

Connecticut Agricultural Experiment Station

NEW HAVEN, CONN.

BULLETIN 206

FEBRUARY, 1918

Being the Report on Commercial Feeding Stuffs 1917

By E. M. BAILEY

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AND

Reports of Board of Control and Treasurer

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Commercial Feeding Stuffs.

BY E. M. BAILEY*

Under the Connecticut statutes the term "concentrated commercial feeding stuff" covers practically all feeds excepting hay and straw, whole seeds, unmixed meal made directly from any of the cereals or from buckwheat, and feed ground from whole grain and sold directly from manufacturer to consumer.

Section 4592 requires that every lot or parcel of concentrated commercial feeding stuff shall bear a statement giving the name and address of the manufacturer or importer, the number of net pounds in the package, the name of the article, and the percentages of protein and fat contained in it. The law forbids the use of any metal in affixing tags.

No registration of feeds or payment of analysis or license fees is required.

The penalty for violation of the statute is not more than \$100 fine for the first offense and not more than \$200 for each subsequent offense.

The law authorizes this station to take samples from any manufacturer or dealer, in a prescribed manner, and requires the station to analyze annually at least one sample of each brand which it has collected, and to publish these analyses "together with such additional information in relation to the character, composition and use thereof as may be of importance."

INSPECTION OF 1917.

One hundred and two samples of feeds were collected by our agent, Mr. Churchill, during the months of November and

* With the assistance of Messrs. C. E. Shepard, M. A. D'Esopo and H. D. Edmund, Analysts.

December, 1917, and January, 1918. These samples are classified as follows:

Cottonseed Meal.....	11	Hominy Feed.....	5
Cottonseed Feed.....	1	Brewers' Grains.....	2
Linseed Meal.....	4	Distillers' Grains.....	2
Wheat Bran.....	6	Dried Beet Pulp.....	2
Mixed Feed.....	10	Horse, Dairy and Stock	
Wheat Middlings.....	6	Feed.....	35
Rye Feed.....	3	Cocoa Shell Meal.....	1
Rye Middlings.....	1	Poultry Feed.....	10
Corn Oil Cake Meal.....	1		—
Gluten Feed.....	2	Total.....	102

Miscellaneous feeds, fifty-two in number, have been sent in by private individuals and by the Dairy Commissioner.

One hundred and twenty-one complete fodder analyses were made in connection with field experiments of the Storrs Station.

One hundred and forty-three such analyses in connection with field experiments of this Station were also made.

Seven hundred samples of shelled corn were examined for nitrogen or moisture or both. These are in connection with plant breeding experiments.

A total of 1,118 samples of fodder materials have had complete or partial analyses.

Only the regular fodder inspection and miscellaneous feeds sent by private individuals will be discussed here. Other results are connected with investigations which will be discussed elsewhere.

THE ROLE OF THE NUTRIENTS.

The law of this State requires a statement of the amount of protein and fat only in any feed, but for the intelligent preparation of a ration other nutrient constituents should be known. Numerous authoritative works* on the nutrition of animals discuss the

* **Henry and Morrison**, Feeds and Feeding. Henry and Morrison, Madison, Wis. **Jordan, W. H.**, The Feeding of Animals. The MacMillan Co., New York. **Armsby, H. P.**, The Principles of Animal Nutrition. John Wiley & Son, New York.

functions of the several constituents at much length, but it will not be amiss to briefly restate here the part played by these constituents in the digestive process.

Water. Air dry feeding stuffs, whether concentrates or roughage, still contain some moisture which cannot be seen or felt. The amount of such moisture averages not far from ten or twelve per cent. While not a nutrient in the ordinary sense, water is essential to the animal, but since it is obtained in abundance from sources other than the feed, its presence therein is not of importance. Excessive amounts, however, jeopardize the keeping qualities of a feed and automatically reduce the percentage of the more desirable ingredients.

Ash. The mineral constituents of feeds are contained in the ash. Their importance is far greater than has been generally supposed and can be appreciated from the fact that animals fed on rations deprived so far as possible of all ash constituents, generally die sooner than animals given no food at all. That lime, iron, phosphorus, potassium, sodium, chlorine and other mineral substances, all of which are contained in the ash of vegetable materials, are essential to the animal body, is shown by the conspicuous presence of one or more of them in all the vital tissues and secretions. Just how they act is not completely understood, but one of their functions is undoubtedly to stimulate those cell activities (enzymic processes) which are at the foundation of both animal and vegetable life.

Protein. This is the name of a group of nitrogen-containing substances essential to the life of the animal body. They repair body waste, build up new body tissue, and, to a lesser extent, furnish heat and energy. It was long supposed that all the group of proteins could perform all these functions. But investigations of recent years, particularly those which have been carried on in the research laboratory of this Station, have shown that such is not the case; that while one protein can both repair and build, another can repair only. The one not only suffices to maintain the body against its own wear and tear, but causes it to grow and develop naturally; the other suffices only to prevent decline. Hence the important distinction has been made between complete and incomplete proteins. This is enough to suggest that, in addition to the standard of digestibility by which we now

differentiate between proteins, we shall eventually judge them by the more critical standard of specific service rendered. It further suggests the wisdom, not only of supplying a sufficient quota of protein in the ration of an animal, but of supplying it from different sources so that those elements which are deficient or lacking in one may be supplied by another. In other words, a mixed ration is as desirable for the lower animals as for human beings.

Crude Fibre. By this term is meant the coarser and more woody tissue characteristic of all forms of roughage and present on the outer coats of cereal grains. Such material is in part digested by ruminants but its chief value lies in its mechanical effect in the intestinal tract.

Nitrogen-free Extract. Here are included those substances termed carbohydrates which embrace nutrients of the starch and sugar types. Their principal part in nutrition is to supply heat and energy, but they have also the power of sparing protein, by which is meant that when fed together with protein they reduce the amount of the latter food required. An excess of these foods over the immediate needs of the body can be transformed into fat and stored in the body tissue.

Ether Extract (Crude Fat). Fats, like the carbohydrates furnish energy to the body and like them also, but to a lesser extent, spare protein. As energy producers their value is 2.25 times greater than that of either carbohydrate or protein. This ether-soluble material is in all cases crude fat, by which we understand that non-fatty substances like chlorophyll and coloring matter may be included therein.

Table 1 shows the digestion coefficients, or percentages of the food elements of the more commonly used feeds which are digestible by neat cattle (Feeds and Feeding, by Henry and Morrison, 1915, page 647 et seq.).

Some of these figures are the result of only a very few tests, and all of them represent short periods of feeding and must be regarded as showing comparative digestibility of the feeds only very roughly. Like chemical composition, a statement of the digestibility of a feed is only a single "pointer" to the feeder, helpful, if it is not over-valued.

TABLE I. DIGESTION COEFFICIENTS.

