by bromin.	Meat bases.	Protein (N×6.25).	Proteids insoluble in hot water.	Gelatinoids and proteids precipitated by bromin.	Meat bases.
		P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct*	*P. ct.*
18135	Potted ham and chicken, Maconochie Bros.	62.86	70.80	11.21	2.16	1.59	0.19	0.38	13.50	9.94	1.19	1.18
18137	Potted mixed game, Maconochie Bros.	54.03	70.67	23.55	.....	.....	.....	.....	.....	.....	.....	.....
18138	Potted ham, chicken, and tongue, Maconochie Bros.	64.48	71.92	10.34	1.99	1.47	.14	.38	12.44	9.19	.88	1.18
18139	Potted veal and ham, Maconochie Bros.	48.91	61.59	20.59	2.55	1.88	.15	.52	15.94	11.75	.94	1.62
18141	Potted ham and tongue, Maconochie Bros.	49.28	57.73	14.63	.....	.....	.....	.....	.....	.....	.....	.....
18143	Potted turkey and tongue, Maconochie Bros.	55.56	66.01	15.83	2.71	2.01	.37	.33	16.94	12.56	2.31	1.03
18263	Potted ham, Rex brand, Cudahy Canning Co.	57.84	71.68	19.31	3.05	2.27	.53	.25	19.06	14.19	3.31	.78
18579	Potted ham and tongue, Maconochie Bros.	55.71	66.54	16.27	2.27	1.51	.42	.34	14.19	9.44	2.62	1.06
18112	Potted game, Richardson & Robbins.	48.69	64.52	24.54	3.74	3.16	.29	.29	23.38	19.75	1.81	.90
18153	Potted game, Curtice Bros. Co.	56.21	66.47	15.43	3.15	2.71	.18	.26	19.69	16.94	1.12	.81
18415	Potted duck, Richardson & Robbins.	42.86	63.79	32.81	3.36	2.68	.34	.34	21.00	16.75	2.12	1.06
18587	Potted game, Curtice Bros. Co.	55.74	71.29	21.81	2.86	2.30	.25	.31	17.88	14.38	1.56	.97
	Average	54.35	66.92	18.86	2.78	2.16	.29	.34	17.40	13.49	1.79	1.06
	Maximum	64.48	71.92	32.81	3.74	3.16	.53	.52	23.38	19.75	3.31	1.62
	Minimum	42.86	57.73	10.34	1.99	1.47	.14	.25	12.44	9.19	.88	.78

and miscellaneous potted goods.

Composition of original material.								Composition of dry material.				Serial No.
Starch.	Glycogen, calculated to dry, fat-free material.	Saltpeter.	Total ash.	Sodium chlorid.	Heavy metals per kilogram.	Preservatives.	Total.	Protein (N×6.25).	Fat.	Total ash.	Sodium chlorid.	
P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*Milligrams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	
10.13	0.19	.....	3.53	2.42	.....	Boric acid.	100.09	36.38	30.18	9.51	6.52	18135
.....	.....	.....	.....	.....	.....	.....do.....	.....	.....	51.23	.....	.....	18137
Present.	.....	.....	3.20	2.38	Tin... 42.9	None.....	89.27	35.00	29.11	9.01	6.70	18138
10.98	.31	.....	4.58	3.48	.....	Boric acid.	99.41	31.19	40.30	8.96	6.81	18139
12.20	.....	.....	.....	.....	.....	None.....	.....	.....	28.85	.....	.....	18141
11.44	.....	.....	.....	1.55	.....	.....do.....	98.73	38.12	35.62	.....	3.49	18143
.....	.....	.....	1.86	.....	Tin...112.0	.....	97.29	45.19	45.80	4.41	.....	18263
10.86	.18	.....	3.55	.65	.....	None.....	99.56	32.00	36.74	8.02	1.47	18579
.....	.26	.....	3.44	2.06	Tin... 83.7	.....do.....	99.20	45.66	47.83	6.70	4.02	18112
Present.	.21	.....	3.51	2.37	.....	.....do.....	94.08	44.94	35.24	8.02	5.41	18153
.....	.29	.....	2.49	3.61	.....	.....do.....	98.16	36.75	57.42	4.36	6.32	18415
.....	.....	.....	2.93	.35	.....	.....do.....	97.39	40.38	49.28	6.62	.75	18587
.....	.24	.....	3.23	2.09	.....	.....	.....	38.56	40.63	.....	.....	
.....	.29	.....	4.58	3.61	.....	.....	.....	45.66	63.20	9.51	6.81	
.....	.18	.....	1.86	.33	.....	.....	.....	31.19	28.85	4.36	.75	

TABLE 26.—*Composition*

Serial No.	Description and manufacturer.	Composition of original material.										
		Water.	Water in fat-free substance.	Fat.	Nitrogen.				Nitrogenous substances.			
					Total.	Coagulated proteids.	Precipitated by bromin.	Meat bases.	Protein (N×6.25).	Coagulated proteids.	Gelatinoids and proteids precipitated by bromin.	Meat bases.
		P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
18208	Deviled chicken, Wm. Underwood & Co.	57.60	69.94	17.64	3.30	2.63	0.36	0.31	20.63	16.44	2.25	0.97
18122	Deviled ham, Wm. Underwood & Co.	41.32	62.57	33.96	2.90	2.51	.13	.26	18.13	15.69	.81	.81
18392	Deviled ham, Armour Canning Co.	42.58	66.93	36.38	.....	.....	.....	.....	.....	.....	.....	.....
18394	Deviled ham, Armour Packing Co.	65.04	.....	15.45	2.83	2.02	.50	.31	17.69	12.62	3.12	.97
18538	Original deviled ham, Underwood Co.	39.98	65.02	38.51	2.63	2.21	.28	.14	16.44	13.81	1.75	.44
18618	Blue Label deviled ham, Curtiee Bros. Co.	53.35	66.75	20.08	2.88	2.46	.42	.00	18.00	15.38	2.62	.00
19382	Deviled ham, American brand, German-American Provision Co.	65.59	74.52	6.61	2.52	.90	.48	.14	15.75	11.88	3.00	.41
19395	Deviled ham, "Coin Special," The G. H. Hammond Co.	45.95	60.53	24.09	.....	.....	.....	.....	.....	.....	.....	.....
18209	Deviled tongue, Wm. Underwood & Co.	50.17	67.00	25.12	3.07	2.46	.42	.19	19.19	15.38	2.62	.59
18393	Deviled tongue, Armour Packing Co.	64.60	79.56	18.80	2.55	1.88	.42	.25	15.94	11.75	2.62	.78
19384	Deviled tongue, American brand, German American Provision Co.	60.88	72.41	15.92	2.66	2.24	.42	.00	16.63	14.00	2.62	.00
18207	Deviled turkey, Wm. Underwood & Co.	55.33	68.66	19.42	3.08	2.55	.28	.41	19.25	15.94	1.75	1.28
	Average	53.54	68.54	22.67	2.84	2.29	.37	.20	17.77	14.29	2.32	.63
	Maximum	65.59	79.56	38.51	3.30	2.63	.50	.41	20.63	16.44	3.12	1.28
	Minimum	39.98	60.53	6.61	2.52	.90	.13	.00	15.75	11.75	.81	.00

[a] Boric acid was not found in other samples of this brand of deviled ham.

of deviled meat.

Composition of original material.								Composition of dry material.				Serial No.
Starch.	Glycogen, calculated to dry, fat-free material.	Saltpeter.	Ash.	Sodium chlorid.	Heavy metals per kilogram.	Preservatives.	Total.	Protein (N×6.25).	Fat.	Total ash.	Sodium chlorid.	
P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*Milligrams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	
.....	.....	.....	2.71	.....	Tin ... 39.8 Zinc .. 28.0	None	97.61	48.63	41.60	6.39	.....	18208
.....	0.28	0.02	5.53	4.41	Tin ... 62.4	.....	98.21	31.00	67.48	9.42	7.52	18122
3.92	.....	.....	2.70	.....	.....	None	.....	.....	63.36	4.70	.....	18392
.....	.40	.....	3.30	.....	.....	Boric acid .	100.58	50.60	44.19	9.44	.....	18394
.....	.....	.02	3.62	.19	.....	None	98.13	27.38	64.17	6.03	.32	18538
Present.	.....	.01	2.50	.31	Tin ... 87.8	.....do	93.94	38.56	43.04	5.36	.66	18618
.....	.....	.02	4.86	4.26	.....	.....do	96.40	51.82	21.74	15.98	14.01	19382
4.93	.....	.....	3.88	.....	.....	Boric acid[a]	.....	.....	44.57	7.03	.....	19395
.....	.....	.....	4.09	5.76	Tin ... 29.7 Zinc .. 69.9	None	97.97	38.50	50.42	8.21	11.56	18209
.....	.....	.....	3.08	.....	.....	.....do	101.63	45.00	53.11	8.70	.....	18393
Present.	.....	.03	4.82	3.70	.....	.....do	98.27	42.50	40.70	12.32	9.46	19384
.....	.....	.....	3.85	3.80	Tin .. 177.0 Zinc . 57.2	....do	97.57	43.06	43.47	8.62	8.51	18207
.....	.....	.....	3.75	3.20	.....	.....	.....	41.71	52.71	.....	.....	
.....	.....	.....	5.53	5.76	.....	.....	.....	51.82	67.48	15.98	14.01	
.....	.....	.....	2.70	.19	.....	.....	.....	27.38	21.74	4.70	.32	

TABLE 27.—*Composition*

Serial No.	Description and manufacturer.	Composition of original material.										
		Water.	Water in fat-free substance.	Fat.	Nitrogen.				Nitrogenous substances.			
					Total.	Insoluble in hot water.	Precipitated by bromin.	Meat bases.	Protein (N × 6.25).	Proteids insoluble in hot water.	Gelatinoids and proteids precipitated by bromin.	Meat bases.
		P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
18156	Frankfort sausage, C. G. Hartman.	62.65	83.00	24.52	1.47	1.31	0.06	0.10	9.19	8.19	0.38	0.31
18221	Delicatess Frankfurter, The Genoese-American Provision Co.	65.20	78.95	17.43	2.16	1.88	.14	.14	13.50	11.75	.88	.43
18539	Frankfort sausage, C. G. Hartman.	64.65	82.93	22.05	1.65	1.54	.07	.04	10.31	9.62	.44	.12
18564	Conservoirte Frankfurter bratwurst, Gustav Amandus.	48.59	80.46	39.61	1.48	1.18	.11	.19	9.25	7.38	.69	.59
18615	Echte Frankfürter würste, Türk & Papst.	56.68	82.34	31.26	1.51	1.32	.06	.13	9.44	8.25	.38	.41
18106	Cambridge sausages, Harry Peck & Co.	52.99	70.01	24.36	2.07	1.62	.06	.39	12.94	10.12	.38	1.22
18107	Truffled liver sausage, Henry Auerbach.	44.74	71.19	37.15	2.24	1.88	.06	.30	14.00	11.75	.38	.93
18109	Irish sausages, Cunningham de Fourier Co.	61.98	73.17	15.29	1.98	1.45	.20	.33	12.38	9.06	1.25	1.03
18129	Mortadella sausages, Fratella Manni.	44.02	59.81	26.40	3.83	3.32	.09	.42	23.94	20.75	.56	1.31
18155	Oxford potted sausage, Burnham-Morrill Co.	45.90	78.25	41.34	1.51	1.12	.13	.26	9.44	7.00	.81	.81
18365	Chicken sausage, Gotha Preserved Meat and Sausage Co.	46.59	77.20	34.12	1.46	1.09	.20	.17	9.13	6.81	1.25	.53
18423	Frankfurter bratwurst, Heinrich Bauer.	50.66	80.57	37.12	1.71	1.51	.06	.14	10.69	9.44	.38	.44
18616	Finest fois gras truffle sausage, Henry Aucrbach.	46.65	72.75	35.88	1.96	1.54	.20	.22	12.25	9.62	1.25	.69
18658	Mortedella sausages, Fratelli Lanzarini.	47.23	61.97	23.79	3.08	2.91	.11	.06	19.25	18.19	.69	.19
18104	Vienna sausage, National Pure Food Co.	72.34	82.28	12.08	2.17	1.91	.13	.13	13.56	11.94	.81	.41
18219	Vienna sausage, Armour Packing Co.	60.04	68.06	11.78	3.86	2.96	.50	.40	24.12	18.50	3.12	1.25
18232	Sauerkraut and Vienna sausage, Armour Packing Co.	88.61	91.85	3.53	.52	.38	.03	.11	3.25	2.38	.19	.34
18342	Vienna sausage, German-American Provision Co.	66.47	74.82	11.16	2.69	1.96	.62	.11	16.81	12.25	3.88	.34
18386	Van Camp's Vienna sausage, Van Camp Packing Co.	50.16	64.76	22.54	3.29	2.88	.22	.19	20.56	18.00	1.38	.59
18391	Vienna sausage, Armour & Co.	60.73	74.95	18.97	2.30	1.85	.20	.25	14.38	11.56	1.25	.78
18412	Vienna sausage, National Pure Food Co.	79.42	85.93	7.58	1.88	1.54	.28	.06	11.75	9.62	1.75	.19
18437	Vienna sausage, Armour Packing Co.	61.35	72.18	15.01	3.38	2.45	.42	.41	20.50	15.31	2.62	1.28
18459	Vienna sausage, Kingan & Co.	56.96	72.67	21.62	2.30	1.88	.20	.22	14.38	11.75	1.25	.69
18533	Vienna sausage, Libbey, McNeill & Libbey.	65.52	72.04	11.43	3.03	2.18	.48	.37	18.94	13.62	3.00	1.16
19397	Vienna sausage, G. H. Hammond & Co.	62.68	77.80	19.43	.....	.....	.....	.....	.....	.....	.....	.....
	Average	58.51	75.59	21.82	2.23	1.82	.19	.21	13.92	11.37	1.21	.67
	Maximum	88.61	91.85	41.34	3.86	3.32	.62	.42	24.12	20.75	3.88	1.31
	Minimum	44.02	59.81	3.53	.52	.38	.03	.04	3.25	2.38	.19	.12

[a] Stated by the manufacturers to be packed by a firm which uses "during the extreme warm weather a very small per cent of some well-known preservative in order to keep the meat sweet while being handled."

of canned sausages.

