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†F. Atwood Sirrine, M.S., Special Agent.
FRANK E. NEWTON, Jennie Terwilliger, Clerks and Stenographers.
ADIN H. HORTON, Computer.

Address all correspondence, not to individual members of the staff, but to the NEW YORK AGRICULTURAL EXPERIMENT STATION, GENEVA, N. Y.
The Bulletins published by the Station will be sent free to any farmer applying for them.

* Connected with Fertilizer Control.
† In Second Judicial Department.
DIRECTOR'S REPORT FOR 1904.

Honorable Board of Control of the New York Agricultural Experiment Station.

Gentlemen:—In accordance with the usual custom, I have the honor to submit herewith the annual report of the New York Agricultural Experiment Station for the year 1904. In the character and progress of the Station work the report is not unlike that of previous years. Certain efforts to which the members of the Staff have given their time and energy have been productive of definite and unquestionably beneficial results, while in other directions the only report that can be made is that the problems which it is sought to solve are still being pursued. This is the usual effort of scientific investigation.

It is sometimes discouraging, and to the public is often disappointing, that so few of the unsolved problems that present themselves to the agricultural practitioner can at any one time be made the subject of investigation and that progress toward placing agricultural knowledge upon a surer and safe basis through scientific effort is necessarily slow.

CHANGES IN THE STATION STAFF.

Fortunately for the Station fewer changes have occurred in the Station staff than has been the case during some previous years. Mr. Vinton A. Clark, First Assistant Horticulturist, after two years of faithful and efficient service, resigned his position to accept a more prominent one in connection with the Agricultural Experiment Station of the University of Arizona. This vacancy has been filled by the appointment of Mr. Nathaniel O. Booth, who occupied the position previous to the appointment of Mr. Clark.

Mr. Harold E. Hodgkiss, B.S., graduate of the Massachusetts Agricultural College, has been appointed to the position of Assistant Entomologist.
CHANGES IN THE LAWS RELATING TO THE STATION.

The legislature of 1904 enacted considerable legislation which materially affects the status of this institution. The law under which the Station is organized and carries on its work was modified in several particulars, the principal changes being the placing of the Commissioner of Agriculture on the Board of Control, the establishing of closer relations between the Department of Agriculture and the Experiment Station and the removal of any indefiniteness as to the responsibilities of the Board. The relation of the Station to certain inspection laws was very materially changed. Heretofore the administrative laws controlling the sale and inspection of fertilizers and concentrated feeding stuffs have been in the hands of the Director of the Station, subject to the regulations of the Board of Control. Under the terms of the new laws their administration rests with the Commissioner of Agriculture, it still being the duty of the Station to analyze the samples of fertilizers and feeding stuffs which may be selected under the authority of the Commissioner of Agriculture. It is not understood, at least it was not so expressed, that this readjustment of responsibility for the execution of the provisions of the inspection laws was due to any dissatisfaction with the administration of the laws by the Station authorities but it was felt, rather, that the enforcement of all agricultural law should be unified under the control of a single department. Doubtless these changes will be found to have been wisely conceived. The other important item of legislation which should be mentioned in this connection was the passage of an act giving the Director of this institution broad and unquestionable authority to publish "results of analyses made by him, or under his authority or direction, of any commodities or substances analyzed in pursuance of or under the provisions of the statutes of this State." Authority was also granted to "publish bulletins containing results of analyses made of such substances or commodities, which analyses were made prior to the passage of this act and which have not heretofore been published." Such authority wisely used is often essential to the protection of the best interests of the agricultural public.
APPROPRIATION FOR A NEW BUILDING.

With insurance money received by the Station and with an appropriation made by the legislature of 1903, the losses occasioned by the fire in 1902 have been replaced, with the exception of a building for the storage of farm machinery and grain. Through an appropriation of $4,500, made by the legislature of 1904, this building is now in process of construction and when this is completed the Station will be better equipped with buildings of all kinds than ever before in its history.