	Protein	Fiber	Carbo- hydrates	Fat
Cotton Seed Meal.....	84	37	75	95
Linseed Meal (old process).....	89	57	78	89
Wheat Bran.....	76	43	74	62
Wheat Feed.....	77	36	76	87
Wheat Middlings.....	77	30	78	88
Red Dog Flour.....	88	36	88	86
Corn Gluten Meal.....	85	55	90	93
Corn Gluten Feed.....	85	76	88	85
Hominy Feed.....	66	76	90	91
Dried Brewers' Grains.....	81	87	80	85
Malt Sprouts.....	77	87	80	85
Dried Distillers' Grains.....	73	95	81	95
Dried Beet Pulp.....	52	83	83	..
Wheat Bran and Corn Cob Feed.....	63	28	71	92

NUTRITIVE RATIO.

Nutritive ratio is a term with which many dairymen are, and all should be, familiar. The nutritive ratio of a given feed means the ratio between the digestible protein and the amount of digestible carbohydrates (or nitrogen-free extract and fiber) and crude fat (or ether extract) which that feed contains. We have already noted above that protein and carbohydrates have the same energy producing value, and that fat has 2.25 times as much, hence in calculating a nutritive ratio, fat must be first resolved to the same energy basis as carbohydrate which is done by multiplying by the factor 2.25.

Taking as an example, cottonseed meal containing 35.43 per cent of protein, 12.28 per cent of fiber, 32.37 per cent of nitrogen-free extract and 6.50 per cent of fat, the first step is to determine the amount of the several nutrients which are digestible. Referring to the list of coefficients of digestibility, Table I, it is seen that these coefficients for cottonseed meal are protein 84, fiber 37, carbohydrates 75 and fat 95. Multiplying the above percentages by these factors respectively, we find to be digestible 29.8 per cent. of protein, 4.5 per cent fiber, 24.2 per cent nitrogen-free extract, and 6.2 per cent fat. Reducing the digestible fat to the energy equivalent basis of the carbohydrates, we obtain 14.0. The total digestible carbohydrate from nitrogen-free extract and

fiber is $29.8 + 4.5 = 34.3$, to which is added the fat $14. = 48.3$. The nutritive ratio can now be stated, and is carbohydrate+fat, 48.3: protein, 29.8 or $\frac{48.3}{29.8} = 1.6$. The nutritive ratio is therefore 1:1.6. In this way the nutritive ratio of any feed for which coefficients of digestibility have been determined, may be calculated.

COMMENT ON ANALYSES.

(The analyses are tabulated on pages 466 to 477.)

Cottonseed Meal. This product is recognized by the Association of Feed Control Officials and generally in the trade as a product of the cotton-seed only, composed principally of the kernel with such portion of the hull as is necessary in the manufacture of oil; provided that nothing shall be recognized as cottonseed meal that does not conform to the foregoing definition and that does not contain at least 36 per cent of protein.

There are three classes of meals, viz.: *Choice, Prime and Good.*

Choice cottonseed meal must be finely ground, not necessarily bolted, perfectly sound and sweet in odor, yellow, free from excess of lint, and must contain at least 41 per cent of protein.

Prime cottonseed meal must be finely ground, not necessarily bolted, of sweet odor, reasonably bright in color, yellow, not brown or reddish, free from excess of lint, and must contain at least 38.6 per cent of protein.

Good cottonseed meal must be finely ground, not necessarily bolted, of sweet odor, reasonably bright in color, and must contain at least 36 per cent of protein.

The cottonseed meals examined this year, eleven in number, averaged 35.43 per cent protein, 12.28 per cent fiber, 32.27 per cent nitrogen-free extract, and 6.50 per cent fat. The average price per ton was \$57.55. As compared with this product last year the protein content is 2.30 per cent and the fat content 0.15 per cent lower, while the price is \$10.60 per ton higher. The average guaranteed amounts of protein and fat were 36.46 per cent and 5.05 per cent respectively, from which it is seen that these feeds as a class fail to meet their guaranty as to protein by 1.03 per cent, and exceed the declared amount of fat by 1.50

per cent. The amount of crude fiber found is a trifle lower than last year, but considerably in excess of amounts found during the six years previous.

Samples which failed to meet their guaranties by 1 per cent or more of protein were one sample of the Buckeye brand; one sample marked Second Class, one sample each of Danish, Pilgrim and Puritan brands.

The brand selling for the highest price, viz. :—\$63.00, contained the highest per cent of protein, and was well above guaranty in other respects; but another brand selling for \$62.00 was the lowest but one of all samples in content of protein.

Cottonseed Feed is a mixture of cottonseed meal and cottonseed hulls, containing less than 36 per cent of protein.

This class of feeds will become largely recruited from the ranks of those now classed as cottonseed meal if the downward tendency in quality of the latter, as noted in the last few years, continues.

Only one sample of this class was examined this year, and this was in substantial accord with its guaranty.

Linseed Meal is the ground product obtained after extraction of part of the oil from ground flaxseed screened and cleaned of weed seeds and other foreign materials by the most improved commercial processes. Old Process meal is that from which the oil is removed by hydraulic pressure. In the New Process the oil is removed by the use of solvents.

Four samples were examined this year. The average composition was substantially the same as last year. Two equalled or exceeded the guaranteed amount of protein, the others falling less than 1 per cent below. Guaranties of fat were exceeded in all cases. The average price \$59.50 is \$11.64 higher than the average last year.

Wheat Bran is the coarse outer coating of the wheat berry obtained in the usual commercial milling process from wheat that has been cleaned and scoured.

Wheat Bran with Screenings not Exceeding Mill Run is either wheat bran with the whole mill run of screenings or wheat bran with a portion of the mill run of screenings, provided that such portion is not an inferior portion thereof.

The six samples examined contained an average of 15.13 per cent of protein, 4.99 per cent of fat. One sample bore no statement of guaranty. The others exceeded their guaranties in all cases. The price per ton has advanced \$7.70 over the average shown a year ago.

Wheat Mixed Feed is a mixture of the products other than the flour obtained from the milling of the wheat berry.

Ten samples of this class of feeds, averaged 15.88 per cent protein and 5.13 per cent of fat. All exceeded their guaranties in fat, and also, with one exception, in protein. The one deficiency in protein was less than 1 per cent. The average of all ingredients was nearly the same as last year but the price per ton shows an advance of about \$12.00.

Wheat Middlings may be *Standard Middlings* (Shorts), which are the fine particles of the outer and inner bran separated from bran and white middlings, or they may be *White Middlings* which are that part of the offal of wheat intermediate between shorts or standard middlings and red dog.

The samples examined exceeded their guaranties as to protein and fat with one exception, in which a deficiency of less than 1 per cent protein was found. As regards price, the maximum last year is the minimum now. There is also a wide variation in price, three brands selling for \$44 to \$46, and three others for \$50 to \$68 per ton. The average advance over the prices of a year ago is \$14.38 per ton.