Composition of original material.								Composition of dry material.				
Starch.	Glycogen, calculated to dry, fat-free material.	Saltpeter.	Total ash.	Sodium chlorid.	Heavy metals per kilogram.	Preservatives.	Total.	Protein (N × 6.25).	Fat.	Ash.	Sodium chlorid.	Serial No.
P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*Milligrams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	
.....	.....	.....	3.92	2.19	.....	Boric acid .	99.97	24.63	65.64	10.50	5.86	18156
2.40	.....	.....	1.88	.14	Tin .. 44.5 Zinc . 237.5	Sulphite ...	99.97	38.81	.....	5.40	.40	18221
.....	.....	.....	2.05	.17	.....	Boric acid .	98.93	29.19	.....	5.80	.48	18539
.....	.....	.....	1.95	.07	.....	.....do	98.81	18.00	.....	3.79	.14	18564
.....	.....	.....	2.36	.....	.....	None	99.34	21.81	.....	5.45	.....	18615
.....	.....	.....	2.12	.....	.....	.....do	91.19	27.50	.....	4.51	.....	18106
.....	.....	.....	3.12	1.71	.....	Boric acid .	98.07	25.31	.....	5.65	3.09	18107
Present.	.....	.....	2.58	.....	.....	None	91.19	32.56	.....	6.79	.....	18109
.....	.....	.....	5.96	4.68	.....	.....do	99.00	42.75	.....	10.65	8.36	18129
Present.	.....	.....	1.71	1.03	.....	.....do	97.57	17.44	76.42	3.16	1.90	18155
4.66	.....	.....	3.04	.....	.....	.....do	97.00	17.06	26.44	5.69	.....	18365
.....	.....	.....	1.58	.10	.....	Boric acid .	99.62	21.69	75.22	3.20	.20	18423
Present.	.....	0.01	3.03	.23	.....	.....do	97.13	22.94	67.26	5.68	.43	18616
1.63	.....	.03	6.37	3.62	.....	None	98.09	36.50	45.08	12.07	6.86	18658
.....	.....	.....	1.91	.....	.....	Boric acid .	99.49	49.00	43.67	6.91	.....	18104
.....	.....	.03	2.72	.30	Tin ... 20.7	None	97.44	60.38	29.48	6.81	.75	18219
.....	.....	.01	1.74	.04	.....	Boric acid .	96.80	28.57	30.99	15.28	.35	18232
4.60	.....	.02	2.79	.24	.....	.....do	101.50	50.12	33.28	8.32	.72	18342
5.40	.....	.....	3.16	.42	Tin... 108.0	.....do.[a] ...	101.30	41.25	45.23	6.34	.85	18386
1.80	.....	.....	3.19	.....	.....	.....do	98.28	36.63	48.30	8.12	.....	18391
.....	.....	.....	1.45	.....	.....	.....do	100.01	57.06	36.83	7.05	.....	18412
.....	.....	.04	2.83	.57	.....	None	98.44	53.06	38.83	7.32	1.47	18437
.....	.....	.....	3.13	.30	.....	Boric acid [b]	95.40	33.37	50.23	7.27	.70	18459
1.66	.....	.....	1.35	.25	.....	None	96.08	54.94	33.15	3.92	.73	18533
.....	.....	.....	5.64	2.33	.....	Boric acid .	87.75	.....	52.05	15.11	6.24	19397
.....	.....	.....	2.86	1.02	.....	.....	.....	35.02	46.95	.....	.....	
.....	.....	.....	6.37	4.68	.....	.....	.....	60.38	76.42	.....	8.36	
.....	.....	.....	1.35	.04	.....	.....	.....	17.06	26.44	.....	.14	

[b] The manufacturers state: "During extreme warm and damp weather we find it necessary to use a very small per cent of some well-known preservative that is universally adapted to guard against the meat turning sour while being handled before it is canned and processed."

TABLE 28.—*Composition*

Serial No.	Description and manufacturer.	Composition of original material.										
		Water.	Water in fat-free substance.	Fat.	Nitrogen.				Nitrogenous substances.			
					Total.	Insoluble in hot water.	Precipitated by bromin.	Meat bases.	Protein (N×6.25).	Proteids insoluble in hot water.	Gelatinoids and proteids precipitated by bromin.	Meat bases.
		P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
18110	Veal and ham pâté, Harry Peck & Co.	55.63	69.67	20.15	.....	.....	.....	.....	.....	.....	.....	.....
18210	Pâté de poulet aux truffles, G. Dumontier, Bruxelles.	34.13	71.93	52.55	1.43	1.34	0.08	0.01	8.94	8.38	0.50	0.03
18211	Pâté de becasse aux truffles, G. Dumontier, Bruxelles.	32.75	10.30	53.41	1.51	1.34	.11	.06	9.44	8.38	.69	.19
18212	Pâté de perdreau aux truffles, G. Dumontier, Bruxelles.	34.53	71.55	51.74	1.46	1.12	.11	.23	9.12	7.00	.69	.72
18213	Pâté a la diable, Harry Peck..	37.63	58.26	35.41	2.60	2.27	.17	.16	16.25	14.19	1.06	.50
18215	Chicken and ham pâté, Harry Peck.	56.31	67.37	16.42	2.07	1.34	.20	.53	12.94	8.38	1.25	1.65
18345	Pâté ham, tongue, and chicken, Cunningham & De Fourier Co., limited.	60.18	70.24	14.31	2.21	1.76	.25	.20	13.81	11.00	1.56	.62
18357	Napier lunch pâté, Cunningham & De Fourier Co., limited.	66.71	86.01	22.44	2.32	1.75	.22	.35	14.50	10.94	1.38	1.09
18375	Pâté de becasse, au fois gras, "Beaumarchand."	46.69	71.79	34.96	2.74	1.34	.06	1.34	17.12	8.38	.38	4.18
18540	Pâté de perdreau, au truffe, G. Du Montier.	41.92	71.54	41.40	1.82	1.43	.20	.19	11.37	8.94	1.25	.59
18558	Pâté de foie gras, au truffes, The Cunningham de Fourier Co.	37.97	60.17	38.50	2.72	1.79	.37	.56	17.00	11.19	2.31	1.75
18559	Turkey and tongue pâté, The Cunningham de Fourier Co.	60.27	70.24	14.20	2.46	2.00	.16	.30	15.37	12.50	1.00	.94
18561	Pâté de foie gras truffe, Amieux Freres.	39.13	68.76	43.09	1.90	1.54	.06	.30	11.87	9.62	.38	.94
18562	Pâté de foie gras truffe, L. A. Price.	37.80	72.14	47.60	1.46	1.15	.06	.25	9.12	7.19	.38	.78
18566	Pâté de foie gras truffe, du perigorde, Gabriel Triat & Co.	34.11	62.31	45.35	1.34	1.01	.06	.27	8.37	6.31	.38	.84
18567	Pâté de foie gras truffe, du perigorde, Gabriel Triat & Co.	28.16	68.75	59.04	1.23	.92	.06	.25	7.69	5.75	.38	.78
18216	Turkey and tongue pâté, Harry Peck.	59.22	69.52	14.82	1.99	1.57	.22	.20	12.44	9.81	1.38	.62
18217	Chicken and tongue pâté, Harry Peck.	55.56	63.85	12.98	2.10	1.54	.20	.36	13.12	9.62	1.25	1.12
18347	Terrine de foies gras aux truffes, "Beaumarchant."	19.57	55.36	64.65	1.57	1.23	.06	.28	9.81	7.69	.38	.87
18364	Terrine de foies gras, Mosser Freres, de Strasbourg.	30.17	.....	.....	1.53	1.23	.08	.22	9.56	7.69	.50	.68
18422	Terrine de foies gras aux truffes du Perigord, L. Henry.	34.10	66.85	48.99	1.62	1.46	.08	.08	10.13	9.12	.50	.25
18424	Fois gras, Columbia Wurstfabrik.	56.97	77.50	26.49	2.02	1.40	.20	.42	12.62	8.75	1.25	1.31
18613	Terrine de foie gras aux truffes du Perrigorde, B. La Forest.	47.54	77.90	38.97	1.46	.98	.11	.37	9.13	6.12	.69	1.15
18614	Purée de foie gras aux truffes du Perrigorde.	54.74	79.24	30.92	1.43	1.20	.14	.09	8.94	7.50	.88	.28
18403	Wild duck pâté, truffled, Franco-American Food Co.	51.96	74.30	30.06	1.90	1.43	.20	.27	11.87	8.94	1.25	.84
18117	Chicken livers, Richardson & Robbins.	44.16	64.28	31.29	3.48	2.95	.12	.41	21.75	18.44	.75	1.28
18214	Chicken and truffles, Harry Peck.	61.44	71.13	13.62	2.74	2.52	.22	.....	17.13	15.75	1.38	.....
18399	Chicken liver pâté, truffled, Franco-American Food Co.	48.82	70.18	30.44	2.10	1.83	.14	.24	13.12	11.44	.19	.75
18401	Chicken pâté, truffled, Franco-American Food Co.	48.02	70.98	32.35	1.88	1.54	.28	.06	11.75	9.62	1.75	.19
18397	Quail pâté, truffled, Franco-American Food Co.	50.79	74.30	31.64	1.79	1.46	.20	.13	11.19	9.12	1.25	.41

of pâtés and purées

Composition of original material.								Composition of dry material.				Serial No.
Starch.	Glycogen, calculated to dry, fat-free material.	Saltpeter.	Total ash.	Sodium chlorid.	Heavy metals per kilogram.	Preservatives.	Total.	Protein (N×6.25).	Fat.	Total ash.	Sodium chlorid.	
P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*Milligrams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	
1.10	.....	.....	.....	.....	.....	Boric acid	.....	.....	45.41	.....	.....	18110
1.72	.....	.....	3.13	.....	.....	None	100.44	13.56	79.78	4.75	.....	18210
1.62	.....	.....	2.60	.....	.....	do	99.64	14.00	79.38	3.87	.....	18211
.....	.....	.....	3.40	1.50	.....	do	98.08	13.94	79.03	5.19	2.29	18212
.....	.....	.....	3.10	.....	.....	Boric acid	91.89	26.06	56.78	4.97	.....	18213
.....	.....	.....	2.45	.....	.....	do	86.46	29.63	37.58	5.61	.....	18215
14.40	.....	0.01	2.33	.40	Tin .. 193.0 Zinc . 153.0	do	90.00	34.69	35.97	5.85	1.03	18345
15.80	.....	.....	2.34	.....	.....	do	104.90	43.56	67.40	7.03	.....	18357
.....	.....	.....	1.89	.....	.....	None	96.48	32.13	65.57	3.54	.....	18375
.....	.....	.....	1.64	1.98	.....	do	95.74	19.63	71.28	2.82	3.41	18540
.....	.....	.06	4.32	.56	.....	.....	96.04	27.38	62.06	6.64	.90	18558
6.20	.....	.....	2.48	.22	.....	None	91.39	38.69	35.76	6.24	.55	18559
.....	.....	.....	3.06	1.84	.....	do	96.22	19.50	70.80	5.03	3.02	18561
.....	.....	.....	3.40	.....	.....	Benzoic acid.	97.15	14.69	76.53	5.47	.....	18562
.....	.....	.....	2.59	.....	.....	None	89.58	12.69	68.83	3.93	.....	18566
.....	.....	.....	2.83	.....	.....	do	96.94	10.69	82.19	3.94	.....	18567
14.86	.....	.....	2.75	.20	.....	Benzoic acid.	88.60	30.50	36.34	6.74	.49	18216
.....	.....	.....	2.33	.30	.....	Boric acid	82.86	29.56	29.21	5.24	.68	18217
.....	.....	.....	2.78	.....	.....	None	95.94	12.19	80.38	3.46	.....	18347
.....	.....	.....	2.34	.....	.....	do	41.38	13.69	.....	3.35	.....	18364
.....	.....	.....	4.05	.33	.....	do	97.01	15.38	74.34	6.15	.51	18422
Present.	.....	.....	3.40	1.63	.....	Boric acid	98.17	29.32	61.58	7.90	.38	18424
.....	.....	.....	5.40	.....	.....	None	99.87	17.38	74.28	10.29	.....	18613
3.53	.....	.....	3.41	.....	.....	Boric acid	97.73	19.75	68.32	7.53	.....	18614
5.46	.....	.....	2.35	1.49	.....	.....	75.40	24.69	62.57	4.89	3.10	18403
.....	0.32	.....	2.24	.....	Tin ... 62.8	None	98.24	38.94	56.04	4.01	.....	18117
.92	.....	.....	7.35	1.87	.....	Boric acid	99.54	44.44	35.32	19.06	4.85	18214
7.66	.....	.....	2.38	.32	.....	None	94.02	25.63	59.47	4.65	.63	18399
5.01	.....	.....	2.53	.....	.....	do	94.46	22.63	62.23	4.87	.....	18401
6.16	.....	.....	2.38	1.66	.....	do	95.59	22.75	64.30	4.84	3.37	18397