GENERAL IMPROVEMENTS.

For some time subsequent to the fire of 1902, the grounds of the Station presented a somewhat unattractive appearance, due in part to the unsightly foundations of the burned buildings and the clutter attendant upon building operations. Such conditions no longer exist. The new buildings are in place, old buildings are removed, a large amount of necessary grading has been done, all the buildings have been newly painted in more desirable colors and the appearance of the whole institution is now so attractive that it is easy to regard the fire as a fortunate occurrence.

HOUSES FOR THE STATION STAFF.

The building equipment of the Station now provides for the housing of five families belonging to the Station staff. Under the conditions at present prevailing the homes of the staff are widely scattered. The married members, other than those provided for on the Station grounds, live in various parts of the city in rented houses. There is involved in this arrangement a great deal of uncertainty as to permanence and desirability of location. It is also often inconvenient; and it certainly makes exceedingly difficult and impossible, almost, that social unity which should prevail at such an institution and which is a large factor in its spirit and success. The desirability and attractiveness of any salaried position are to a very large degree determined by social relations and by the environment and influences which surround the home. In view of the fact that there is an almost continuous effort to draw away from the Station its best
men, sometimes successfully, it would seem to be a good policy to do all that is possible to render positions at the Experiment Station so attractive that efficient and useful men shall not be drawn away. It is fair to raise the question, therefore, whether, if it is not inconsistent with the established policy of the State, several more houses should not be erected on the Station grounds, sufficient in number at least to accommodate the heads of departments and certain minor officials whose presence near the Station at all times is very essential.

MAINTENANCE FUND.

The various funds that were appropriated by the legislature of 1904 for the maintenance of the Station during the fiscal year beginning Oct. 1, 1904, were as follows:

Salaries .......................................................... $22,000
Labor .......................................................... 13,000
Expenses of various departments of research .................. 16,000
General expense, heat, light, water, apparatus, repairs, etc. 4,000
Expenses of horticultural investigation ....................... 8,000
Fertilizer inspection ......................................... 10,000
Feeding stuff inspection ...................................... 3,500

By action of your Board, the legislature is asked to appropriate similar sums for the fiscal year beginning Oct. 1st, 1905, with the exception that the amount for salaries is recommended to be $23,000, and the amount for the expenses of the various departments only $15,000, the total sum asked for remaining unchanged.

THE MAILING LIST.

During the past year the mailing list has been revised by removing all names of those deceased and those who have changed their place of residence without notice to the Station, so that they were not receiving the bulletins. Although the addition of new names to the list has been no less than during former years, there has been an apparent decrease in the number of persons to whom our publications have been sent in New York.

The number of names now on our records is as follows:
AN IMPORTANT STATION PUBLICATION.

There is now in press a publication for which the legislature of 1904 generously provided, which is to be known as the "Apples of New York." This publication is to be issued in two parts. The first, or the one now in press, will include the late varieties of apples, and the second part will be devoted to the summer and fall varieties. It is expected that the two parts will present about 500 pages of printed matter and approximately 300 plates, nearly half of which will be representations in color of the most important varieties. This work will present the results of apple studies which have been carried on at the Station for over twenty years, besides much data collected from practical orchardists throughout the State. As the number of copies authorized is limited, every effort should be made to place them in the hands of those who are directly interested in apple culture either as orchardists or nursery men.

DEMONSTRATION EXPERIMENTS.

There is a growing tendency in experiment station work towards carrying on demonstration experiments in connection with the commercial operations of the farm and orchard. It is very evident that no experiment station farm can be so organized as to give opportunities for observations in connection with
all classes of commercial work. For this reason, it is necessary for a station to make arrangements with farmers and orchardists to obtain control of certain areas on particular farms where a good opportunity is offered to conduct desired experiments. These experiments are not in the nature of object lessons for the imparting of information already known to be of practical utility, but are intended to determine whether certain new knowledge or methods may be efficiently applied to practice. The New York Experiment Station is not behind other institutions in utilizing this means of prosecuting its work. During the past year the Station has either conducted work or arranged for work in numerous localities in the State. These experiments may be classified as follows:

TREATMENT OF ASPARAGUS RUST.
F. A. Sirrine ............Riverhead.