Rye Feed and *Rye Middlings* are by-products from the rye grain corresponding to those defined under similar terms for wheat by-products.

Of rye products, three rye feeds and one rye middlings were examined. All exceeded their guaranties in both protein and fat. Variations in price per ton were not so wide as in the case of wheat products but an advance of about 25 per cent over last year's figures is shown.

Corn Gluten Feed is that portion of commercial shelled corn that remains after the separation of the larger part of the starch and the germ by the process employed in the manufacture of corn-starch and glucose.

Only two samples of this class were analyzed. Globe exceeded its guaranty in both protein and fat. Buffalo was found deficient

in fat to the extent of 0.56 per cent. These products, which sold for \$40 to \$43 last year, are \$55 to \$58 per ton now.

Hominy Feed (Hominy Chop, Hominy Meal) is a mixture of the bran coating, the germ and a part of the starchy portion of the corn kernel obtained in the manufacture of hominy grit for human consumption.

Five samples of hominy feed averaged 11.52 per cent protein and 7.00 per cent fat, exceeding their guaranties in all cases. The average price per ton advanced from \$45.00 last year to \$64.00 now. Prices vary from \$45.00 to \$75.00. The brand selling for \$45.00 has the same amount of protein and nearly the same amount of fat, with other constituents about the same as the brand selling for 66.6 per cent higher.

Oil Cake Meal is obtained by grinding the press cake left after partial removal of oil from the corn germ.* The analysis of the single sample examined appears in Table VI.

Brewers' Grains are the properly dried residue from cereals obtained in the manufacture of beer. They consist chiefly of barley but may contain whatever other cereals were used in conjunction therewith.

The two samples examined satisfied their guaranties except for a negligible deficiency in protein in one case. The composition remains uniform with that shown by previous inspections. The price has advanced during the year from an average of \$31.00 to \$55.00.

Distillers' Grains are the dried residue from cereals obtained in the manufacture of alcohol and distilled liquors. The product shall bear the designation indicating the cereal predominating.

Two samples were examined. One satisfied the guaranties as to protein and fat within reasonable limits, but contained more than the guaranteed maximum of crude fiber. The other exceeded the guaranteed amount of protein, but was deficient in fat. Last year seven samples of this class ranged in price from \$30.00 to \$43.00 per ton. One of the brands* this year sold for \$62.00.

Dried Beet Pulp is the dried residue obtained in the manufacture of beet sugar.* Two samples of this product satisfied their guaranties. Prices last year ranged from \$33.00 to \$37.00 per ton. The selling price this year was \$46.00 and \$52.00.

* Not an A. F. C. O. definition.

Proprietary Mixed Feeds are not products of definite composition. They are an outlet for various by-products and their ingredients will be governed by what is available to the manufacturer to put into them. Besides cereal grains and by-products thereof they may also contain screenings, cereal hulls and other fillers. Salt and saccharine substances such as molasses or corn syrup are also added in some cases.

Many brands bear on the tags, in addition to the chemical guaranty, a statement of the ingredients used. Information of this character, not required by law in this State, is given by the manufacturers of the following brands:

Pennant Stock Feed. Fine white hominy and oat by-products, $\frac{1}{2}$ of 1 per cent of salt.

Bufceco Chop Feed. Ground corn, oats, barley, hominy feed, oat shorts and oat hulls.

Bufceco Steam Cooked Feed. Ground corn, oats, hominy feed, oat shorts, oat middlings, oat hulls and $\frac{1}{2}$ of 1 per cent salt.

Bufceco Horse Feed. Ground oats, corn, barley, wheat middlings, hominy feed, oat shorts, oat middlings, oat hulls, linseed meal, corn gluten feed.

Wirthmore Stock Feed. Ground barley, ground oats, ground hominy meal, ground corn, oatmeal by products, $\frac{1}{2}$ of 1 per cent salt. Part of the ingredients have been cooked or steamed, and are more easily assimilated and have better keeping qualities.

Economic Horse and Mule Feed. Distillers' and yeast grains from corn, rye, barley malt and sprouts, linseed meal, cottonseed meal, brewers' grains from barley, wheat bran, humus, salt, molasses and corn.

H & S Horse, Mule and Dairy Feed. Flaxseed meal, old process oil meal, alfalfa meal, brewers' and rye distillers' grains, pure cane syrup, $\frac{1}{2}$ of 1 per cent salt.

Larro-feed. Cottonseed meal, corn gluten feed, distillers' grains (mainly from corn), dried beet pulp, standard wheat bran, standard wheat middlings, $\frac{3}{4}$ of 1 per cent salt. Wheat bran and middlings may contain "ground screenings not exceeding mill run."

Peerless Horse Feed, Corn, oats, alfalfa meal, molasses.

King Corn Horse and Mule Feed. Corn, oats, alfalfa and molasses.

Emerald Horse Feed. Cracked corn, oats, barley, alfalfa meal and molasses.

Union Grains. Fowrex distillers' grains, choice cottonseed meal, old process linseed meal, white wheat middlings, wheat bran, hominy meal, gluten feed, brewers' grains, malt sprouts, $\frac{1}{2}$ of 1 per cent salt.

Bufceco Poultry Mash. Ground corn, wheat bran and middlings, hominy feed, corn gluten feed, oat middlings and rolled oats.

Thirty-five brands of this class of feeds were examined. Of these ten failed to meet their guaranties either in protein or fat or both. Deficiencies up to 1 per cent in protein and 0.25 per cent in fat have been disregarded. The deficient brands are as follows:

TABLE II. PROPRIETARY FEEDS BELOW GUARANTY.

No.	Brand	Protein Deficiency%	Fat Deficiency%
9792	Unicorn Dairy Ration.....	1.81	....
9856	Big Clover Complete Ration.....	....	0.42
9784	Economic Horse and Mule Feed.....	3.94	1.19
9821	Horse, Mule and Dairy Feed.....	....	1.11
9803	Badger Stock Feed.....	1.37	....
9781	Peerless Horse Feed.....	....	0.47
9770	Big Q Dairy Ration.....	2.00	....
9867	Purina Calf Chow Feed.....	....	0.55
9826	Ryde's Cream Calf Meal.....	....	1.37
9819	Biles Ready Ration.....	....	0.46

While our law requires guaranties of protein and fat only, other guaranties, if made, should be correct. In thirteen brands the maximum of crude fiber was declared and in three instances this maximum was exceeded by more than 1 per cent. Thus **9808**, **Bufceco**, **9781**, **Peerless**, and **9785**, **Emerald**, **Horse Feeds**, contained excess fiber to the extent of 2.31, 2.10 and 4.56 per cent respectively.