TABLE 28.—*Composition of*

Serial No.	Description and manufacturer.	Composition of original material.										
					Nitrogen.				Nitrogenous substances.			
		Water.	Water in fat-free substance.	Fat.	Total.	Insoluble in hot water.	Precipitated by bromin.	Meat bases.	Protein (N×6.25).	Proteids insoluble in hot water.	Gelatinoids and proteids precipitated by bromin.	Meat basis.
		P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
18398	Grouse pâté, truffled, Franco-American Food Co.	51.37	72.66	29.29	1.95	1.67	.14	.14	12.19	10.44	.88	.43
18402	Pheasant pâté, truffled, Franco-American Food Co.	50.20	73.62	31.81	1.79	1.37	.17	.25	11.19	8.56	1.06	.78
18405	Partridge pâté, truffled, Franco-American Food Co.	56.04	75.08	25.36	2.04	1.54	.17	.33	12.75	9.62	1.06	1.03
18406	Woodcock pâté, truffled Franco-American Food Co.	57.35	78.64	27.08	1.88	1.57	.22	.09	11.75	9.81	1.38	.28
18128	Purée de foie gras truffléc, J. B. Rilhac.	43.32	75.97	42.98	1.59	1.32	.06	.21	9.94	8.25	.38	.65
18346	Purée de foie gras truffée, Louis Freres & Co.	47.50	71.04	33.14	2.07	1.57	.14	.36	12.94	9.81	.88	1.12
18413	Purée de foie gras truffée, L. Hafner.	47.80	78.53	39.13	1.68	1.26	.14	.28	10.50	7.88	.88	.87
18541	Purée de foie gras truffe, Amieux Freres.	56.24	81.07	30.63	1.32	1.12	.11	.09	8.25	7.00	.69	.28
18553	Purée de Faisan de Strasbourg, etc., Georges Brück.	32.77	70.61	53.59	1.71	1.29	.22	.20	10.69	8.06	1.38	.62
18554	Purée de Zungen de Strasbourg, Georges Brück.	34.87	71.73	51.39	.....	.....	.....	.....	.....	.....	.....	.....
18555	Purée de Perdreaux de Strasbourg, Georges Brück.	33.81	70.78	52.23	1.57	1.34	.17	.06	9.81	8.38	1.06	.19
18556	Purée de grives de Strasbourg, Georges Brück.	41.38	70.16	41.02	2.27	1.70	.20	.37	14.19	10.62	1.25	1.16
18557	Purée de fois gras, L. A. Price.	52.70	77.26	31.79	1.51	1.15	.08	.28	9.44	7.19	.50	.87
	Average	45.87	71.18	35.41	1.91	1.50	.16	.27	11.92	9.35	.94	.82
	Maximum	66.71	86.01	64.65	3.48	2.95	.37	1.34	21.75	18.44	2.31	4.18
	Minimum	19.57	55.36	12.98	1.23	.92	.06	.01	7.69	7.00	.38	.....

pâtés and purées—Continued.

Composition of original material.								Composition of dry material.				Serial No.
Starch.	Glycogen, calculated to dry, fat-free material.	Saltpeter.	Total ash.	Sodium chlorid.	Heavy metals per kilogram.	Preservatives.	Total.	Protein (N×6.25).	Fat.	Total ash.	Sodium chlorid.	
P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*Miligrams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	
Present.	.....	.....	2.70	.....	.....	None	95.11	25.06	60.23	5.55	.....	18398
6.20	.....	.....	2.36	1.38	.....	.....do	94.77	22.44	63.88	4.74	2.77	18402
6.60	.....	.....	2.60	1.36	.....	.....do	95.71	29.00	57.69	5.91	3.09	18405
5.40	.....	.....	2.10	1.15	.....	.....do	98.00	27.56	63.50	4.92	2.20	18406
1.40	.....	.....	2.04	1.27	.....	.....do	97.62	17.50	75.84	3.60	2.24	18128
7.42	.....	.....	3.20	.....	.....	.....do	95.65	24.63	63.12	6.09	.....	18346
.....	.....	.....	2.76	.....	.....	.....do	99.32	20.13	74.96	5.29	.....	18413
.....	.....	.....	2.48	.....	.....	.....do	97.32	18.87	69.99	5.67	.....	18541
.....	.....	.....	2.84	.....	.....	.....do	99.26	15.88	79.72	4.22	.....	18553
.....	.....	.....	2.46	.....	.....	.....do	88.72	.....	78.90	3.78	.....	18554
.....	.....	.....	3.19	.32	.....	.....do	98.86	14.81	78.90	4.82	.48	18555
.....	.....	.....	3.10	.36	.....	.....do	98.53	24.19	69.97	5.29	.61	18556
3.46	.....	.....	2.05	.22	.....	Benzoic acid.	95.10	19.94	67.20	3.34	.47	18557
7.44	.....	.....	2.88	.97	.....	.....	93.82	23.36	63.87	5.41	1.76	
15.80	.....	.....	7.35	1.98	.....	.....	104.90	44.44	82.19	19.06	4.85	
.92	.....	.....	1.64	.20	.....	.....	41.38	10.69	29.21	2.82	.47	

TABLE 29.—*Composition*

Serial No.	Description and manufacturer.	Composition of original material.										
		Water.	Water in fat-free substance.	Fat.	Nitrogen.				Nitrogenous substances.			
					Total.	Insoluble in hot water.	Precipitated by bromin.	Meat bases.	Protein (N×6.25).	Proteids insoluble in hot water.	Gelatinoids and proteids precipitated by bromin.	Meat bases.
		P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
18102	Chicken tamale, Armour Packing Co.	66.74	73.82	9.59	1.12	1.00	0.04	0.08	7.00	6.25	0.25	0.25
18396	Curried fowl, Cunningham & De Fourier Co.	69.19	74.52	7.16	2.46	1.77	.34	.83	15.38	11.06	2.12	2.59
18400	Chicken curry à l'Indienne, Franco-American Food Co.	73.21	76.53	4.33	2.10	1.51	.31	.28	13.12	9.44	1.94	.87
18612	Curried fowl, Richardson & Robbins.	71.25	37.78	3.42	2.55	1.74	.48	.33	15.94	10.88	3.00	1.03
18404	Chicken sauté à la marengo, Franco-American Food Co.	67.32	73.41	8.40	3.15	2.74	.06	.35	19.69	17.12	.38	1.09
18408	Beef à la mode, Franco-American Food Co.	71.16	75.82	6.14	2.93	2.74	.02	.17	18.31	17.12	.12	.53
18409	Braised beef à la jardinière, Franco-American Food Co.	70.76	76.78	7.84	2.55	2.41	.04	.10	15.94	15.06	.25	.31
18103	Camp pie, Cunningham-De Fourier Co.	64.85	72.00	9.93	2.51	2.02	.08	.41	15.69	12.62	.50	1.28
18132	Rilletles, plain, French Delicacies and Preserves Co.	20.34	51.03	62.10	2.29	1.75	.12	.42	14.31	10.94	.75	1.31
18133	Rilletles, truffled, French Delicacies and Preserves Co.	18.66	49.60	62.38	2.32	1.73	.10	.49	14.50	10.81	.62	1.53
18151	Galantine of wild boar's head, Cunningham-De Fourier Co.	60.96	69.34	12.09	3.48	2.22	.55	.71	21.75	13.88	3.44	2.21
18204	Wild boar's head, Harry Peck.	63.41	72.29	12.28	3.24	2.46	.53	.25	20.25	15.38	3.31	.78
18268	Spiceless brawn, Armour Canning Co.	58.10	75.51	23.06	3.53	2.41	.62	.50	22.06	15.06	3.88	1.56
18344	Strasbourg meats, Cunningham & De Fourier Co., Ltd.	47.09	62.63	24.81	3.56	2.46	.59	.51	22.25	15.38	3.69	1.59
18363	Cretes et rognons de coq, Boucharge.	79.70	83.85	4.95	2.32	2.10	.20	.02	14.50	13.12	1.25	.06
18395	Peck's Strasbourg meats, Harry Peck & Co.	51.87	.....	.....	2.80	2.40	.14	.26	17.50	15.00	.88	.81
18425	Rognons de coq, Boucharge.	73.23	78.95	7.24	2.30	1.93	.22	.15	14.30	12.06	1.38	.47
18427	Galantine of chicken and ham, Harry Peck.	56.87	69.18	17.79	1.68	1.34	.25	.09	10.50	8.38	1.56	.28
18389	Brawn, "Coin Special," G. H. Hammond & Co.	49.48	64.02	22.71	3.08	2.13	.56	.39	19.25	13.31	3.50	1.22
18977	Horse meat (cross ribs), canned in laboratory.	55.22	57.65	4.22	5.91	4.62	.65	.64	36.94	28.87	4.06	2.00
18220	Chicken, ham, and tongue, Cunningham-De Fourier Co.	44.41	66.10	32.82	2.91	1.96	.50	.45	18.19	12.25	3.12	1.39
	Average	58.75	67.54	17.16	2.80	2.17	.31	.36	17.49	13.52	1.90	1.10
	Maximum	79.70	83.85	62.38	5.91	4.62	.65	.83	36.94	28.87	3.88	2.59
	Minimum	18.66	37.78	3.42	1.12	1.34	.02	.02	7.00	6.25	.12	.06

of miscellaneous meats.

Composition of original material.								Composition of dry material.				Serial No.
Starch.	Glycogen, calculated to dry, fat-free material.	Saltpeter.	Total ash.	Sodium chlorid.	Heavy metals per kilogram.	Preservatives.	Total.	Protein (N×6.25).	Fat.	Total ash.	Sodium chlorid.	
P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*Milligrams.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	
15.46	.....	.....	2.80	1.99	.....	None	101.34	21.06	28.83	8.42	5.98	18102
.....	.....	.....	1.30	.06	.....	do	93.42	49.88	23.24	4.22	.20	18396
.....	.....	.....	2.14	1.57	.....	do	91.93	49.00	16.19	7.99	5.86	18400
.78	.....	.....	6.50	.....	.....	do	96.86	55.44	11.89	22.61	.....	18612
.....	.....	.....	1.62	1.99	.....	do	95.93	60.25	25.70	4.96	6.09	18404
Present.	.....	.....	2.13	.....	.....	do	97.51	63.50	21.29	7.38	5.01	18408
1.16	.....	.....	1.65	.40	.....	do	95.87	54.63	26.81	5.64	1.37	18409
7.20	.....	.....	3.50	.....	.....	Boric acid.	92.68	44.63	28.25	9.96	8.27	18103
.....	.....	0.021	3.31	2.53	.....	None	98.81	18.00	77.96	4.16	3.18	18132
.....	.....	.....	3.90	2.91	Tin ... 28.7	do	97.90	17.81	76.69	4.79	3.58	18133
.....	.....	.06	4.48	2.26	.....	do	97.22	55.69	30.97	11.48	5.79	18151
.....	.....	.01	3.91	2.69	.....	do	99.08	55.38	33.56	10.69	7.35	18204
.....	.....	.01	1.78	2.25	Tin ... 44.6 Zinc .. 43.0	.....	103.45	52.62	55.03	4.25	5.37	18268
.....	.....	.03	2.14	.....	.....	None	94.73	42.06	46.89	4.04	2.56	18344
.....	.....	.....	.55	.....	.....	do	99.63	71.42	24.38	2.71	1.71	18363
.....	.....	.....	3.54	.....	.....	Boric acid.	.....	36.38	.....	7.36	5.98	18395
.....	.....	.....	1.70	.09	.....	None	96.08	53.69	27.05	6.35	.34	18425
15.20	.....	.030	2.20	.....	.....	Boric acid.	87.08	24.38	41.24	5.10	3.29	18427
.....	.....	.12	7.95	4.57	.....	None	98.29	38.13	44.95	15.74	9.05	19389
.....	0.47	.....	1.89	.....	.....	do	.....	82.51	9.42	4.22	2.92	18977
.....	.....	.....	3.33	.35	.....	Benzoic acid.	.....	32.75	59.04	5.99	.63	18220
.....	.....	.....	2.97	1.13	.....	.....	96.54	46.63	35.47	7.52	4.03	
.....	.....	.....	7.95	4.57	.....	.....	103 45	71.42	77.96	22.61	9.05	
.....	.....	.....	.55	.06	.....	.....	87.08	17.81	9.42	2.71	.20	