TREATMENT OF RASPBERRY CANE BLIGHT.
Dobson Bros..............Charlotte

POTATO SPRAYING EXPERIMENTS.
1 Brainerd & Beaumont, Gain’ville.
2 Robert Dunn............West Henrietta.
3 F. E. Gott.............Spencerport.
4 P. H. Pettit..........Clifton Springs
5 H. E. Cook............Denmark
6 W. E. Griffith........Madrid
7 N. W. Porter..........Malone
8 Datus Clark ............Peru.
9 John Middleton.......Slaters.
10 R. C. Colyer.........Woodbury.
11 R. E. Colyer........Farmingdale.
12 W. H. Satterly .......Mattituck.
13 H. A. Jagger.........Southampton.
14 L. E. Downs.........Southampton.
15 F. A. Sirrine........Riverhead.

EXPERIMENTS WITH GRAPE STOCKS.
Irving A. Wilcox .........Portland.
T. H. King ...............Trumansburg.

THE ECONOMY OF DWARF ORCHARDS.
A. Wood & Son.........Carlton Station.
F. E. Dawley............Fayetteville.
Edward Van Alstyne......Kinderhook.

SYSTEMS OF ORCHARD MANAGEMENT.
W. D. Auchter.........South Greece.
Grant G. Hitchings, South Onondaga.

GROWTH OF FOREIGN VARIETIES OF CHESTNUTS.
W. D. Barns & Son ....Middlehope

EXPERIMENTS WITH FORAGE CROPS.
F. A. Sirrine.........Riverhead.
W. A. Fleet...........Cutchogue.
Edward Van Alstyne.....Kinderhook.

A TEST OF SULPHUR WASHES.
E. E. Robinson ......Centerville.
F. A. Sirrine.........Riverhead.
C. W. Ward ............Queens.
White & Rice ..........Yorktown.
T. C. Maxwell & Bros.....Geneva.
Rice Bros ..Geneva.
Geo. Callard........Carlton Station.
F. G. Whitney .........Youngstown.
W. H. Woolworth .......Youngstown.
A. H. Dutton ........Youngstown.
Will Hall ..........Youngstown.

CONTROL OF CODLING MOTH.
White & Rice ..........Yorktown.
Frank Stevens ..........Youngstown.
T. C. Maxwell & Bros.....Geneva.
The Station officials desire to acknowledge their obligations to those persons with whom they are coöperating and to express appreciation of the faithful and efficient service that is being rendered.

DEPARTMENT OF ANIMAL HUSBANDRY.

Results from poultry feeding experiments.—In earlier poultry feeding experiments at this Station the desirability of sometimes using animal food with the standard grains has been plainly shown. For growing ducklings this was especially evident.

Knowing the general character of the food for wild birds it is to be expected that the young of domestic fowls might subsist to advantage largely upon fresh animal food; but the animal foods of commerce have been subjected to various processes for their separation or preservation and are most convenient for use in the dried form.

Very few data existed concerning the amount or proportion of commercial animal food that could be efficiently or profitably used. To partly supply this lack, feeding experiments have been made, results from some of which are reported in a recent bulletin.

Rations in which these foods supplied 94 per ct. of the total dry matter and 98 per ct. of the protein were fed to ducklings without any apparent ill effects.

During the first few weeks growth was more rapid, and equal growth made from less food (even at a lower cost for food) under a ration in which 60 per ct. of the protein was obtained from animal food than under rations having respectively 20, 40 and 80 per ct. of the protein derived from this source.