Our experience has shown that those proprietary feeds which contain molasses or other added saccharine substance may fail to receive credit for their full amount of crude fat by the official method of extraction. Following our practice of the last few

years, such feeds have been treated first with water to remove sugary materials before the ether extraction was made. The modified method does not give uniformly higher results, but does, we believe, give results closer to the truth.

The following summary shows our experience this year.

TABLE III. FAT IN MOLASSES FEEDS.

No.	Brand	Official Method%	Modified Method%	Guaranty %
9784	Economic Horse and Mule Feed	3.81	3.74	5.00
9821	Horse, Mule and Dairy (Hamlin's)	1.38	2.39	3.50
9858	Atlas Horse Feed.....	0.93	2.46	1.00
9857	Monogram Feed.....	1.86	3.01	3.00
9781	Peerless Horse Feed.....	1.51	1.53	2.00
9785	Emerald Horse Feed.....	1.24	1.97	2.00
9867	Purina Calf Chow Feed.....	3.45	2.60	4.00
9861	Good Luck Feed.....	2.66	2.73	1.50

The prices which prevail for these goods are very high; disproportionate in many instances to the feeding value of the product. Taking the protein content as an index to the feeding value, it is evident that price bears no rational relation to quality. One brand containing the lowest amount of protein, 8.63 per cent, sold for \$47.00. Others containing only from 9 to 11.7 per cent protein sold for from \$60 to \$71.00. Again high protein feeds containing 24 to 24.5 per cent sold for \$80 to \$90.00. Another containing more of this nutrient, viz. 24.88 per cent, sold for \$58.00.

Unusual trade conditions at the present time are naturally reflected in the feed market, and it is idle to discuss prices for they change during such discussion. With the abnormally high prices prevailing for all human food stuffs the price of milk to the consumer is steadily increasing. A glance at the price column in the tables on these pages will convince us that the real problem is not how the dairyman can produce milk profitably, but, rather, how he can produce it at all.

Poultry Feeds. In this class of products, as in the stock feeds, one looks in vain for any relation between price and quality. One brand with 50 per cent protein sells for \$82.00 and another with only 19 per cent sells for only \$5.00 less. Platco Laying Mash fell below its protein guaranty by 1.68 per cent. Purina Chicken Chowder and Chick Chuck were deficient in fat.

MISCELLANEOUS SAMPLES.

Partial or complete analyses have been made of the following samples, taken and submitted by individuals.

Cottonseed Meal. **10525, 9752, 9753, 9101**, brands or manufacturers not known; **8836**, Rugg Murdock, Boston; **8835**, Humphreys-Godwin Co., Memphis, Tenn.; **9018**, J. E. Soper Co., Boston; **9019**, Meridian Grain & Elevator Co., Meridian, Miss.; **8770**, National Feed Co., St. Louis, Mo., all sent by Coles Co., Middletown.

9999, bought for imported, sent by Herold's Lanedale Farm, New Canaan.

8806, 8807, American Red Tag Meal, Union Seed & Fertilizer Co., New York; **8763**, Forfat Brand, Humphreys-Godwin Co., Memphis, Tenn.; **8764**, Danish Brand, Humphreys-Godwin Co., Memphis, Tenn., sent by S. J. Orr, West Suffield.

TABLE IV—PROTEIN IN COTTONSEED MEALS.

No.	Found %	Guaranteed %	No.	Found %	Guaranteed %	No.	Found %	Guaranteed %
10525	35.38	36.00	8835	35.56	....	8806	37.81	....
9752	35.44	....	9019	36.94	....	8807	36.50	....
9753	37.94	....	9018	35.69	....	8763	38.31	38.55
9101	36.88	....	8770	35.50	38.50	8764	34.75	36.00
8836	36.81	....	9999	28.56	....		

Wheat Bran—**9599**, Holstein Feed. (Under stock price). Wheat bran with screenings, sent by J. B. Brainard, Bloomfield, contained 10.69 per cent protein. Guaranty, 12 per cent.

Wheat Middlings. **9758**, Washburn-Crosby, sent by L. A. Bevan, contained 15.94 per cent protein.

Corn Meal, **9748**, sent by J. B. Stetson, contained 9.25 per cent protein.

9142, bought for corn meal, sent by G. B. Dimon, Chestnut Hill. This was a coarse feed consisting of corn and wheat products with oat hulls and bran coats. It contained 16.88 per cent of protein.

Gluten Feed. **8960**, KKK Corn Gluten Feed. J. C. Hubinger Bros. Co., Keokuk, Iowa, sent by D. W. Ives, E. Wallingford, contained 24.56 per cent of protein. Guaranty 23 per cent or more.

8884, Buffalo Gluten Feed, sent by Jewett City Grain Co., contained 23.88 per cent protein.

Proprietary Stock Feeds. **8741**, Crosby's Ready Ration, sent by Seymour Grain Buyers' Club, C. R. Newton, Agt., contained 23.88 per cent protein. Guaranty 25 per cent.

9338, Dairy Feed, sent by A. B. Wakeman, Fairfield, contained 20.06 per cent protein.

Poultry Feeds. **9249**, Protox Poultry Food, Fine, American Agricultural Chemical Co., New York, sent by F. M. Peasley, Cheshire, contained 53.13 per cent protein and 5.99 per cent phosphoric acid. Guaranty 55 per cent protein.

8954, Meat Scrap, the L. T. Frisbie Co., New Haven, sent by C. A. Stone, Oakville, contained 41.75 per cent protein.

8955, Meat Scrap, The Conn. Fat Rendering and Fertilizer Co., New Haven, sent by C. A. Stone, Oakville, contained 42.13 per cent protein.

Miscellaneous Feeds. **9760**, Toasted Milk Nuts, sold by J. E. Bartlett, Jackson, Michigan, and sent by C. M. Jarvis, Berlin. The product contained 8.90 per cent water, 1.25 per cent ash, 14.19 per cent protein, 7.91 per cent crude fiber, 66.21 per cent nitrogen-free extract, and 1.54 per cent crude fat. The significance of the name is not apparent to us from any information we have concerning it, and we have no data by which to judge its digestibility. Judging from the analysis the gross supply of nutrient is satisfactory and, if palatable, should be a desirable feed. The price for this product was \$30.00 per ton.

9709, Corn Oil Meal, car heated, The Meader-Atlas Co., New York, sent by C. M. Jarvis, Berlin, contained 21.44 per cent protein.

9712, Peanut "Skins" sent by H. H. Worthington of New Milford. This was composed of the thin brown red coat or skin which covers the edible portion of the peanut. Small fragments of peanut were present which accounts in part for the considerable amount of fat found. The sample contained 6.50 per cent water, 2.33 per cent ash, 14.88 per cent protein, 10.12 per cent fiber, 44.43 per cent nitrogen-free extract and 21.74 per cent fat. The bitter taste of these skins is a familiar fact, and their palatability

to animals will decide their use as a fodder. The analysis shows that the sample contains very considerable amounts of nutrient material.