TABLE 30.—*Fats from roast and boiled beef.*

Serial No.	Description and manufacturer.	Color.	Specific gravity at $\frac{100°}{100°}$.	Specific gravity at $\frac{100°}{15°}$.	Degrees butyro-refracto-meter.	Index of refrac-tion at 35°.	Melting point.	Chilling point.	Iodin number.	Koetts-torfer's number.	Soluble acids.	Insoluble acids.	Heat with H_2SO_4.
											Per cent.	*Per cent.*	° *C.*
18000	Canned roast beef, Armour Canning Co.	Light yellow			47.0	1.4571	42.2						36.0
18003	Canned roast beef, Libby, McNeill & Libby.	do			53.2	1.4614	41.7		43.6		0.74	94.66	
18004	Canned roast beef, Wilson Packing Co.	Brownish yellow	0.8932	0.8569	54.8	1.4625	41.4	35.5	45.2				
18006	Canned roast beef, Armour & Co.	Yellow			52.8	1.4609	43.9		40.3		.34	95.27	
18007	Canned roast beef, Libby, McNeill & Libby.	Light yellow	.8925	.8563		1.4602	36.5	28.0	50.5	200.0	.42	94.58 93.60	35.6
18008	Canned roast beef, Armour Canning Co.	Lemon-yellow			53.0	1.4612	41.9		43.4	195.0	.67	93.37	
18009	Canned roast beef, Libby, McNeill & Libby.	Brown-yellow	.9046	.8679	54.6	1.4622	40.1		48.9				
18013	Canned roast beef, Armour Packing Co.	White-yellow	.8941	.8578	51.9	1.4605	43.5	33.5	36.1	197.0	.44	92.23	
18014	Canned roast beef, The G. H. Hammond Co.	Brown-yellow	.8925	.8563	54.1	1.4620	37.4	31.5	46.5	190.0	.52	93.16	35.7
18018	Canned roast beef, Nelson Morris & Co.	do	.8937	.8575	53.1	1.4613	38.0	32.5	49.4	194.0	.35	93.08	
18028	Canned roast beef, Prairie State Packing Co.	Brown	.8968	.8604	51.7	1.4604	38.6	37.0	47.8	195.0	.55	92.98	
18029	Canned roast beef, Armour Canning Co.	Light yellow	.8932	.8569	52.5	1.4609	38.5	31.5	49.2	200.0	.38	94.50	
18030	Canned roast beef, Armour & Co.	Orange	.8970	.8606	55.0	1.4626	37.6	34.5	47.9				
18031	do	Light yellow	.8928	.8566	52.0	1.4606	40.7	34.0	44.3	188.0	.32	92.89	
18267	Roast beef, Armour Canning Co.	Whitish yellow	.8940	.8577	50.0	1.4593	38.7	31.5	39.9	199.0	.41	91.90	
18527	Roast beef, Cincinnati Abattoir Co.	Brown			55.5	1.4629	40.8		44.2				

18606	Roast beef, Burnham & Morrill Co.	Yellow	.8969	.8605	53.5	1.4614	37.7	27.8	50.6	190.0	.22	93.78	.....
18968	Fresh beef, chuck	do	.8971	.8606	53.0	1.4612	43.0	29.0	48.0	.....	.....	.....	.....
	Average		.8953	.8589	52.8	1.4610	40.1	32.2	45.6	194.8	.45	93.54	35.8
	Maximum		.9046	.8679	55.5	1.4629	43.9	37.0	50.6	200.0	.74	95.27	36.0
	Minimum		.8925	.8563	47.0	1.4571	36.5	27.8	36.1	188.0	.22	91.90	35.6

TABLE 31.—*Fats from canned corned beef.*

Serial No.	Manufacturer.	Color.	Specific gravity $\frac{100°}{100°}$.	Specific gravity $\frac{100°}{15°}$.	Degrees butyro-refracto-meter.	Index of refraction at 35°.	Melting point.	Chilling point.	Iodin number.	Koetts-torfer's number.	Soluble acids.	Insoluble acids.	Heat with H_2SO_4.
											Per cent.	*Per cent.*	° *C.*
17524	The Cudahy Canning Co	Yellow	.....	.....	54.1	1.4619	39.0	.....	45.1	193.0	0.54	94.27	.....
18148	Armour Canning Co	Light yellow	.....	.....	53.1	1.4613	40.1	.....	39.3	197.0	.50	91.90	.....
18149	Armour Packing Co	Light brown	.....	.....	53.3	1.4613	37.2	.....	39.8	192.0	.44	91.80	35.6
18163	Fairbank Canning Co	Light yellow	0.8933	0.8571	55.0	1.4626	38.6	29.0	42.4	.....	.....	.....	.....
18233	The Cincinnati Abattoir Co	Brown	.....	.....	56.0	1.4631	41.5	.....	37.9	.....	.....	.....	.....
18238	Libby, McNeill & Libby	Light yellow	.8944	.8581	53.0	1.4611	38.1	29.0	48.6	210.0	1.62	93.82	37.0
18417	Armour Packing Co	Yellow	.....	.....	54.3	1.4621	41.3	.....	41.5	191.0	.45	89.65	.....
18460	Kingan & Co	Brown-yellow	.....	.....	55.3	1.4627	41.2	.....	45.8	195.0	.59	93.53	36.8
18647	The Jacob Dold Canning Co	Light yellow	.....	.....	53.0	1.4612	43.4	34.5	39.4	.....	.09	89.51	.....
19386	The G. H. Hammond Co	Yellow	.8925	.8563	52.7	1.4609	41.0	31.5	47.1	196.0	.60	94.50	35.5
	Average		.8934	.8572	53.98	1.4618	40.14	31.0	42.7	196.3	.60	92.87	36.2
	Maximum		.8944	.8581	56.0	1.4631	43.4	34.5	48.6	210.0	1.62	94.50	37.0
	Minimum		.8925	.8563	52.7	1.4609	37.2	29.0	37.9	191.0	.09	89.51	35.5

TABLE 32.— *Fats from canned dried and smoked beef.*

Serial No.	Manufacturer.	Color.	Specific gravity $\frac{100°}{100°}$.	Specific gravity $\frac{100°}{15°}$.	Degrees butyro-refracto-meter.	Index of refrac-tion at 35°.	Melting point.	Chilling point.	Iodin number.	Koetts-torfer's number.	Soluble acids.	Insoluble acids.	Heat with H_2SO_4.
											Per cent.	*Per cent.*	° *C.*
18120	Armour & Co	Brown			54.5	1.4623	41.8						
18235	Armour Canning Co	Dark brown			56.0	1.4631			55.3				
18465	Libby, McNeill & Libby	Black			58.0	1.4645		27	57.4				
18580	Armour Canning Co	Dark brown			56.0	1.4631			51.9				
18162	Francis H. Leggett & Co	Brown			54.5	1.4623	40.2		53.2				
18264	The J. C. Ergood Co	Dark brown			54.1	1.4619	38.6		55.1				
18438	Armour Packing Co	Brown			55.0	1.4626			53.2				
18453	J. W. Beardsley's Sons	do			54.2	1.4621	39.0		52.9				
18528	C. D. Butt	Dark brown			55.6	1.4629	37.7		50.9				
18646	American Beef and Fish Co	Brown			51.0	1.4599	38.4	29	52.6				
19387	The G. H. Hammond Co	do			58.5	1.4649		22	57.5				
	Average				55.2	1.4627	39.3	26	54.1				
	Maximum				58.5	1.4649	41.8	29	57.5				
	Minimum				51.0	1.4599	37.7	22	50.9				

TABLE 33.—*Fats from horse meat.*

Serial No.	Description.	Color.	Specific gravity at $\frac{100°}{100°}$.	Specific gravity at $\frac{100°}{15°}$.	Degrees butyro-refracto-meter.	Index of refraction at 35°.	Melting point.	Chilling point.	Iodin number.	Koetts-torfer's number.	Soluble acids.	Insoluble acids.	Heat with H_2SO_4.
											Per cent.	*Per cent.*	° *C.*
18961	Horse meat, second cut round[a]	Black	0.9160	0.8788	62.0	1.4670			61.2				
18962	Horse meat, first cut round[a]	do	.9063	.8694					67.8				
18963	Horse meat, shoulder clod[a]	do	.9063	.8694	62.0	1.4670			61.6	199	0.19	90.93	48.0
18964	Horse meat, cross ribs[a]	do	.9112	.8742	63.0	1.4678			57.1	202	2.76	90.30	46.2
18965	Horse meat, chuck[a]	do	.9117	.8747	62.0	1.4673			67.2	198	.97	92.74	50.5
18966	Horse meat, plate[a]	Dark orange	.8934	.8572	58.1	1.4646	28.0	15.5	76.9	203	.44	95.44	48.8
18967	Horse meat, brisket[a]	do	.9128	.8758	62.5	1.4674			61.5	203	1.78	91.31	48.5
19016	Horse meat, chuck, horse No. 1	Orange	.9096	.8727	57.0	1.4639	27.2	12.0	75.3	196	2.59	90.22	56.5
19017	Horse meat, chuck, horse No. 2	do	.9160	.8788	61.0	1.4665		18.0	68.4				
19018	Horse meat, chuck, horse No. 3	do			76.5	1.4762			77.0				
19019	Horse meat, ribs, horse No. 1	Brown	.9068	.8700	58.3	1.4647	32.5	16.5	63.6	204	2.21	88.18	51.4
19020	Horse meat, ribs, horse No. 2	do	.8868	.8508			32.0	20.5	62.5				
19021	Horse meat, ribs, horse No. 3	do							61.4				
19022	Horse meat, flank, horse No. 1	do	.8914	.8553	55.2	1.4625	29.0	13.0	65.9	197	.58	93.61	49.4
19023	Horse meat, flank, horse No. 2	do	.9184	.8811	60.5	1.4662		25.0	66.0	205	.32	89.58	50.0
19024	Horse meat, flank, horse No. 3	do			72.2	1.4736			68.9				
	Average		.9067	.8699	62.3	1.4673	29.7	17.2	66.4	201	1.32	91.37	49.9
	Maximum		.9184	.8811	76.5	1.4762	32.5	25.0	77.0	205	2.76	95.44	56.5
	Minimum		.8868	.8508	55.2	1.4625	27.2	12.0	61.4	196	.19	88.18	46.2

[a] Horse killed by accident.

TABLE 34.—*Fats from mixtures of horse meat with beef and pork.*

Serial No.	Description.	Color.	Specific gravity at $\frac{100°}{100°}$.	Specific gravity at $\frac{100°}{15°}$.	Degrees butyro-refracto-meter.	Index of refraction, at 35°.	Melting point.	Chilling point.	Iodin number.	Saponification equivalent.	Soluble acids.	Insoluble acids.	Heat with H_2SO_4.
											Per cent.	*Per cent.*	°C.
18968	Fresh beef chuck	Yellow	0.8971	0.8607	53.0	1.4612	43.0	24.0	48.0	.....	.....	.....	.....
18969	Fresh pork, rib and loin	White	.8789	.8423	50.1	1.4593	36.0	18.5	54.4	194	0.38	92.49	35.0
18962	Horse meat, first cut round	Orange	.9063	.8694	.....	.....	.....	.....	67.8	.....	.....	.....	.....
18963	Horse meat, shoulder clod	Black	.9063	.8694	62.0	1.4670	.....	.....	61.6	199	0.19	90.93	48.0
18964	Horse meat, cross ribs	do	.9112	.8742	63.0	1.4678	.....	.....	57.1	202	2.76	90.30	46.2
18970	1 part horse meat (18963) and 1 part beef (18968).	Brown	.8901	.8540	54.1	1.4620	37.0	28.0	49.7	200	1.44	92.80	43.2
18972	1 part horse meat (mixture of equal parts 18962 and 18963) and 1 part pork (18969).	Orange	.....	.....	53.5	1.4614	29.2	23.0	59.6	192	0.04	93.14	45.6
18973	2 parts horse meat (18964) and 1 part pork (18969).	do	.8920	.8558	55.1	1.4627	38.7	27.5	55.9	196	0.44	94.39	42.0
18974	Equal parts horse meat (18964). beef (18968), and pork (18969).	Yellow	.8946	.8584	.....	1.4628	36.8	30.0	54.3	200	0.70	94.21	44.0
18975	1 part horse meat (18966) and 2 parts beef (18968)	Dark brown	.9023	.8657	56.4	1.4634	32.8	25.0	54.5	202	1.25	92.58	.....
18976	1 part horse meat (18966) and 2 parts pork (18969).	Orange	.8875	.8515	53.0	1.4612	27.5	.....	64.1	196	0.44	93.01	39.7