Later growth was made at somewhat more economical expenditure of food under the "20 per ct. ration," but was slower. Under the rations containing larger proportions of animal food, marketable size was reached about two weeks sooner.

Results on the whole favored the use, for the first few weeks, of the ration in which 60 per ct. of the protein came from animal food, and later those containing larger and increasing proportions of grain foods.
DEPARTMENT OF BACTERIOLOGY.

Fermentation in canned peas.—The canning industry in this State utilizes over $3,500,000 worth of farm products annually. The losses from fermentation of the finished products are often large and the causes of the same are obscure. The results of a study of fermentation in canned peas have been reported. The trouble was caused by a species of bacterium which produced unusually resistant spores. Heating the canned peas to 240° F. for 30 minutes was found to be sufficient to prevent the fermentation. This conclusion was tested by canning a ton of peas to which cultures of the bacillus causing the trouble had been added. A large factory which had previously suffered heavy losses put our suggestions into practice with entire success.

Black rot of cabbage spread by cabbage seed.—A study of black rot of cabbage has been carried on for a number of years in connection with the Botanical Department. The agencies by which the disease spreads are being investigated. Black rot is found in the seed-bearing plants and the germ causing the disease is present on the seed from such plants. It has also been found that the disease germs are able to remain alive on the seed at least eleven months. This shows that at the time of planting the seed may carry the disease germs. We have here an explanation for severe outbreaks where the disease had been previously unknown and there was no apparent source of infection.

Soaking the seed for fifteen minutes in a 1:1000 corrosive sublimate solution or in a 0.4 per cent. formalin solution just before planting is suggested as a cheap and effective means of destroying the germs upon the seed.

DEPARTMENT OF CHEMISTRY.

Chemical changes in the souring of milk and their relations to cottage cheese.—This work was undertaken for the purpose of learning some facts about the chemical changes that occur in milk when it sours, and also for the purpose of applying the facts to the manufacture of cottage (Dutch) cheese. In addition, a study was made (1) of the chemical changes that take place in cottage cheese after it is prepared and (2)
of the digestibility of fresh cottage cheese as compared with new cheddar cheese. The action of lactic acid, formed in milk by the fermentation of milk-sugar, upon the milk-casein was found to take place in two stages; in the first stage the acid forms a compound, which in Bulletin 215 was called casein monolactate, but which by more recent work we have found to be free casein; in the second stage, after the formation of more acid, the casein unites with this acid to form a compound which is the familiar solid substance of sour milk and which constitutes a large part of the dry matter of cottage cheese. The conditions of temperature were ascertained for the best yield and quality of cottage cheese. Success was attained in making good cottage cheese from milk by direct addition of hydrochloric acid, thus shortening the time of manufacture from one or two days to as many hours. It was found that very slight chemical change occurs in cottage cheese after it is made, and in this respect the behavior of cottage cheese is wholly unlike that of cheddar cheese. According to popular belief, cottage cheese is more readily digested than cheddar cheese, and this belief was supported by artificial digestion of the two kinds.

The composition of commercial whale-oil soaps in relation to spraying.—Many complaints have been received from fruit-growers in regard to the unsatisfactory results given by commercial whale-oil soaps in spraying fruit trees. In some cases the insects were not killed, while in other cases the foliage was seriously injured. In response to inquiries on this subject, an investigation was undertaken to study the composition of the commercial whale-oil soaps commonly found in the market. It was found that these soaps vary greatly in composition. Different lots of soap from the same factory were found to contain actual soap varying from 24 to 46 per cent. So great is the variation in composition of these soaps that they cannot be relied upon at all for giving uniform results. Since manufacturers are unwilling to furnish commercial whale-oil soap of guaranteed composition, experiments were made resulting in the recommendation of a certain formula for home-manufacture of fish-oil soap. The homemade soap destroys plant lice and does not injure foliage; it costs less and can be relied upon to give uniform results. In addition,
a study was made of the amount of free-alkali in soap that will do injury to foliage. Soaps containing less than 5 per ct. of free alkali did no injury under the conditions employed. Full details are given for the home-making of fish-oil soap and addresses are given of parties who will furnish materials.