9248, Cracker Waste, Loose Wiles Biscuit Co., sent by C. M. Jarvis, Berlin, contained 6.19 per cent protein.

9401, Damaged Wheat; **9537**, Beans (seconds); **9536**, Damaged Oats, all sent by C. M. Jarvis, Berlin, were analyzed as follows:

	9401	9537	9536
Water.....	11.20%	15.83%	9.30%
Ash.....	2.56	3.50	3.95
Protein.....	11.88	21.75	11.88
Fiber.....	2.95	3.07	9.60
Nitrogen-free extract	68.57	54.96	60.04
Fat.....	2.84	0.89	5.23

9547, Grain Siftings, waste, sent by John E. Gifford, County Agent, Rockville. This was found to contain 13.50 per cent of protein, equivalent to 2.16 per cent of nitrogen. It also contained 0.88 per cent total phosphoric acid and 1.24 per cent total potash with 17.44 per cent total ash and 10.33 per cent ash insoluble in acid.

8860, Peanut Meal; **8869**, Damaged Corn (burned); **9411**, Alfalfa Ground Feed; **8870**, Rye and Oats, all sent by C. M. Jarvis, Berlin, were analyzed as follows:

	8860	8869	9411	8870
Water.....	8.06%	7.75%	14.34%	6.45%
Ash.....	5.42	1.73	3.95	2.69
Protein.....	36.56	11.44	15.13	12.38
Fiber.....	8.15	8.59	13.45	6.76
Nitrogen free extract..	35.06	66.35	50.16	68.53
Fat.....	6.75	4.14	2.97	3.19

Sample 8869 was corn that had been damaged by burning and a considerable part of the "fiber" shown above is charcoal.

8758, Waste Flour, Franco-American Baking Co., sent by Frank N. Platt, Milford, contained 11.06 per cent protein.

9061, Corn and Bean Silage, sent by Karl B. Musser, Storrs, contained, as received, 43.74 per cent water, 1.68 per cent ash, 3.37 per cent protein, 6.84 per cent fiber, 2.01 per cent

crude fat (ether extract), and 12.36 per cent nitrogen-free extract.

A sample of Condensed Buttermilk **10637**, made by the Consolidated Products Co., Lincoln, Neb., and a sample of Dried Buttermilk **10684** obtained from Hales and Edwards Company, Chicago, Ill., were sent to us by C. M. Jarvis of Berlin.

The composition of these products is shown by the following analyses:

	10637		10684	
	As Analyzed %	Dry Basis %	As Analyzed %	Dry Basis %
Moisture.....	76.97	00.00	8.27	00.00
Solids.....	23.03	100.00	91.73	100.00
Ash.....	2.94	12.77	12.15	13.24
Protein.....	9.57	41.55	31.07	33.87
Milk Sugar.....	6.98	30.31	34.34	37.43
Fat.....	2.78	12.07	7.24	7.89
Undetermined.....	0.76	3.30	6.93	7.57
Calories per lb.....	413.0	1,794.0	1,480.0	1,614.0
Nutritive ratio.....	1:1.4	.....	1:1.6	.....

Reduced to the dry basis, it is seen that these materials are closely alike, the difference being within the range of normal variations in the composition of buttermilk. The ash consists largely of phosphates of lime and common salt. They are abundantly nutritious and are reported to have been used with success as a feed for pigs. The dried product is more economical to transport, and possesses the added advantage of superior keeping qualities.

The following feeds were submitted by the Dairy Commissioner for examination with reference to their conformity to guaranty.

TABLE V—FEEDS SAMPLED BY THE DAIRY COMMISSIONER.

No.	Brand, Manufacturer or Jobber	Protein	
		Guaranteed %	Found %
	<i>Cottonseed Meal.</i>		
9697	Not given.....	.....	36.13
11905	Puritan, J. E. Soper Co., Boston.....	36.00	34.13
11722	American Red Tag, Union Seed & Fer. Co., N. Y.	38.55	37.56
11718	American Red Tag, Union Seed & Fer. Co., N. Y.	38.55	38.75
11717	Puritan, J. E. Soper Co., Boston.....	36.00	31.44
11716	No. 7, Union Seed & Fertilizer Co., New York...	36.00	35.50
11715	National Feed Co., St. Louis, Mo.....	38.50	35.00

No.	Brand, Manufacturer or Jobber	Protein	
		Guaranteed %	Found %
<i>Brewers' Grains.</i>			
11871	Not given.....	30.00	28.13
<i>Proprietary Feeds.</i>			
11714	Portage Stock Feed, Ak. Feed & Mill Co., Akron, O.	8.00	8.88
11720	Anchor Dairy Feed, Globe Elevator Co., Buffalo, N. Y.....	16.00	13.50
11719	Bonnie Horse Feed, Holmes, Keeler & Kent Co....	13.00	14.13

TABLE VI.—ANALYSES OF COMMERCIAL FEEDS

Station No.	Brand.	Retail Dealer.
OIL SEED PRODUCTS.		
<i>Cotton Seed Meal.</i>		
9844	Buckeye. Buckeye Cotton Oil Co., Cincinnati, O.	<i>Middlefield:</i> Middlefield Grain & Coal Co. Guaranty.....
9854	Buckeye. Buckeye Cotton Oil Co., Cincinnati, O.	<i>Hartford:</i> Loydon, Northam & Loydon..... Guaranty.....
9849	Second Class. Byromville Oil Co., Byromville, Ga.	<i>Hazardville:</i> A. D. Bridges Sons..... Guaranty.....
9851	Danish. Humphreys, Godwin Co., Memphis, Tenn.....	<i>Hartford:</i> Olds & Whipple Guaranty.....
9779	Danish. Humphreys, Godwin Co., Memphis, Tenn.....	<i>Wallingford:</i> E. E. Hall... Guaranty.....
9817	Danish. Humphreys, Godwin Co., Memphis, Tenn.....	<i>Yantic:</i> A. R. Manning... Guaranty.....
9864	Forfat. Humphreys, Goodwin Co., Memphis, Tenn.....	<i>New Haven:</i> Crittenden-Benham Co. Guaranty.....
9815	Puritan. J. E. Soper Co., Boston, Mass.	<i>New London:</i> P. Schwartz Co. Guaranty.....
9835†	Pilgrim. J. E. Soper Co., Boston, Mass.	<i>Meriden:</i> August Grulich. Guaranty.....
9840	Puritan. J. E. Soper Co., Boston, Mass.	<i>Colchester:</i> M. Klingon Guaranty.....
9793	Surety. Union Seed & Fert'z'r. Co., Clarksdale, Miss.	<i>Guilford:</i> Morse & Landon. Guaranty..... Average guaranty... .. Average of analyses..... Average digestible.....
<i>Cotton Seed Feed.</i>		
9774	77. Humphreys, Godwin Co., Memphis, Tenn.	<i>North Haven:</i> Co-operative Feed Co. Guaranty.....
<i>Linseed Meal, Old Process.</i>		
9799†	American Linseed Co., New York.	<i>West Cheshire:</i> G. W. Thorpe Guaranty.....
9841	American Linseed Co., Buffalo, N. Y.	<i>Colchester:</i> M. Klingon... Guaranty.....
9810	Archer Daniels Linseed Co., Buffalo, N. Y.	<i>Derby:</i> Peterson Hendee Co. Guaranty.....
9778	Kellogg's. Spencer Kellogg, Buffalo, N. Y.	<i>Wallingford:</i> E. E. Hall .. Guaranty..... Average guaranty... .. Average of analyses..... Average digestible.....
WHEAT PRODUCTS.		
<i>Wheat Bran.</i>		
9771*	Wm. Hamilton & Son, Honeoye Falls, N. Y.	<i>North Haven:</i> Co-operative Feed Co. Guaranty.....