TABLE 35.—*Fats from canned ham and bacon.*

Serial No.	Description and manufacturer.	Color.	Specific gravity at 100°/100°.	Specific gravity at 100°/15°.	Degrees butyro-refracto-meter.	Index of refraction at 35°.	Melting point.	Chilling point.	Iodin number.	Koetts-torfer number.	Soluble acids.	Insoluble acids.	Heat with H_2SO_4.
											Per cent.	*Per cent.*	°C.
18105	Sliced Star ham, Armour & Co	Lemon yellow	0.8745	0.8390	50.5	1.4596	26.2	22.5	53.5	188	0.99	87.72	.....
18150	Boneless ham, Curtice Bros. Co	Brown	.8921	.8559	54.2	1.4620	26.4	18.0	54.4	181	.32	90.61	.....
18203	Sliced ham, Armour Packing Co	do	.8966	.8602	55.2	1.4627	23.6	18.0	61.6	179	.35	88.03	.....
18206	Boneless cooked ham, Richardson & Robbins.	Lemon yellow	.8758	.8403	50.1	1.4593	29.2	21.0	53.5	189	1.43	88.50	.....
18359	Prosciutto scelto in fette, Fratelli Lanzarini.	Dark brown	.8999	.8634	54.4	1.4623	30.5	24.0	56.9	187	.19	94.20	.....
18414	Lunch ham, Richardson & Robbins	Yellow	.9066	.8698	58.2	1.4648	28.8	21.5	48.5	207	2.63	90.62	.....
18573	Huckins' sandwich ham, J. H. W. Huckins & Co.	Orange	.8609	.8260	49.0	1.4586	27.1	19.0	50.6	186	1.11	86.40	43.5
19390	Lunch ham, The G. H. Hammond Co.	do	.8959	.8596	55.5	1.4629	30.0	17.5	61.8	199	1.67	94.35	.....
18108	Sliced Star bacon, Armour & Co	Lemon yellow	.8883	.8523	53.5	1.4614	26.6	19.0	60.5	200	1.	92.44	.....
18131	"Beech-nut bacon," Imperial Packing Co.	do	.8938	.8576	54.1	1.4619	27.2	20.5	59.9	198	.36	94.10	39.8
18236	Sliced breakfast bacon, Kingan & Co.	Brown	.9022	.8656	55.2	1.4627	29.0	22.0	56.9	199 201	1.33 1.39	92.05	40.8
18370	Sliced breakfast bacon, Armour Packing Co.	Yellow	.8953	.8590	55.0	1.4626	26.1	21.0	68.2	192 200	.24 .57	94.51	.....
19396	Breakfast bacon, The G. H. Hammond Co.	Orange	.8796	.8439	49.3	1.4591	29.5	20.0	64.8	186	.19	86.83	41.5
	Average		.8893	.8533	53.4	1.4615	27.7	20.3	57.8	193	.98	90.80	41.4
	Maximum		.9066	.8698	58.2	1.4648	30.5	24.0	68.2	207	2.63	94.51	43.5
	Minimum		.8609	.8260	49.0	1.4586	23 6	17.5	48.5	179	.19	86.40	39.8

TABLE 36.—*Fats from canned tongue.*

Serial No.	Description and manufacturer.	Color.	Specific gravity at $\frac{100°}{100°}$.	Specific gravity at $\frac{100°}{15°}$.	Degrees butyro-refracto-meter.	Index of refraction at 35°.	Melting point.	Chilling point.	Iodin number.	Koetts-torfer number.	Soluble acids.	Insoluble acids.	Micro-scopic examination.	Heat with H_2SO_4.
											Per cent.	*Per cent.*		°C.
18411	Calf's tongue, sauce piquante, Franco-American Food Co.	Yellow				1.4677	35.9			200	1.57	92.10		
18617	Calf's tongue, tomato sauce, Franco-American Food Co.	Brown	0.8996	0.8631	54.4	1.4622	36.8	28.5	48.03	192	.64	93.15	Beef	
18157	Lambs' tongues, H. C. Derby & Co.	do	.9083	.8714	56.0	1.4631	36.4	29.0	43.58	205	2.60	91.86		39.6
18621	Lambs' tongues, Geo. D. Brown & Co.	Yellow	.8953	.8570	55.0	1.4626	37.8	30.0	53.53	190	.42	92.48		
18146	Lunch tongue, Armour Packing Co.	Brown	.9096	.8726	57.8	1.4642	26.5	20.5	51.03	202	.50	89.08	Pork	
18147	Lunch tongue, Armour Canning Co	do	.9024	.8658	57.7	1.4643	27.9	15.0	63.55	190	.53	94.47		
18575	Huckins' sandwich tongue, J. H. W. Huckins & Co.	Orange	.8775	.8419	53.0	1.4611	35.5	26.0	47.25	195	.95	90.04	Beef	
18640	Cooked lunch tongue, Fairbank Canning Co.	Brown	.9025	.8659	58.0	1.4645	26.7	17.0	62.61	201	2.13	93.34	Pork	46.5
19391	Lunch tongue, The G. H. Hammond Co.	Orange				1.4637	39.2		51.03				Beef	
18121	Cooked ox tongue, Armour Canning Co.	Brownish yellow	.8932	.8572	53.8	1.4616	40.3	33.0	42.52	183	.75	88.29	do	
18130	Cooked ox tongue, E. H. Vestey Canning Co.	do	.9018	.8652	50.7	1.4638	41.4	33.0	37.84	196	1.86	89.68		
18145	Rolled ox tongue, Curtice Bros. Co.	Orange	.8940	.8577	54.4	1.4622	35.0	26.5	48.61	181	.45	88.57	Beef	

18205	Rolled tongue, Richardson & Robbins.	Yellow	.8730	.8376	.....	1.4658	36.4	27.0	41.35	187	.76	87.62	.....do	.....
18416	Lunch ox tongue, Richardson & Robbins.	Light yellow	.8917	.8555	52.2	1.4607	39.5	32.0	47.70	197	.44	92.88	.....do	.....
18581	Cooked ox tongue, J. & F. Schroth Packing Co.	Yellow	.8717	.8363	47.2	1.4573	38.7	31.0	39.66	185	.93	86.20	.....do	32.6
18611	Rolled tongue, Richardson & Robbins.	.....do	.8805	.8448	51.2	1.4600	35.9	26.0	49.13	190	.42	90.04	.....do	32.4
19392	Ox tongue, The G. H. Hammond Co.	Orange	.8921	.8559	54.3	1.4621	38.7	26.0	52.09	199	.60	94.78	.....do	.....
	Average		.8929	.8565	54.0	1.4628	35.8	26.7	48.79	193	.97	90.91	.....	37.8
	Maximum		.9096	.8726	58.0	1.4677	41.4	33.0	63.55	205	2.60	94.78	.....	46.5
	Minimum		.8717	.8363	47.2	1.4573	26.5	15.0	37.84	181	.42	86.20	.....	32.4

TABLE 37.—*Fats from fowls of known origin.*

Serial No.	Description and manufacturer.	Color.	Specific gravity at $\frac{100°}{100°}$.	Specific gravity at $\frac{100°}{15°}$.	Degrees butyro-refractometer.	Index of refraction at 35°.	Melting point.	Chilling point.	Iodin number.	Koetts-torfer number.	Soluble acids.	Insoluble acids.	Heat with H_2SO_4.
											Per cent.	*Per cent.*	°C.
19322	Roast chicken, prepared in laboratory.	Orange			53.0	1.4612		12.0	73.5				
19380	Canned chicken (white meat), Libby, McNeill & Libby.[a]				62.5	1.4674	28.0		77.6				
19381	Canned chicken (dark meat), Libby, McNeill & Libby.[a]		0.9120	0.8750	62.0	1.4673		36.5	78.8				
19441	Fresh chicken (white meat), prepared in laboratory.	Orange	.8918	.8556	54.6	1.4623	32.5		68.1	199	0.60	96.03	42.8
19442	Fresh chicken (dark meat), prepared in laboratory.	do	.8917	.8555	55.0	1.4626	32.5	21.0	71.5	198	.92	95.40	38.9
19378	Canned turkey (white meat), Armour & Co.[a]				60.2	1.4660	29.3	23.0	78.2				
19379	Canned turkey (dark meat), Armour & Co.[a]		.9157	.8785	62.0	1.4670	28.0	15.0	81.3				
19477	Fresh turkey (white meat), prepared in laboratory.	Black	.8849	.8490	54.0	1.4619	32.8		67.0				45.5
19478	Fresh turkey (dark meat), prepared in laboratory.	do	.9044	.8672	58.1	1.4646	33.1	16.0	86.4	199	.36	95.50	52.0
19446	Fresh duck (Pekin), prepared in laboratory.	Orange	.8922	.8560	53.1	1.4612	31.0	23.5 17.5	74.5	196	.15	95.39	48.0
19450	Fresh duck (Mallard), prepared in laboratory.	do	.9067	.8698	49.0	1.4590	34.0	12.0	80.2				
	Average		.8999	.8633	56.7	1.4637	31.2	19.6	76.1	198	.51	95.58	45.4
	Maximum		.9157	.8785	62.5	1.4674	34.0	36.5	86.4	199	.92	96.03	52.0
	Minimum		.8849	.8490	49.0	1.4590	28.0	12.0	67.0	196	.15	95.39	38.9

[a] Canned in the writer's presence.

TABLE 38.—*Fats from canned fowl.*

Serial No.	Description and manufacturer.	Color.	Specific gravity at $\frac{100°}{100°}$.	Specific gravity at $\frac{100°}{15°}$.	Degrees butyro-refracto-meter.	Index of refraction at 35°.	Melting point.	Chilling point.	Iodin number.	Koetts-torfer number.	Soluble acids.	Insoluble acids.	Heat with H_2SO_4.
											Per cent.	*Per cent.*	°C.
18118	Boned chicken, Richardson & Robbins.	Dark yellow	.....	.....	60.1	1.4659	31.6	19.5	61.71	193	0.56	94.47	.....
18144	Boned chicken, Curtice Bros. Co.	Brown yellow	.....	.....	63.8	1.4682	29.7	.....	69.82	180	1.58	85.29	.....
18574	Sandwich chicken, J. H. W. Huckins & Co.	Yellow	0.8983	0.8618	55.0	1.4626	38.9	31.0	50.21	201	.38	93.42	.....
18589	Boned chicken, Curtice Bros. Co.	Brown	.....	.....	62.8	1.4677	33.3	.....	68.34	.....	.....	.....	.....
18608	Roast chicken, Burnham & Morrill Co.	Light yellow	.....	.....	60.1	1.4659	26.6	.....	73.68	.....	.....	.....	.....
18648	Roast chicken, Potter & Wrightington.	Yellow	.....	.....	65.7	1.4695	32.1	.....	52.79	198	3.55	88.44	.....
18119	Boned turkey, Richardson & Robbins.	Greenish yellow.	.9109	.8731	62.1	1.4671	29.4	17.0	66.45	199	1.41	96.54	.....
18123	Boned turkey, Curtice Bros. Co.	Lemon yellow	.....	.....	65.2	1.4692	34.5	20.5	68.01	198	3.00	91.14	.....
18154	Roast turkey, Burnham & Morrill Co.	Yellow	.....	.....	65.4	1.4694	35.6	.....	68.20	192	2.51	91.72	.....
18576	Sandwich turkey, J. H. W. Huckins & Co.	Light yellow	.8964	.8600	51.6	1.4603	36.0	29.0	55.80	.....	.....	.....	.....
18609	Roast duck, Burnham and Morrill Co.	Orange	.9044	.8672	58.0	1.4645	32.3	20.0	66.10	202	1.78	92.68	52.5
18610	Roast goose, Burnham and Morrill Co.	do	.8914	.8553	54.0	1.4619	29.0	15.0	74.50	190	.46	90.83	51.5
	Average		.9003	.8635	60.3	1.4660	32.4	21.7	64.63	195	1.69	91.61	.....
	Maximum		.9109	.8731	65.7	1.4695	38.9	31.0	74.50	202	3.55	96.54	.....
	Minimum		.8914	.8553	51.6	1.4603	26.6	15.0	50.21	180	.38	85.29	.....

TABLE 39.—*Fats from potted beef.*

Serial No.	Description and manufacturer.	Color.	Specific gravity $\frac{100°}{100°}$ at	Specific gravity $\frac{100°}{15°}$ at	Degrees butyro-refracto-meter.	Index of refraction at 35°.	Melting point.	Chilling point.	Iodin number.	Koetts-torfer number.	Soluble acids.	Insoluble acids.	Heat with H_2SO_4.
											Per cent.	*Per cent.*	°C.
18111	Potted beef, Richardson & Robbins	Lemon yellow	0.8909	0.8634	54.0	1.4619	34.0	26.5	60.8	188	0.28	91.29	.....
18140	Potted Strassburg beef, Maconochie Bros.	Light yellow	.....	.....	55.2	1.4627	40.1	30.0	43.6	.....	.....	.....	.....
18142	Potted beef, Maconochie Bros	do	.....	.....	57.0	1.4639	41.4	.....	38.7	.....	.....	.....	.....
19393	Potted beef, The G. H. Hammond Co.	Orange	.....	.....	55.0	1.4644	34.2	.....	48.0	.....	.....	.....	.....
	Average	.....	.8909	.8634	55.3	1.4632	37.4	28.2	47.8	188	.28	91.29	.....
	Maximum	.....	.8909	.8634	57.0	1.4644	41.4	30.0	60.8	188	.28	91.29	.....
	Minimum	.....	.8909	.8634	54.0	1.4619	34.0	26.5	38.7	188	.28	91.29	.....