The science and practice of making cider-vinegar.—In response to numerous inquiries made by farmers as to why their home-made cider-vinegar was so often below the legal standard, an investigation was begun seven years ago having for its object a thorough study of the vinegar-making process, starting with material known to be normal. Some 36 experiments were made in the investigation. The composition of apple juice is given for a large number of different varieties of apples. The chemical changes of apple juice under different conditions during the alcoholic and acetic stages of fermentation were studied and a practical application made to the relations and control of those fermentations in making cider-vinegar. Attention is called to the fact that good vinegar may lose its acidity on standing. The causes and remedies are given. Other topics treated in this work are the behavior of malic acid during fermentations, the solids of apple juice and cider-vinegar, cider-vinegar in relation to legal standards, conditions commonly producing cider-vinegar of poor quality, and directions for home-manufacture of cider-vinegar.

Study of the principal phosphorus compound of wheat bran.—As a necessary part of an extended investigation of the metabolism and function of phosphorus compounds in the nutrition of the milch cow, a study was made of the principal phosphorus compound of wheat bran. It was found to be undoubtedly a previously known non-nitrogenous body with the formula \( \text{C}_8\text{H}_6\text{P}_2\text{O}_9 \) or anhydro-oxmethylene-diphosphoric acid. Since this body was identified investigations have been conducted which indicate that it may occupy a peculiar place in the nutrition of the cow. Further observations are planned with reference to the elucidation of this point.

DEPARTMENT OF ENTOMOLOGY.

The lime-sulphur-soda wash for orchard treatment.—The investigations to determine the value of this spray for orchard treatment have been continued. Applications of the wash for the
control of the scale gave somewhat variable results which indicate that the various preparations were not always equally destructive to the scale. Some treatments proved very effective, showing that an efficient spray may be prepared without the use of external heat. As there is a demand for such a wash upon the part of smaller orchardists further experiments are to be undertaken to devise methods by which all preparations may be made equally effective.

In the experiments with apple trees applications of the wash proved very efficient in preventing injuries by early spring leaf eating insects as the bud moth and case bearer. Such treatment was of little or no value for the codling moth. Owing to the absence of apple scab the value of a sulphur wash for this disease remains undetermined. For the treatment of peaches it has been shown that one application of a sulphur wash during dormant season will efficiently control both leaf curl and scale. Future experiments are necessary to determine the value of the sulphur washes as combined fungicides and insecticides for the treatment of other varieties of fruit.

*Fall use of sulphur sprays.*—In this work a study has been made of the effects of fall applications of sulphur washes upon fruit and leaf buds, and upon the scale. The experiments were conducted in three orchards, two near Geneva and one near Queens, L. I. One of these was a thrifty young orchard of peaches and plums which had received the best of attention in every respect and contained no scale. The other orchard at Geneva, of apples, pears, crab apples, cherries and plums was older, was well infested with scale, and had received no treatment for insects or diseases, but had been well cared for in other respects. The third orchard, at Queens, contained only apples and peaches, and showed plainly the effects of scale injury. The sprayed trees in the three orchards numbered 66 large apple trees, 33 pear trees, 257 plum trees, 39 cherry trees, 6 crab apple trees and 252 peach trees. Applications of the washes were made during November. In the orchard which was free of scale the applications caused a diminution in the amount of bloom and foliage of peaches and plums which varied according to the spray applied, the lime-sulphur proving the least destructive. In
orchard II, which was infested with scale the plums lost from 10 to 50 per ct. of their blossoms and had slight injuries to the leaf buds upon the lower branches. Morello cherries suffered a loss of five per ct. of the blossoms. Apples and pears were affected in the same degree. Crab apples bore a full crop of fruit and foliage. In orchard III, which was infested with scale there was no apparent reduction in the blossoms and leaves upon the moderately infested trees.