* With screenings not exceeding mill run.

† Wire tags.

SAMPLED IN 1917.

Station No.	Pounds per Hundred						Price per ton.
	Water.	Ash.	Protein. (N. x 6.25)	Fiber.	Nitrogen-free Extract. (Starch, gum, etc.)	Ether Extract. (Crude Fat)	
9844	7.59	5.74	34.94	12.15	33.20	6.38	\$58.00
.....	.....	.....	36.00	14.00	30.00	5.00	.....
9854	6.84	6.38	35.38	11.86	33.22	6.32	61.00
.....	.....	.....	36.00	14.00	30.00	5.00	.....
9849	7.94	5.38	34.19	13.54	32.08	6.87	62.00
.....	.....	.....	36.00	.....	.....	.....	.....
9851	8.15	5.42	31.44	14.84	33.50	6.65	53.00
.....	.....	.....	36.00	15.00	25.00	5.00	.....
9779	7.65	5.49	35.56	10.84	33.97	6.49	55.00
.....	.....	.....	36.00	15.00	25.00	5.00	.....
9817	7.93	5.67	36.13	12.13	32.10	6.04	56.00
.....	.....	.....	36.00	15.00	25.00	5.00	.....
9864	7.75	6.22	39.69	10.17	29.46	6.71	63.00
.....	.....	.....	38.55	12.00	25.00	5.00	.....
9815	6.41	7.17	35.94	13.10	30.62	6.76	55.00
.....	.....	.....	36.00	15.00	30.00	5.00	.....
9835	6.93	5.66	36.31	13.00	31.69	6.41	58.00
.....	.....	.....	38.50	10.00	.....	5.00	.....
9840	8.44	5.28	34.75	11.36	34.12	6.05	58.00
.....	.....	.....	36.00	15.00	30.00	5.00	.....
9793	8.30	6.31	35.44	12.11	30.94	6.90	54.00
.....	.....	.....	36.00	14.00	27.00	5.50	.....
.....	.....	.....	36.46	.....	.....	5.05 ¹	.....
.....	7.63	5.88	35.43	12.28	32.27	6.50	57.55
.....	.....	.....	29.8	4.5	24.2	6.2	.....
9774	9.16	4.37	19.63	22.73	40.10	4.01	40.00
.....	.....	.....	20.00	28.00	.....	4.00	.....
9799	10.01	5.31	33.81	7.52	37.08	6.27	60.00
.....	.....	.....	34.00	8.00	.....	5.00	.....
9841	9.55	5.15	35.31	6.93	36.67	6.39	58.00
.....	.....	.....	34.00	.....	.....	5.00	.....
9810	9.89	5.29	32.13	6.96	36.66	9.07	64.00
.....	.....	.....	33.00	.....	.....	6.00	.....
9778	9.77	5.13	33.69	5.61	39.70	6.10	56.00
.....	.....	.....	33.00	.....	.....	5.00	.....
.....	.....	.....	33.50	.....	.....	5.25	.....
.....	9.81	5.22	33.73	6.75	37.53	6.96	59.50
.....	.....	.....	30.0	3.9	29.3	6.2	.....
9771	9.38	5.43	14.81	8.11	58.20	4.07	45.00
.....	.....	.....	11.75	10.60	.....	2.15	.....

¹ Ten analyses.

TABLE VI.—ANALYSES OF COMMERCIAL FEEDS

Station No.	Brand.	Retail Dealer.
<i>WHEAT PRODUCTS—Continued.</i>		
<i>Wheat Bran—Continued.</i>		
9865*	Pittsford Milling Co., Pittsford, N. Y.....	<i>New Haven:</i> Crittenden-Benham Co..... Guaranty.....
9782	Korno. St. Paul Mill Co., St. Paul Minn. . . .	<i>Wallingford:</i> E. E. Hall... Guaranty.....
9805	Angelus. Thompson Milling Co., Lockport, N. Y.....	<i>Ansonia:</i> Ansonia Flour & Grain Co..... Guaranty.....
9802*	Washburn, Crosby's. Washburn Mills, Minneapolis, Minn.....	<i>West Cheshire:</i> G. W. Thrope Guaranty.....
9776*	Black Hawk. Western Flour Mill Co., Davenport, Iowa.....	<i>Wallingford:</i> E. E. Hall... Guaranty..... Average guaranty..... Average of analyses..... Average digestible.....
<i>Wheat Feed (Mixed Feed)</i>		
9816	Bailey Fancy. E. W. Bailey & Co., Montpelier, Vt.....	<i>Yantic:</i> A. R. Manning... Guaranty.....
9811	Bulls Eye. Blish Milling Co., Seymour, Ind....	<i>Derby:</i> Peterson Hendee Co. Guaranty.....
9777**	Boston. Duluth Superior Mill. Co., Duluth, Minn.....	<i>Wallingford:</i> E. E. Hall... Guaranty.....
9795	Improved Grafton. Grafton Roller Mills, Grafton, No. Dak.....	<i>Middletown:</i> Meech & Stoddard, Inc..... Guaranty.....
9859	Improved Grafton. Grafton Roller Mills, Grafton, No. Dak.....	<i>Waterbury:</i> Spencer Grain Co., Inc..... Guaranty.....
9822	Pennant. National Mill. Co., Toledo, O.....	<i>Norwich:</i> Chas. Slosberg... Guaranty.....
9852	Occident. Russell Miller Mill. Co, Minneapolis, Minn.....	<i>Hartford:</i> G. M. White.... Guaranty.....
9809A	Gold Mine. Sheffield King Mill. Co., Minneapolis, Minn.....	<i>Shelton:</i> Ansonia Flour & Grain Co..... Guaranty.....
9825	Wagoner-Gates Mill. Co., Independence, Mo..	<i>Willimantic:</i> Willimantic Grain Co..... Guaranty.....
9773	Kent, Williams Bros. Co., Kent, O.....	<i>North Haven:</i> Co-operative Feed Co..... Guaranty..... Average guaranty..... Average of analyses..... Average digestible.....
<i>Wheat Middlings.</i>		
9789*	Hecker-Jones-Jewell Mill. Co., New York.....	<i>Bridgeport:</i> Susman-Feuer Co..... Guaranty.....
9842*	Millbourne. Millbourne Mills, Philadelphia, Pa.....	<i>Colchester:</i> M. Klingon... Guaranty.....
9801*	Ogilvie Flour Mill Co., Winnipeg, Canada.....	<i>West Cheshire:</i> G. W. Thorpe Guaranty.....