TABLE 40.—*Fats from potted chicken and turkey.*

Serial No.	Description and manufacturer.	Color.	Specific gravity $\frac{100°}{100°}$.	Specific gravity $\frac{100°}{15°}$.	Degrees butyro-refractometer.	Index of refraction at 35°.	Melting point.	Chilling point.	Iodin number.	Koetts-torfer number.	Soluble acids.	Insoluble acids.	Microscopic examination (other fats).	Heat with H_2SO_4.
											Per cent.	*Per cent.*		°C.
18113	Potted chicken, Richardson & Robbins.	Lemon yellow..	0.9029	0.8663	59.5	1.4655	32.0	18.5	65.6	196	.....	92.90	.....	.....
18126	Potted chicken, Curtice Bros. Co.	Orange	.9116	.8746	54.7	1.4624	38.8	20.5	57.8	199	.....	86.08	Pork.....	48.6
18266	Potted chicken, Armour Canning Co.	Light yellow ...	.....	.9003	59.6	1.4655	38.0	.....	39.8	.....	.....	86.81	....do	.....
18439	Potted chicken, Armour Packing Co.	Orange	.....	.....	63.4	1.4677	.....	27.0	39.0	.....	.....	.....	....do	.....
18447	Columbia potted chicken, Mullin-Blackledge Co.	Yellow	.....	.....	60.0	1.4659	39.0	.....	43.9	.....	.....	.....	....do	.....
18463	Potted chicken, Van Camp Packing Co.	.....do	.9207	.8833	58.2	1.4647	37.0	.....	67.7	.....	.....	.....	.....	.....
18114	Potted turkey, Richardson & Robbins.	Lemon yellow..	.9050	.8683	59.8	1.4658	30.0	17.5	67.8	193	0.54	93.81	.....	.....
18125	Potted turkey, Curtice Bros. Co.	Orange	.9098	.8729	54.0	1.4619	38.0	20.0	58.4	201	.....	86.98	.....	49.0
18441	Potted turkey, Armour Packing Co.	.....do	.....	.....	66.5	1.4700	34.7	21.0	40.0	.....	.....	.....	Pork.....	.....
18586	Potted turkey, Curtice Bros. Co.	.....do	.....	.....	46.5	1.4568	30.1	19.5	64.4	.....	.....	.....	.....	.....
	Average.....	.....	.9100	.8776	58.2	1.4646	35.3	20.6	54.4	197	.....	89.32	.....	48.8
	Maximum	.....	.9207	.9003	66.5	1.4700	39.0	27.0	67.8	201	.....	93.81	.....	49.0
	Minimum.....	.....	.9029	.8663	46.5	1.4568	30.0	17.5	39.0	193	.....	86.08	.....	48.6

TABLE 41.—*Fats from potted ham.*

Serial No.	Manufacturer.	Color.	Specific gravity at $\frac{100°}{100°}$.	Specific gravity at $\frac{100°}{15°}$.	Degrees butyro-refractometer.	Index of refraction at 35°.	Melting point.	Chilling point.	Iodin number.	Koetts-torfer number.	Soluble acids.	Insoluble acids.	Heat with H_2SO_4.
											Per cent.	*Per cent.*	°C.
18115	Richardson & Robbins	Lemon yellow	0.8950	0.8587	55.0	1.4626	33.0	19.5	58.3	189	0.40	93.08	.....
18127	Curtice Bros. Co	Orange	.9297	.8920	57.0	1.4639	36.8	23.0	60.7	216	6.25	81.78	42.2
18136	Maconochie Bros	Light yellow	.9090	.8721	56.1	1.4632	39.3	27.0	49.3	.....	.....	.....	.....
18218	Armour Packing Co	Orange	.9056	.8688	55.0	1.4626	30.0	22.5	57.4	.....	.....	.....	.....
18461	Van Camp Packing Co	Yellow	.9204	.8830	56.0	1.4631	37.6	24.5	46.1	.....	.....	.....	.....
18467	Fairbank Canning Co	Orange	.8936	.8573	54.2	1.4620	28.5	18.0	56.2	197	.99	91.15	.....
18577	Mullen-Blackledge Co	do	.8878	.8518	52.0	1.4606	33.7	19.5	56.5	189	.15	90.10	38.2
18639	T. E. Wells Co	Brown	.8990	.8625	53.3	1.4615	34.0	28.5	59.3	.....	.....	.....	.....
18645	Queen City Canning Co	do	.8923	.8561	54.2	1.4620	.....	24.0	48.2	.....	.....	.....	.....
19383	German-American Provision Co	do	.....	.....	48.5	1.4582	35.5	.....	55.6	.....	.....	.....	.....
19394	The G. H. Hammond Co	Orange	.....	.....	54.0	1.4619	39.5	35.0	60.5	.....	.....	.....	.....
	Average		.9036	.8669	54.1	1.4620	34.8	24.2	.....	198	1.95	89.03	40.2
	Maximum		.9297	.8920	57.0	1.4639	39.5	35.0	60.7	216	6.25	93.08	42.2
	Minimum		.8878	.8518	48.5	1.4582	28.5	18.0	46.1	189	.15	81.78	38.2

TABLE 42.—*Fats from potted tongue.*

Serial No.	Manufacturer.	Color.	Specific gravity at $\frac{100°}{100°}$.	Specific gravity at $\frac{100°}{15°}$.	Degrees butyro-refracto-meter.	Index of refrac-tion at 35°.	Melt-ing point.	Chill-ing point.	Iodin num-ber.	Polenske number.	Soluble acids.	Insoluble acids.	Micro-scopic examina-tion.	Heat with H_2SO_4.
											Per cent.	*Per cent.*		°C.
18116	Richardson & Robbins	Lemon yellow	0.8858	0.8499	48.8	1.4584		27.5	48.0	188	0.57	93.28	Beef	
18124	Curtice Bros. Co	Brown	.9067	.8699	54.5	1.4652	41.0	33.5	46.2				do	
18134	Maconochie Bros	Dark brown			66.0	1.4690			62.6				Pork	
18450	Cudahy Canning Co	Orange	.8998	.8633	54.0	1.4619	35.7	25.0	49.2				Beef	
18451	Reed Bros. Packing Co., Ltd	do	.8992	.8627	57.0	1.4639	39.0	27.0	57.3	195	1.13	92.62	do	
18456	Jacob Dole Canning Co	do	.9160	.8788	54.0	1.4619	33.0	27.0	57.3				Pork	
18458	A. Weber & Co	Yellow	.8983	.8618	55.4	1.4627	29.2	16.5	55.0	198	1.50	90.57	do	
18462	Van Camp Packing Co	Orange			57.5	1.4642	39.5	27.0	44.3				Beef	
18466	Fairbank Canning Co	Brown	.9073	.8705	53.0	1.4612	38.6	27.0	44.8				do	
18530	Eastmans Co	Dark brown			57.5	1.4642	34.2		52.1				do	
18532	Libby, McNeill & Libby	Yellow	.8930	.8567	57.8	1.4644	30.5	21.0	64.7	194	Trace.	93.43		
18560	The Cunningham de Fourier Co.	do	.8922	.8560	52.2	1.4607	31.5	27.5	53.4	193	.40	93.74	Beef	35.6
18578	Mullen-Blackledge Co	Orange	.8980	.8615			33.0	20.5	52.7	190	.26	91.14	do	
18588	Curtice Bros. Co	Brown			53.2	1.4614	35.4	24.0	51.7				do	
18590	Armour Packing Co	Dirty yellow	.8955	.8592	51.1	1.4600	35.4	27.0	53.5	198	.47	93.63	do	
18650	T. E. Wells Co	Orange			54.4	1.4621	27.5		55.9					
19385	German-American Provision Co.	do	.8990	.8625	54.5	1.4623	29.0	16.0	57.1	198	.51	95.04		
	Average		.8992	.8627	55.1	1.4627	33.9	24.8	53.3	194	.61	92.93		
	Maximum		.9160	.8788	66.0	1.4690	41 0	33.5	64.7	198	1.50	95.04		
	Minimum		.8858	.8499	48.8	1.4584	27.5	16.0	44.3	188	.26	90.57		

TABLE 43.—*Fats from mixed and miscellaneous potted goods.*

Serial No.	Description and manufacturer.	Color.	Specific gravity at $\frac{100°}{100°}$.	Specific gravity at $\frac{100°}{15°}$.	Degrees butyro-refractometer.	Index of refraction at 35°.	Melting point.	Chilling point.	Iodin number.	Koetts-torfer number.	Soluble acids.	Insoluble acids.	Heat with H_2SO_4.
											Per cent.	*Per cent.*	° *C.*
18135	Potted ham and chicken, Maconochie Bros.	Light yellow			58.2	1.4646	38.5	25.0	48.9				
18137	Potted mixed game, Maconochie Bros.	do	0.9116	0.8746	55.7	1.4630	37.5	26.0	50.5				
18138	Potted ham, chicken, and tongue, Maconochie Bros.	do			55.0	1.4626	37.6	26.5	53.2				
18139	Potted veal and ham, Maconochie Bros.	do	.9181	.8808	55.0	1.4626	40.7	29.5	45.6				
18143	Potted turkey and tongue, Maconochie Bros.	do			57.7	1.4643	40.0		41.5				
18579	Potted ham and tongue, Maconochie Bros.	Orange	.8982	.8617	53.5	1.4615	30.0	20.0	60.8	192	0.27	91.81	
18112	Potted game, Richardson & Robbins.	Lemon yellow	.9029	.8663	59.3	1.4655	31.0	18.5	64.5	193	.82	92.88	
18153	Potted game, Curtice Bros. Co.	do	.8974	.8610	54.0	1.4619	36.5	23.0	58.3	195	1.02	92.30	
18415	Potted duck, Richardson & Robbins.	Orange	.9209	.8835	60.5	1.4662	33.2	20.0	60.6				
18587	Potted game, Curtice Bros Co.	Greenish yellow			56.0	1.4631	34.2		46.9				
	Average		.9082	.8713	56.5	1.4635	35.9	23.6	52.1	193	.70	92.33	
	Maximum		.9209	.8835	60.5	1.4662	40.7	29.5	64.5	195	1.02	92.88	
	Minimum		.8974	.8610	53.5	1.4615	30.0	18.5	41.5	192	.27	91.81	

TABLE 44.—*Deviled meat.*

Serial No.	Description and manufacturer.	Color.	Specific gravity at $\frac{100°}{100°}$.	Specific gravity at $\frac{100°}{15°}$.	Degrees butyro-refracto-meter.	Index of refraction at 35°.	Melting point.	Chilling point.	Iodin number.	Koetts-torfer number.	Soluble acids.	Insoluble acids.	Heat with H_2SO_4.
											Per cent.	*Per cent.*	° *C.*
18208	Deviled chicken, Wm. Underwood Co.	Brown	0.8962	0.8598	56.7	1.4636	35.0	21.0	70.6	195	0.27	94.29	.....
18122	Deviled ham, Wm. Underwood Co	Lemon yellow	.8996	.8631	55.1	1.4626	32.5	.....	58.5	190	.47	92.60	.....
18392	Deviled ham, Armour Canning Co	do	.....	.....	53.2	1.4614	38.5	22.0	48.0	.....	.....	.....	.....
18394	Deviled ham, Armour Packing Co	Orange	.....	.....	61.0	1.4667	31.5	25.0	53.2	.....	.....	.....	.....
18618	Deviled ham, Curtice Bros. Co	Light yellow	.8950	.8587	56.5	1.4635	28.0	18.5	66.5	198	.24	94.12	40.0
19382	Deviled ham, American brand, German-American Provision Co.	Brown	.....	.....	53.1	1.4613	40.2	.....	53.9	.....	.....	.....	.....
19395	Deviled ham, The G. H. Hammond Co.	Green yellow	.....	.....	62.8	1.4676	28.5	.....	61.7	.....	.....	.....	.....
18209	Deviled tongue, Wm. Underwood Co.	Brown	.8992	.8627	50.1	1.4594	29.7	19.0	51.4	.....	.....	.....	.....
18393	Deviled tongue, Armour Packing Co	.....	.....	.....	55.0	1.4626	39.0	.....	47.3	.....	.....	.....	.....
19384	Deviled tongue, American brand, German-American Provision Co.	Orange	.8924	.8562	55.0	1.4626	28.0	12.5	57.9	198	.63	95.09	.....
18207	Deviled turkey, Wm. Underwood Co.	Brown	.8986	.8622	52.5	1.4609	31.3	27.0	60.4	206	2.12	88.74	.....
	Average	.....	.8968	.8605	55.5	1.4629	32.9	20.7	57.2	197	.75	92.97	.....
	Maximum	.....	.8996	.8631	62.8	1.4676	40.2	27.0	70.6	206	2.12	95.09	.....
	Minimum	.....	.8924	.8562	50.1	1.4594	28.0	12.5	47.3	190	.24	88.74	.....