The lime-sulphur wash, the lime-sulphur-salt wash and the lime-sulphur-caustic soda wash were equally effective as insecticides. Applications of these sprays controlled the scale and with some slight exceptions insured the production of clean fruit.

DEPARTMENT OF HORTICULTURE.

Apples in storage.—In Bulletin 248 different varieties of apples are treated with regard to their season of ripening and keeping and their adaptability for storage purposes. The bulletin is based upon material obtained from three distinctly different sources: First, from storage tests made at this Station with fruit grown in the Station orchards; second, from men of practical experience in handling fruit both in cold storage and in ordinary fruit warehouses; third, from tests made by the U. S. Department of Agriculture in cooperation with this Station with numerous varieties of apples from the Station orchards stored in chemical cold storage. The tests which were made at this Station were undertaken with the primary purpose of determining the ordinary season of ripening and the keeping qualities of the different varieties which were under test in the Station orchards. This work brought out some results of general interest concerning the keeping of apples, worthy of publication, but which, when regarded from the standpoint of the general adaptability of the varieties to cold storage purposes, were incomplete. In order that a more complete account of the behavior of different varieties in storage might be presented than could be derived from the experiments at the Station, men of practical experience in storing apples on a large scale under commercial conditions were consulted and much material of practical importance was thus obtained.
In 1901–2 this Station furnished over 100 varieties of apples to
be used in cold storage tests at Buffalo under the direction of
Profs. G. Harold Powell and S. H. Fulton of the U. S. Department
of Agriculture. The results of their work were first reported
in Bulletin 48 of the Bureau of Plant Industry, U. S. Depart-
ment of Agriculture. Much material which was thus made avail-
able has been included in the notes that are published in Bulle-
tin 248. In this bulletin varieties which are included in the
Station tests are arranged chronologically according to the aver-
age life of the fruit in storage. The experience of fruit storage
men is then given concerning conditions which affect the keep-
ing qualities of apples, the comparative efficiency of different
kinds of storage as applied to different varieties, the tempera-
ture at which different varieties should be held in cold storage,
the relation between seasonal differences and keeping qualities
of apples, the kinds of deterioration that may precede decay in
cold storage and the varieties which are liable to each.

The varieties are then treated in alphabetical order, giving for
each the results of the tests which were made in the natural tem-
perature storage rooms at this Station, the results of the tests
made in cold storage by the U. S. Department of Agriculture,
and lastly a summary of the experience of cold storage men with
the variety.

Selecting seed by specific gravity.—The method of seed selection
by means of salt solutions has long been known to gardening.
A simpler form of the method, which consists in floating off
light seed in pure water, is practiced by some in this country,
particularly by growers of lettuce under glass. But the method
appears never to have come into any considerable vogue either in
Europe or America despite the fact that striking results have
repeatedly been obtained by its use and that it has been recom-
mended by several European experimenters. In Bulletin 256 a
variation of the method of seed selection by salt solutions is
described, in which separates are made at much shorter intervals
than in the method as heretofore practiced. This permits of
determining with greater precision the distribution of seeds with
regard to specific gravity. It is found that within the limits of
the variety the lower the specific gravity the greater the propor-
tion of small seeds, and vice versa. The separation of seeds by the method of salt solutions is, therefore, in part a crude separation according to size.

A quite definite correlation exists between the specific gravity of a seed and its germination. Seeds of low specific gravity do not germinate at all. Those in a range higher germinate scantily and in many cases produce comparatively weak plants. Seeds of highest specific gravity, or, in case of oil bearing seeds, those of intermediate specific gravity, give the highest percentage of germination. To some extent a correlation appears to exist also between the specific gravity of the seed and the vigor of the resulting plant.