* With screenings not exceeding mill run.

** With wheat screenings.

ANALYSES.

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SAMPLED IN 1917—Continued.

Station No.	Pounds per Hundred.						Price per ton.
	Water.	Ash.	Protein. (N. x 6.25)	Fiber	Nitrogen-free Extract. (Starch, gum, etc.)	Ether. Extract. (Crude Fat)	
9865	9.93	6.25	14.25	8.96	56.12	4.49	\$50.00
.....
9782	9.45	5.91	14.94	8.56	55.90	5.24	38.00
.....	.....	.....	14.00	.....	.....	4.00	.....
9805	8.80	5.61	15.88	10.21	53.66	5.84	42.00
.....	.....	.....	15.00	.....	.....	4.00	.....
9802	8.84	6.15	14.69	13.43	52.52	4.37	42.00
.....	.....	.....	16.25	.....	.....	4.00	.....
9776	8.94	5.62	16.25	10.35	52.90	5.94	38.00
.....	.....	.....	13.30	.....	.....	3.00	.....
.....	.....	.....	14.06 ²	.....	.....	3.43 ²	.....
.....	9.22	5.83	15.13	9.93	54.88	4.99	42.50
.....	.....	.....	11.5	4.3	40.6	3.1	.....
9816	9.62	6.65	15.38	7.88	55.80	4.67	48.00
.....	.....	.....	15.00	.....	.....	3.75	.....
9811	9.66	5.65	15.25	8.33	56.60	4.51	49.00
.....	.....	.....	16.00	9.10	.....	4.40	.....
9777	9.17	4.14	17.06	7.76	55.81	6.06	45.00
.....	.....	.....	16.00	.....	.....	4.50	.....
9795	9.36	4.63	16.75	6.88	56.83	5.55	48.00
.....	.....	.....	14.00	.....	.....	2.70	.....
9859	11.28	4.43	15.94	7.69	55.20	5.46	51.00
.....	.....	.....	14.00	.....	.....	2.70	.....
9822	9.09	4.80	15.44	6.01	60.02	4.64	49.00
.....	.....	.....	15.00	.....	.....	3.75	.....
9852	9.42	5.73	15.81	7.41	56.22	5.41	54.00
.....	.....	.....	15.00	.....	.....	4.50	.....
9809A	9.98	5.02	16.38	8.00	54.89	5.73	51.00
.....	.....	.....	15.00	.....	.....	4.00	.....
9825	9.46	5.94	15.63	7.36	56.90	4.71	50.00
.....	.....	.....	15.00	.....	.....	4.00	.....
9773	10.37	4.75	15.19	6.01	59.15	4.53	51.00
.....	.....	.....	12.00	.....	.....	3.00	.....
.....	.....	.....	14.70	.....	.....	3.73	.....
.....	9.74	5.17	15.88	7.33	56.74	5.13	49.60
.....	.....	.....	12.2	2.6	43.1	4.5	.....
9789	9.49	5.08	16.94	6.97	56.14	5.38	44.00
.....	.....	.....	15.50	8.00	54.67	4.75	.....
9842	9.90	4.29	15.38	5.57	59.72	5.14	46.00
.....	.....	.....	16.00	3.00	.....	4.00	.....
9801	10.15	4.08	15.25	7.72	57.63	5.17	46.00
.....	.....	.....	15.00	.....	.....	4.00	.....

² Five analyses.

TABLE VI.—ANALYSES OF COMMERCIAL FEEDS

Station No.	Brand.	Retail Dealer.
	<i>WHEAT PRODUCTS—Concluded</i> <i>Wheat Middlings—Concluded</i>	
9853	XX Daisy. Pillsbury Co., Minneapolis, Minn..	Hartford: G. M. White.... Guaranty.....
9860	B. Pillsbury Co., Minneapolis, Minn.....	Waterbury: Spencer Grain Co., Inc..... Guaranty.....
9850	Snowball. Shane Bros. & Wilson Co., Minne- apolis, Minn.....	Hazardville: A. D. Bridges Sons..... Guaranty..... Average guaranty..... Average of analyses..... Average digestible.....
	RYE PRODUCTS.	
9824	Feed. Boutwell Mill. Co., Troy, N. Y.....	Willimantic: Willimantic Grain Co..... Guaranty.....
9845	Irving Mills Feed. Van Vechten Mill. Co., Rochester, N. Y.....	Middlefield: Middlefield Grain & Coal Co..... Guaranty.....
9780	Irving Mills Feed. Van Vechten Mill. Co., Rochester, N. Y.....	Wallingford: E. E. Hall... Guaranty.....
9832	Pure Middlings. Washburn-Crosby Co., Minne- apolis, Minn.....	Wallingford: Gallagher Bros. Guaranty.....
	MAIZE PRODUCTS. <i>Corn Gluten Feed.</i>	
9806	Globe. Corn Products Refining Co., New York.	Ansonia: Ansonia Flour & Grain Co..... Guaranty.....
9791	Buffalo. Corn Products Refining Co., New York.....	East Haven: F. A. Forbes.. Guaranty..... Average analyses..... Average digestible.....
	<i>Hominy Feed.</i>	
9823	Spring Garden. Baltimore Pearl Hominy Co., Baltimore, Md.....	Norwich: Chas. Slosberg.. Guaranty.....
9837	Bufecoco. Buffalo Cereal Co., Buffalo, N. Y....	Meriden: Meriden Grain & Feed Co..... Guaranty.....
9848	Badger. Chas. A. Krause Mill. Co., Milwaukee, Mo.....	Thomsonville: Geo. S. Phelps & Co..... Guaranty.....
9846	Steam Cooked. Miner-Hillard Mill. Co., Wilkes-Barre, Pa.....	Middlefield: Middlefield Grain & Coal Co..... Guaranty.....
9794	Steam Cooked. Miner Hillard Mill. Co., Wilkes-Barre, Pa.....	Guilford: Morse & Landon Guaranty..... Average guaranty..... Average of analyses..... Average digestible.....
	<i>Oil Cake Meal.</i>	
9798	Heart of the Corn. Chicago Heights Oil Mfg. Co., Chicago, Ill.....	Middletown: Meech & Stod- dard, Inc..... Guaranty.....