TABLE 45.—*Fats from canned sausage.*

Serial No.	Description and manufacturer.	Color.	Specific gravity at $\frac{100°}{100°}$.	Specific gravity at $\frac{100°}{15°}$.	Degrees butyro-refracto-meter.	Index of refrac-tion at 35°.	Melting point.	Chilling point.	Iodin number.	Koetts-torfer number.	Soluble acids.	Insoluble acids.	Heat with H_2SO_4.
											Per cent.	*Per cent.*	° *C.*
18156	Frankfort sausage, C. G Hartman	Light yellow	0.8947	0.8584	54.1	1.4619	34.8	22.5	51.7	199	1.06	91.78	.....
18221	Delicatess Frankfürter, The Genoese American Provision Co.	.....do	.9042	.8675	55.1	1.4627	37.7	26.0	56.1	.....	.....	.....	.....
18539	Frankfort sausage, C. G. Hartman	White	.8924	.8562	52.0	1.4606	35.7	20.5	58.7	193	1.70	89.88	.....
18564	Conservirte Frankfürter bratwurst, Gustav Amandus.	.....do	.8786	.8519	.....	1.4559	39.0	21.0	55.8	186	.14	88.49	.....
18615	Echte Frankfürter wurste, Türk & Papst.	.....do	.8843	.8484	51.0	1.4599	35.0	18.0	60.9	184	.12	88.25	.....
18106	Cambridge sausage, Harry Peck & Co.	White-yellow.	.8964	.8600	53.3	1.4613	36.7	19.5	63.8	199	1.05	89.72	40.0
18107	Truffled liver sausage, Henry Auerbach.	.....do	.8966	.8602	53.0	1.4611	28.8	21.7	50.6	.....	.....	.....	.....
18109	Irish sausage, Cunningham & De Fourier Co.	.....	.....	.....	54.2	1.4620	41.5	33.5	48.2	193	1.43	.....	.....
18129	Mortadella sausage, Fratella Nanni	Lemon yellow	.9225	.8850	56.1	1.4632	36.8	21.0	46.1	.....	.....	.....	.....
18155	Oxford potted sausage, Burnham & Morrill Co.	Light yellow	.8969	.8605	54.5	1.4623	31.5	19.8	55.3	200	.93	92.38	.....
18365	Chicken sausage, Gotha Preserved Meat and Sausage Co.	Orange	.....	.....	60.3	1.4660	31.7	.....	39.8	.....	.....	.....	.....
18423	Frankfürter bratwurst fabrik, Henry Bauer.	.....	.....	.....	.....	.....	.....	.....	.....	193	.10	92.68	.....
18616	Finest fois gras truffle sausage, Henry Auerbach.	Light yellow	.8840	.8482	49.2	1.4590	32.0	24.5	59.2	189	.10	91.33	.....
18658	Mortedella sausage, Fratelli Lanzarini.	Orange	.....	.....	59.5	1.4654	31.0	.....	.....	.....	.....	.....	.....
18104	Vienna sausage, National Pure Food Co.	Light yellow	.....	.....	54.6	1.4623	40.7	26.0	44.5	.....	.....	.....	.....
18219	Vienna sausage, Armour Packing Co.	Brown	.8970	.8606	53.2	1.4613	30.5	12.0	58.5	.....	.....	.....	.....
18232	Sauerkraut and Vienna sausage, Armour Packing Co.	Yellow	.....	.....	56.0	1.4631	32.7	.....	52.7	.....	.....	.....	.....

18342	Vienna sausage, German-American Provision Co.	.....	.....	.....	56.5	1.4635	38.0	.....	57.4	.....	.....	.....	.....
18386	Van Camp's Vienna sausage, Van Camp Packing Co.	Brownish yellow.	.8939	.8575	53.8	1.4617	27.6	24.5	57.0	192	.37	92.34	.....
18391	Vienna sausage, Armour & Co.....	Light yellow .	.9028	.8662	56.0	1.4631	38.2	22.0	56.8	.....	.....	.....	.....
18412	Vienna sausage, National Pure Food Co.	Yellow	.....	.....	54.8	1.4625	36.0	.....	55.7	.....	.....	.....	.....
18437	Vienna sausage, Armour Packing Co...	.....do	.....	.....	55.2	1.4627	38.6	.....	55.1	.....	.....	.....	.....
18459	Vienna sausage, Kingan & Co.....	Light yellow .	.8903	.8542	54.7	1.4624	37.3	24.0	59.5	.....	.....	.....	.....
18533	Vienna sausage, Libby, McNeill & Libby.	Orange	.....	.....	55.0	1.4626	38.3	.....	59.8	.....	.....	.....	.....
19397	Vienna sausage, The G.H.Hammond Co.	Whitish	.....	.....	53.5	1.4616	.....	.....	62.7	.....	.....	.....	.....
	Average	.....	.8953	.8596	54.6	1.4620	35.2	22.3	55.0	193	.70	90.76	40.0
	Maximum.....	.....	.9225	.8850	60.3	1.4660	41.5	33.5	63.8	200	1.70	92.68	40.0
	Minimum	.....	.8786	.8482	49.2	1.4559	27.6	12.0	39.8	184	.10	88.25	40.0

TABLE 46.—*Fats from pâtés.*

Serial No.	Description and manufacturer.	Color.	Specific gravity at $\frac{100°}{100°}$.	Specific gravity at $\frac{100°}{15°}$.	Degrees butyro-refractometer.	Index of refraction at 35°.	Melting point.	Chilling point.	Iodin number.	Koetts-torfer number.	Soluble acids.	Insoluble acids.	Microscopic examination (other fats).
											Per cent.	*Per cent.*	
18110	Veal and ham pâté, Harry Peck	Nearly white	.....	.....	56.0	1.4633	40.5	.....	45.3	.....	.....	.....	
18210	Pâté de poulet aux truffes, G. Dumontier, Bruxelles.	Light yellow	0.8912	0.8550	53.9	1.4618	35.0	21.5	57.1	199	0.02	94.99	Pork.
18211	Pâté de bécasse aux truffes, G. Dumontier, Bruxelles.	do	.8947	.8584	53.0	1.4612	28.8	20.5	59.3	197	.21	93.97	Do.
18212	Pâté de perdreau aux truffes, G. Dumontier, Bruxelles.	do	.8992	.8627	53.8	1.4617	30.2	17.5	55.5	.....	.....	.....	Do.
18213	Pâté à la diable, Harry Peck	Brown	.....	.....	55.1	1.4627	42.0	32.0	25.6	223	.....	.....	Do.
18215	Chicken and ham pâté, Harry Peck.	Light yellow	.9007	.8642	55.5	1.4628	30.2	20.5	57.0	.....	.....	.....	Do.
18345	Pâté ham, tongue, and chicken, Cunningham & De Fourier Co., Ltd.	Yellow	.8918	.8558	55.0	1.4626	.....	27.0	55.5	.....	.....	.....	Do.
18357	Napier lunch pâté, Cunningham & De Fourier Co., Ltd.	Brown	.8970	.8606	54.4	1.4619	34.0	22.0	59.1	.....	.....	.....	Do.
18375	Pâté de bécasse au foie gras, "Beaumarchand."	Light yellow	.9008	.8643	54.1	1.4619	30.7	23.0	52.1	.....	.....	.....	Do.
18540	Pâté de perdreau aux truffes, G. Dumontier.	White	.8880	.8520	51.5	1.4602	30.0	22.5	54.7	.....	.....	.....	Do.
18558	Pâté de foie gras aux truffes, The Cunningham & De Fourier Co.	Light yellow	.8926	.8564	52.0	1.4606	32.4	24.0	56.3	192	.68	93.04	Beef.
18559	Turkey and tongue pâté, The Cunningham & De Fourier Co.	Dirty yellow	.8966	.8602	54.0	1.4619	34.0	33.0	57.0	.....	.....	.....	Pork.
18561	Pâté de foie gras, truffé, Amieux Frères.	Orange	.....	.....	52.7	1.4609	33.0	21.0	58.9	.....	.....	.....	Do.
18562	Pâté de foie gras, truffé, L. A. Price	Yellow	.....	.....	54.0	1.4619	37.0	28.5	53.7	.....	.....	.....	Beef.
18566	Pâté de foie gras, truffé, Gabriel Triat & Co.	Orange	.8932	.8569	52.0	1.4606	34.0	27.0	55.5	195	.31	93.58	Pork.

18567	Pâte de foie gras, truffé, Gabriel Triat & Co.	Brown	.8919	.8557	50.1	1.4593	31.2	28.0	50.5	193	.32	91.83	Do.
18216	Turkey and tongue pâté, Harry Peck.				58.1	1.4646	39.3		35.1				
18217	Chicken and tongue pâté, Harry Peck.				57.7	1.4643	41.0		34.7				
18347	Terrine de foies gras aux truffes, "Beaumarchand."	Dark brown			55.1	1.4627	32.0		48.5				Do.
18364	Terrine de foies gras, Mosser Frères.	Orange	.8914	.8553	52.2	1.4607	33.3	25.0	52.8				Beef.
18422	Terrine de foies gras aux truffes, L. Henry.	Brown			54.7	1.4624	32.6	20.0	54.0				
18424	Foies gras, Columbia Wurstfabrik	Black	.9018	.8652	54.0	1.4619			51.6	191	1.92	86.94	Do.
18613	Terrine de foie gras aux truffes, B. Laforest.	Brown	.8980	.8616	52.0	1.4606	35.5	26.0	56.9				Do.
18614	Purée de foie gras aux truffes, B. Laforest.	Orange	.9175	.8803	56.0	1.4633		27.0	45.3				Pork and beef.
18128	Purée de foie gras, truffée, J. B. Rilhac.	do	.9040	.8673	55.0	1.4626	28.4	18.0	52.6	193	1.06	92.65	Do.
18346	Purée de foie gras, truffée, Louis Frères & Co.	do	.8886	.8526	54.8	1.4625	36.0	22.0	57.6				Pork.
18553	Purée de faisan de Strasbourg, etc., Georges Brück.	White	.8908	.8547	54.0	1.4619	35.7	23.5	60.1	198	.24	94.94	Do.
18554	Purée de zungen de Strasbourg, Georges Brück.	do	.8972	.8608	54.0	1.4620	34.0	22.0	57.8				Do.
18556	Purée de grives de Strasbourg, Georges Brück.	Orange	.9056	.8689	56.2	1.4632	36.8	27.5	51.3				Do.
18557	Purée de foies gras, L. A. Price	Yellow			54.1	1.4619	31.1		55.7				Do.
18403	Wild duck pâté, truffled, Franco-American Food Co.	Orange	.9014	.8648	59.5	1.4654	30.7	24.0	47.4				
18117	Chicken livers, Richardson & Robbins.	Dark yellow	.8986	.8621	55.5	1.4629	34.5	18.5	61.8	190	.18	95.07	
18214	Chicken truffles, Harry Peck	Brown			58.5	1.4649	39.5		45.2				Do.
18399	Chicken liver pâté, truffled, Franco-American Food Co.	Orange	.9103	.8733	57.2	1.4640	36.7	20.5	63.7				Do.

TABLE 46.—*Fats from pâtés*—Continued.

Serial No.	Description and manufacturer.	Color.	Specific gravity $\frac{100°}{100°}$ at	Specific gravity $\frac{100°}{15°}$ at	Degrees butyro-refractometer.	Index of refraction at 35°.	Melting point.	Chilling point.	Iodin number.	Koetts-torfer number.	Soluble acids.	Insoluble acids.	Microscopic examination (other fats).
											Per cent.	*Per cent.*	
18401	Chicken pâté, truffled, Franco-American Food Co.	Orange	.9314	.8936	59.1	1.4652	32.0	23.5	61.8				
18397	Quail pâté, truffled, Franco-American Food Co.	do	.9258	.8882	57.0	1.4639	28.1	20.8	41.7				Pork.
18398	Grouse pâté, truffled, Franco-American Food Co.	do	.9132	.8761	56.0	1.4631	30.5	25.5	46.4				Do.
18402	Pheasant pâté, truffled, Franco-American Food Co.	do	.9195	.8822	57.3	1.4640	42.2	24.0	41.7				
18405	Partridge pâté, truffled, Franco-American Food Co.	do	.8975	.8611	57.5	1.4642	32.1	18.0	49.0				Do.
18406	Woodcock pâté, truffled, Franco-American Food Co.	do	.9104	.8734	56.4	1.4633	37.0	22.0	50.8				Do.
	Average		.9013	.8648	55.0	1.4625	34.1	23.5	50.9	197	.55	93.00	
	Maximum		.9314	.8936	59.5	1.4654	42.2	33.0	61.8	223	1.92	95.07	
	Minimum		.8880	.8520	50.1	1.4593	28.1	17.5	25.6	190	.02	86.94	

TABLE 47.—*Fats from miscellaneous meats.*

Serial No.	Description and manufacturer.	Color.	Specific gravity at $\frac{100°}{100°}$.	Specific gravity at $\frac{100°}{15°}$.	Degrees butyro-refracto-meter.	Index of refraction at 35°.	Melting point.	Chilling point.	Iodin number.	Koetts-torfer number.	Soluble acids.	Insoluble acids.	Microscopic examination.	Heat with H_2SO_4.
											Per cent.	*Per cent.*		°C.
18102	Chicken tamale, Armour Packing Co.	Whitish	0.9103	0.8733	58.2	1.4652	42.0		37.7				Beef and pork.	
18396	Curried fowl, Cunningham & De Fourier Co., Ltd.	Orange			57.5	1.4642	37.0		52.1					
18400	Chicken curry à l'indienne, Franco-American Food Co.	do			62.7	1.4676	36.7		42.1				Beef*	
18612	Curried fowl, Richardson & Robbins.	Brown			60.2	1.4660			68.5					
18404	Chicken sauté à la meringue, Franco-American Food Co.	Orange			63.2	1.4678	35.0		50.2					
18408	Beef à la mode, Franco-American Food Co.	do			56.0	1.4631	32.2		58.2					
18409	Braised beef à la jardinière, Franco-American Food Co.	Greenish yellow			60.8	1.4662	38.4		38.2	207		91.66		
18103	Camp pie, Cunningham & De Fourier Co.	Lemon yellow			54.0	1.4619	39.0	33.0	54.6				Pork and beef.	
18132	Rillettes plain, French Delicacies and Preserves Co.	do	.8950	.8587	51.0	1.4600	38.5	22.5	52.9	195	1.27	88.83	Beef and pork.	47.0°
18133	Rillettes truffled, French Delicacies and Preserves Co.	Light yellow	.8988	.8624	51.1	1.4599	38.3	20.5	32.9	198	1.26	87.56	do	50.0°
18151	Galantine of wild boar's head, Cunningham & De Fourier Co.	do	.9215	.8841	57.2	1.4640	32.2		46.9				Pork	
18204	Wild boar's head, Harry Peck.	Light brown	.9258	.8882	56.8	1.4637	39.8	23.0	43.5				Beef	
18268	Spiceless brawn, Armour Canning Co.	Brown	.8911	.8550	53.2	1.4613	34.0	22.5	62.3				Pork	
18344	Strasbourg meats, Cunningham & De Fourier Co., Ltd.	Yellow	.8997	.8632	53.2	1.4613	31.0	29.0	53.4				Beef	

TABLE 47.—*Fats from miscellaneous meats*—Continued.