Differences in specific gravity are due either to differences in structure or differences in composition. If the differences in composition are not obscured by differences in structure, which they often are, the differing specific gravities to which they give rise are indexes to the quality of the seed. The report in Bulletin 256 is based on only one season’s work. The literature on the subject is reviewed and preliminary observations are presented. The subject is worthy of further investigation.

Shading strawberries.—In order to study the practical value of the method of shading strawberries, experiments were carried on in 1902 and 1903 in three different localities in this State, the results of which are given in Bulletin 246. The materials used for shading were two grades of thin cheese cloth stretched about twenty inches above the plants. The cost of shading was at the rate of about $350 per acre.

Records are given showing the temperature of the air and of the soil underneath the cloth and outside, cloudiness, evaporation, yields of fruit, etc. The temperature of the air and of the soil underneath the cloth was usually slightly higher than outside. There was also more moisture in the air and in the soil underneath the cloth than outside, the covering diminishing the evaporation about one-half. Shading proved to be somewhat beneficial to the blossoms as a protection against frost. The shaded plants made more rapid growth of foliage and seemed more vigorous and thrifty, but shading appeared to slightly increase the susceptibility of the plants to leaf blight and mildew. Pollination appeared to be as complete underneath the covering as outside.
In regard to yield, there was a considerable increase with the thinner grade of cloth, but a marked decrease with the heavier grade. Shading in some cases produced a considerably larger berry, more attractive in color, but somewhat softer, slightly less acid than those grown outside, also containing a smaller percentage of sugar.

In no case was the increase in yield sufficient to compensate for the cost of the shading. It is believed that under certain conditions the practice of shading may be adapted for the growing of fancy fruit and is likely to be most useful in localities having a large amount of sunshine, a light rainfall and considerable wind.

**INSPECTION WORK.**

*Inspection of fertilizers for 1904.*—In May of this current year, an amendment to the fertilizer law of this State was made by the legislature, as a result of which the administration of the law was transferred to the Department of Agriculture. This Station continues to perform the chemical analyses. The analyses published in Bulletin 253 represent only samples of fertilizers collected by this Station previous to the time the law was amended in May.

During the spring of 1904, the Station's collecting agents visited 98 towns between March 26 and May 9, obtaining 468 samples of commercial fertilizers. These samples represent 371 different brands, the product of 49 different manufacturers, each manufacturer being represented by from one to 145 brands.

The subjoined tabulated statement indicates the different classes included in the collection.

<table>
<thead>
<tr>
<th>Brands containing only nitrogen.</th>
<th>Brands containing only phosphoric acid.</th>
<th>Brands containing nitrogen and phosphoric acid without potassium</th>
<th>Brands containing phosphoric acid and potassium without nitrogen.</th>
<th>Brands of complete fertilizers.</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>22</td>
<td>4</td>
<td>16</td>
<td>47</td>
</tr>
</tbody>
</table>

The following tabulated statement shows the average composition of the complete fertilizers collected, together with a comparison of the guaranteed composition and that found by analysis:
<table>
<thead>
<tr>
<th></th>
<th>Per ct. guaranteed.</th>
<th>Per ct. found.</th>
<th>Average per ct. found above guarantee.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen</td>
<td>0.50</td>
<td>9.88</td>
<td>2.01</td>
</tr>
<tr>
<td>Available phosphoric acid</td>
<td>1.50</td>
<td>10.00</td>
<td>7.56</td>
</tr>
<tr>
<td>Insoluble phosphoric acid</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Potash</td>
<td>0.50</td>
<td>10.00</td>
<td>4.50</td>
</tr>
<tr>
<td>Water-soluble nitrogen</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Water-soluble phosphoric acid</td>
<td>0.00</td>
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**Commercial Valuation and Selling Price of Complete Fertilizers.**

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<thead>
<tr>
<th>Commercial valuation of complete fertilizers.</th>
<th>Selling price of one ton of complete fertilizer.</th>
<th>Average increased cost of mixed materials over unmixed materials for one ton.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$19.85</td>
<td>$17</td>
<td>$45</td>
</tr>
</tbody>
</table>

In the table below we present figures showing the average cost to the purchaser of one pound of plant-food in different forms in mixed fertilizers.

**Average Cost of One Pound of Plant-Food to Consumers in Mixed Fertilizers.**

| Nitrogen | 24.30 cents. |
| Phosphoric acid (available) | 5.90 cents. |
| Potash | 6.25 cents. |

*Feeding stuff inspection for 1904.*—Previous to May 31, 1904, one hundred and four manufacturers or jobbers registered the required guarantees and paid the license fee on one hundred and fifty-four brands of feeding stuffs to be placed on sale in New York State in 1904.

The list of licensed brands are classified as follows:

| Proprietary or mixed feeds, 70 brands. | Corn brans, 3 brands |
| Meat and bone meal, 16 " | Gluten meals, 2 " |
| Hominy feed or chop, 13 " | Sugar beet refuse, 2 " |
| Gluten feeds, 12 " | Cottonseed feed, 1 " |
| Linseed oil meals, 11 " | Germ oil meal, 1 " |
| Distillers' grains, 9 " | |
| Cottonseed meals, 6 " | |
| Malt sprouts, 5 " | Total 154 brands. |
The number of samples collected and analyzed up to May 3d was 263, representing 203 brands.

### Classification of Samples Analyzed.

<table>
<thead>
<tr>
<th>Name of feed</th>
<th>No. samples</th>
<th>No. brands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cottonseed meal</td>
<td>17</td>
<td>13</td>
</tr>
<tr>
<td>Linseed oil meal</td>
<td>19</td>
<td>10</td>
</tr>
<tr>
<td>Linseed cake, ground</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Distillers' grains</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Brewers' grains</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Malt sprouts</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Gluten meal</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Gluten feed</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>Germ oil meal</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Germaline</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Hominy feed or chop</td>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>Mixed feeds (bran and middlings)</td>
<td>35</td>
<td>30</td>
</tr>
<tr>
<td>Oats and their by-products</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Compounded feeds, proprietary and otherwise</td>
<td>96</td>
<td>74</td>
</tr>
<tr>
<td>Poultry foods</td>
<td>34</td>
<td>29</td>
</tr>
<tr>
<td>Miscellaneous feeds</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>263</strong></td>
<td><strong>203</strong></td>
</tr>
</tbody>
</table>

A study of the figures showing the results of the inspection up to May 3 reveals the fact that the samples representing quite a large number of brands contained considerably less protein than called for by guarantees. In all, at least fifty-two samples showed a larger deficit than would be regarded as reasonable.

The deficit occurred as follows:

- Cottonseed meal: 5 samples.
- Linseed meal: 9
- Distillers' dried grains: 4
- Gluten feed: 4
- Hominy feed: 6
- Compounded and proprietary feeds: 18
- Poultry foods: 6

One brand, licensed as cottonseed meal, sold by the Husted Milling and Elevator Co., of Buffalo, N. Y., and recorded as manufactured by R. W. Biggs & Co., of Memphis, Tenn., was found to contain only 21.8 per ct. of protein whereas the minimum guarantee was 41 per ct.
The material was evidently cottonseed feed, or cottonseed meal mixed with ground hulls. Such a feed is fraudulent in its character.

BULLETINS PUBLISHED IN 1904.

No. 245. February. Chemical changes in the souring of milk and their relations to cottage cheese. L. L. Van Slyke and E. B. Hart. Pages 36.


No. 256. October. Seed selection according to specific gravity. V. A. Clark. Pages 59, plates 2.


W. H. JORDAN, Director.

New York Agricultural Experiment Station, Geneva, N. Y., Dec. 15, 1904.