Serial No.	Description and manufacturer.	Color.	Specific gravity at $\frac{100°}{100°}$.	Specific gravity at $\frac{100°}{15°}$.	Degrees butyro-refractometer.	Index of refraction at 35°.	Melting point.	Chilling point.	Iodin number.	Koetts-torfer number.	Soluble acids.	Insoluble acids.	Microscopic examination.	Heat with H_2SO_4.
											Per cent.	*Per cent.*		° *C.*
18363	Cretes et rognons de coq, Boucharge.	Greenish yellow			62.2	1.4671	38.0		44.0					
18395	Peck's Strasbourg meats, Harry Peck & Co.	Orange			55.1	1.4627	39.2		43.6				Beef	
18425	Rognons de coq, Boucharge	Yellow			52.0	1.4673			65.8					
18427	Galantine of chicken and ham, Harry Peck.	Green yellow	.8844	.8485	51.0	1.4599	38.0	22.0	60.1	189	1.41	90.49	Pork	
18444	Celebrated mince meat, Anderson Preserving Co.				69.0	1.4717			40.6	187	0.59			
19389	Brawn, "Coin special," The G. H. Hammond Co.	Orange	.9004	.8638	57.0	1.4639	33.0	18.0	64.4	197	0.98	96.46		42.4°
18220	Chicken, ham, and tongue, Cunningham & De Fourier Co.	do	.9057	.8688	53.2	1.4613	32.2	31.0	50.1					
	Average		.9033	.8666	56.9	1.4641	36.4	24.6	50.6	196	1.10	91.00		
	Maximum		.9258	.8882	69.0	1.4717	42.0	33.0	68.5	207	1.41	96.46		
	Minimum		.8844	.8485	51.0	1.4599	31.0	18.0	32.9	187	0.59	87.56		

*The manufacturers state that the presence of beef fat in this sample is due to the use of condensed beef broth to give strength to the gravy.

INDEX.

A.

Page.

Acetyl value, determination 1422
Acid, arachidic, separation 1429
Acids, fatty 1421
  insoluble 1419
  soluble 1419
  volatile 1422
Amandus, Gustav 1450, 1482, 1506
American Beef and Fish Co 1451, 1458, 1492
Ambühl's method for starch determination 1399
Amieux Frères 1450, 1484, 1486, 1508
Anderson Preserving Co 1512
Arachidic acid. *See* Acid, arachidic.
Armour & Co 1377, 1456, 1464, 1468, 1482, 1490, 1492, 1495, 1498, 1507
Armour Canning Co 1444, 1445, 1446, 1447, 1448, 1449, 1451, 1453, 1456, 1458, 1466, 1470, 1472, 1474, 1476, 1480, 1488, 1490, 1491, 1492, 1496, 1501, 1505, 1511
Armour Packing Co 1377, 1444, 1445, 1446, 1447, 1448, 1449, 1451, 1456, 1458, 1464, 1466, 1472, 1474, 1476, 1480, 1482, 1488, 1490, 1491, 1492, 1495, 1496, 1501, 1502, 1503, 1505, 1506, 1507, 1511
Aromatic oxyacids, detection 1393
Ash, determination 1395
Auerbach, Henry 1444, 1451, 1482, 1506

B.

Bacon, canned, composition and characteristics 1438
Baudoin test for sesame oil 1430
Bauer, Heinrich 1449, 1482, 1506
Beakley, A 1470
Beardsley's Sons, J. W 1449, 1458, 1492
"Beaumarchand" 1447, 1448, 1484, 1508, 1509
Bechi test for cotton-seed oil 1428
Beef, boiled. *See* Roast beef.
  corned 1390
    processing 1391
    curing 1390
    canning 1391
    composition and characteristics 1434
  dried, composition and characteristics 1435
  extract 1389
    equivalents of "soup liquor" 1390
  loss by shrinking 1388
  potted, composition and characteristics 1440
  roast, canning 1376
    composition and characteristics 1433
    parboiling 1376
    preparation 1375
    processing 1376
    shrinkage 1387
  smoked, canned, composition and characteristics 1435
    composition and characteristics 1435

Page.
Benzoic acid, detection 1408
Borax, detection 1406
Boric acid, detection 1406
quantitative determination 1407
Brakeley, A 1449
Braütigam and Edelmann's method for glycogen determination 1400
Brown, George D. & Co 1451, 1466, 1496
Brück, Georges 1450, 1486, 1509
Brücke's method for glycogen determination 1400
Burnham & Morrill Co 1446, 1451, 1456, 1470, 1482, 1491, 1499, 1506
Butt, C. D 1450, 1458, 1492

C.

Canning, influence on composition beef 1378, 1380, 1382, 1384, 1385, 1387
Chicken (*see also* Fowl) 1392
potted, composition and characteristics 1440
Cholesterol, determination 1423
Cincinnati Abattoir Co 1447, 1450, 1456, 1458, 1474, 1476, 1490, 1491
Coloring matter, detection 1410
Columbia Wurstfabrik 1449, 1484, 1509
Coremon. *See* Courlay and Coremon.
Corned beef. *See* Beef, corned.
Cotton-seed oil, Bechi test 1428
Halphen reaction 1428
silver-nitrate test 1428
Courlay and Coremon's method for glycogen determination 1400
Cudahy Canning Co 1377, 1444, 1447, 1449, 1458, 1476, 1478, 1491, 1503
Cudahy Packing Co 1456
Cunningham & De Fourier Co 1444, 1446, 1447, 1448, 1474, 1476, 1482, 1484, 1488, 1503, 1506, 1508, 1511, 1512
Curtice Brothers Co 1445, 1446, 1451, 1464, 1466, 1470, 1472, 1474, 1476, 1478, 1480, 1495, 1496, 1499, 1501, 1502, 1503, 1504, 1505

D.

Derby, H. C., & Co 1446, 1466, 1496
Deviled meat, composition and characteristics 1442
Dold, Jacob, Canning Co 1449, 1451, 1458, 1474, 1476, 1491, 1503
Dumontier, G 1446, 1450, 1484, 1508

E.

Eastmann's Co 1450, 1476, 1503
Edelmann. *See* Braütigam and Edelmann.
Emery Provision Co 1444
Ergood, J. C., Co 1458, 1492

F.

Fairbank Canning Co ... 1444, 1446, 1449, 1451, 1458, 1466, 1474, 1476, 1491, 1496, 1503
Fat, determination 1395
microscopical examination 1431
Fats, determination of cholesterol 1423
index of refraction 1415
melting points 1424, 1425, 1426
phytosterol 1423
specific gravity 1412, 1413, 1414
examination 1412
Fatty acid, determination melting point 1426
acids, determination 1421
Flesh bases. *See* Meat bases.
Fluorids, detection 1407
Fowl, canned, composition and characteristics 1439
Franco-American Food Co 1448, 1451, 1466, 1484, 1486, 1488, 1496, 1509, 1510, 1511
French Delicacies and Preserves Co 1445, 1488, 1511

G.

Page.
Gelatin, determination 1396, 1397
Genoese-American Provision Co 1482, 1506
German-American Provision Co .. 1447, 1453, 1474, 1476, 1480, 1482, 1502, 1503, 1505, 1507
Glycogen, determination 1399
Gotha Preserved Meat and Sausage Co 1448, 1482, 1506

H.

Hafner, L 1449, 1486
Halphen reaction for cotton-seed oil 1428
Hams, canned, composition and characteristics 1438
potted, composition and characteristics 1441
Hammond, G. H. Co .. 1377, 1444, 1453, 1454, 1456, 1458, 1464, 1466, 1472, 1474, 1480, 1482, 1488, 1490, 1491, 1492, 1495, 1496, 1497, 1500, 1502, 1505, 1507, 1512
Hartmann, C. G 1446, 1450, 1482, 1509
Haywood's method for glycogen determination 1401
Henry, L 1449, 1484, 1509
Horse meat, composition and characteristics 1436
Hübl's method for iodin absorption 1417
Huckins, J. H. W. & Co 1450, 1451, 1464, 1466, 1470, 1495, 1496, 1499

I.

Imperial Packing Co 1445, 1464, 1495
Index of refraction, determination 1415
Indols, detection 1393
Insoluble acids, determination 1419
Iodin absorption, determination 1417

K.

Kingan & Co 1447, 1448, 1449, 1458, 1464, 1474, 1476, 1482, 1491, 1495, 1507

L.

Laforest, B 1451, 1484, 1509
Lanzarini, Fratelli 1447, 1451, 1464, 1482, 1495, 1506
Leggett, Francis H., & Co 1446, 1458, 1492
Libby, McNeill & Libby 1377, 1444, 1447, 1449, 1450 1453, 1456, 1458, 1468, 1474, 1476, 1482, 1490, 1491, 1492, 1498, 1503, 1507
Louit Frères & Co 1447, 1486, 1509

M.

Maconochie Bros 1445, 1451, 1472, 1474, 1476, 1478, 1500, 1502, 1503, 1504
Maumené number, determination 1427
Mayrhofer's method of determination, starch 1398
Meat bases, determination 1397
canned composition and characteristics 1431
deviled composition and characteristics 1442
Meats, miscellaneous 1392
composition and characteristics 1443
Melting point, determination 1424, 1425, 1426
Metals, determination 1411
Microscopical examination of fats 1431
Mohler's method, detection benzoic acid 1409
Mosser Frères 1447, 1484, 1509
Mullen-Blackledge Co 1449, 1451, 1472, 1474, 1476, 1501, 1502, 1503

N.

Nanni; Fratella 1445, 1482, 1506
National Pure Food Co 1444, 1448, 1482, 1506, 1507
Nelson, Morris & Co 1377, 1456, 1490
Nerking. *See* Pflüger and Nerking.
Nitrates, detection 1403
determination 1403
Nitrogen, determination 1396
Nitrogenous substances, determination 1396, 1397

P.

Page.
Packing houses, methods of various 1377
Pâtés, composition and characteristics 1443
Peck, Harry, & Co.. 1444, 1446, 1448, 1449, 1482, 1484, 1488, 1506, 1508, 1509, 1511, 1512
Peptones, determination 1396
Pflüger and Nerking method for glycogen determination 1402
Phenols, detection 1393
Phytosterol, determination 1423
Potted beef, composition and characteristics 1440
chicken, composition and characteristics 1440
ham, composition and characteristics 1440
tongue, composition and characteristics 1441
turkey, composition and characteristics 1440
goods, miscellaneous, composition and characteristics 1442
Potter & Wrightington 1451, 1470, 1499
Prairie State Packing Co. 1444, 1456, 1490
Price, L. A 1450, 1484, 1486, 1508, 1509
Proteoses, determination 1396
Proteids, coagulated determination 1396
Ptomaines, detection 1394
Purées, composition and characteristics 1443

Q.

Queen City Canning Co 1451, 1474, 1502

R.

Reed Bros. Packing Co., Ltd 1449, 1476, 1503
Refraction. *See* Index of refraction.
Refractometer, Albe 1415
Zeiss 1416, 1417
Resin oil, determination 1427
Richardson & Robbins..... 1444, 1445, 1446, 1449, 1451, 1464, 1466, 1470, 1472, 1474, 1476, 1478, 1484, 1488, 1495, 1497, 1499, 1500, 1501, 1502, 1503, 1504, 1509, 1511
Rilhac, J. B 1445, 1486, 1509

S.

Saccharin, detection 1410
Salicylic acid, detection 1408
Saponification number, determination 1419
Sausage 1392
canned, composition and characteristics 1442
Schlösing-Wagner method for determination nitrates 1403
Schroth, J. & F. Packing Co 1449, 1451, 1458, 1466, 1497
Sesame oil, Baudouin test 1430
Tocher test 1431
Villivecchia test 1430
Shrinkage of meat in canning 1387
Silico-fluorids, detection 1407
Skatols, detection 1393
Smoked meat 1391
Soluble acids, determination 1419
Soup liquor 1378, 1380, 1382, 1384, 1385, 1387, 1390
Specific gravity, determination 1412, 1413, 1414
Starch, determination 1398
detection 1398
Sugar, reducing, determination 1403
Sulphites, detection 1410

T.

Tocher, test for sesame oil 1431
Tongue 1391
boiling 1391
composition and characteristics 1439

Page.
Tongue, curing 1391
potted, composition and characteristics 1441
Triat, Gabriel, & Co 1450, 1484, 1508, 1509
Türk & Papst 1482, 1451, 1506
Turkey 1392
potted, composition and characteristics 1440

U.

Underwood, Wm. & Co 1445, 1446, 1450, 1480, 1505
Unsaponifiable residue, determination 1423

V.

Van Camp Packing Co 1448, 1449, 1472, 1474, 1476, 1482, 1501, 1502, 1503, 1507
Vestey, E. H., Canning Co 1445, 1466, 1496
Villivecchia, test sesame oil 1430
Volatile acids, determination 1422

W.

Wagner. *See* Schlösing-Wagner.
Water, determination 1395
Weber, A., & Co 1449, 1474, 1476, 1503
Wells, T. E., Co 1451, 1474, 1476, 1502, 1503
Wilson Packing Co 1444, 1456, 1490
Winfield, A. A 1456, 1464

O