TABLE VI.—ANALYSES OF COMMERCIAL FEEDS

Station No.	Brand.	Retail Dealer.
BREWERY AND DISTILLERY PRODUCTS.		
<i>Brewers' Grains.</i>		
9855	Bull. Farmers Feed Co., New York.....	<i>Hartford:</i> Loydon, Northam & Loydon..... Guaranty.....
9847	Providence Brewing Co., Providence, R. I.....	<i>Thompsonville:</i> Geo. S. Phelps & Co..... Guaranty..... Average of analyses..... Average digestible.....
<i>Distillers' Grains.</i>		
9804	Atlas. Atlas Feed & Mill. Co., Peoria, Ill.....	<i>West Cheshire:</i> G. W. Thorpe Guaranty..... Digestible.....
9772	Dried grains. The Fleishman Co., Chicago, Ill.	<i>North Haven:</i> Co-operative Feed Co..... Guaranty..... Digestible.....
MISCELLANEOUS FEEDS.		
9827	Dried Beet Pulp. Holland St. Louis Sugar Co., St. Louis, Mich.....	<i>Willimantic:</i> Willimantic Grain Co..... Guaranty.....
9868	Dried Beet Pulp. Michigan Sugar Co., Bay City, Mich.....	<i>New Haven:</i> R. G. Davis & Son..... Guaranty.....
10207	Cocoa Shell Meal. Hershey Chocolate Co.....	<i>Colchester:</i> Colchester Farm Produce Co..... Guaranty.....
PROPRIETARY MIXED FEEDS.		
<i>Horse, Dairy and Stock Feeds.</i>		
9820	Pennant Stock Feed. E. W. Bailey & Co., Swanton, Vt.....	<i>Norwich:</i> Chas. Slosberg.. Guaranty.....
9796	Blatchford's Calf Meal. Blatchford Calf Meal Co., Waukegan, Ill.....	<i>Middletown:</i> Meech & Stod- dard, Inc..... Guaranty.....
9814	Bufaceo Chop Feed. Buffalo Cereal Co., Buffalo, N. Y.....	<i>New London:</i> P. Schwartz Co..... Guaranty.....
9812	Bufaceo Steam Cooked Feed. Buffalo Cereal Co., Buffalo, N. Y.....	<i>New London:</i> P. Schwartz Co..... Guaranty.....
9808	Bufaceo Horse Feed. Buffalo Cereal Co., Buffalo, N. Y.....	<i>Shelton:</i> Ansonia Flour & Grain Co..... Guaranty.....
9792	Unicorn Dairy Ration. Chapin & Co., Ham- mond, Ind.....	<i>Branford:</i> S. V. Osborn... Guaranty.....
9856	Big Clover Complete Ration. Clover Leaf Mill. Co., Buffalo, N. Y.....	<i>Hartford:</i> Loydon, Nor- tham & Loydon..... Guaranty.....
9828	Clover Leaf Dairy Feed. Clover Leaf Mill. Co Buffalo, N. Y.....	<i>Willimantic:</i> Willimantic Grain Co..... Guaranty.....
9839	Clover Leaf Calf Meal. Clover Leaf Mill. Co., Buffalo, N. Y.....	<i>Colchester:</i> David Shea... Guaranty.....

SAMPLED IN 1917—Continued.

Station No.	Pounds per Hundred						Price per ton.
	Water.	Ash.	Protein. (N. x 6.25)	Fiber.	Nitrogen-free Extract. (Starch, gum, etc.)	Ether Extract. (Crude Fat)	
9855	6.62	3.41	28.44	13.43	41.47	6.63	\$60.00
.....	.....	.....	27.00	.....	.....	6.00	.....
9847	6.31	3.29	24.81	14.78	44.03	6.78	50.00
.....	.....	.....	25.00	.....	.....	5.00	.....
.....	6.47	3.35	26.63	14.11	42.75	6.71	55.00
.....	.....	.....	21.6	6.9	24.4	6.0	.....
9804	6.07	1.86	32.88	12.61	37.43	9.15	62.00
.....	.....	.....	30.00	14.00	30.00	10.00	.....
.....	.....	.....	24.0	14.0	30.3	8.7	.....
9772	6.49	2.60	18.13	23.66	42.14	6.98	44.00
.....	.....	.....	19.00	19.00	.....	7.00	.....
.....	.....	.....	13.2	22.5	34.1	6.6	.....
9827	9.57	3.17	10.60	18.39	57.65	0.62	52.00
.....	.....	.....	8.00	20.00	58.00	0.50	.....
9868	9.62	3.33	8.56	18.06	59.27	1.16	46.00
.....	.....	.....	8.00	20.00	58.00	0.50	.....
10207	3.46	2.86	16.25	14.34	51.18	11.91	30.00
.....	.....	.....	14.00	.....	.....	.....	.....
9820	8.71	4.38	9.25	10.48	60.55	6.63	\$60.00
.....	.....	.....	10.00	10.00	.....	6.50	.....
9796	9.89	5.47	23.94	8.09	46.19	6.42	88.00
.....	.....	.....	24.00	.....	.....	5.00	.....
9814	8.30	3.88	9.06	10.50	62.23	6.03	60.00
.....	.....	.....	8.00	10.00	68.00	4.00	.....
9812	7.06	3.65	9.94	8.58	64.11	6.66	60.00
.....	.....	.....	10.00	8.00	.....	4.00	.....
9808	8.35	4.13	11.69	10.31	60.67	4.85	71.00
.....	.....	.....	11.00	8.00	60.00	4.00	.....
9792	7.88	7.04	24.19	9.81	45.07	6.01	58.00
.....	.....	.....	26.00	.....	.....	5.50	.....
9856	8.72	7.15	23.06	15.81	41.18	4.08	64.00
.....	.....	.....	24.00	.....	.....	4.50	.....
9828	8.34	10.51	13.50	17.84	46.29	3.52	50.00
.....	.....	.....	13.50	.....	.....	3.00	.....
9839	9.57	6.25	22.06	6.95	50.31	4.86	70.00
.....	.....	.....	19.00	.....	.....	5.00	.....

TABLE VI.—ANALYSES OF COMMERCIAL FEEDS

Station No.	Brand.	Retail Dealer.
<p style="text-align: center;">PROPRIETARY MIXED FEEDS—<i>Continued.</i> <i>Horse, Dairy and Stock Feeds—Continued.</i></p>		
9818	Wirthmore Stock Feed. Chas. M. Cox Co., Boston, Mass.	<i>Yantic:</i> A. R. Manning.... Guaranty.....
9784	Economic Horse & Mule Feed. Economic Feed Co., New York.	<i>Milford:</i> E. L. Oviatt.... Guaranty.....
9790	Stock Feed. John W. Eshelman, Lancaster, Pa.	<i>Bridgeport:</i> Susman-Feuer Co. Guaranty.....
9821	Horse, Mule and Dairy Feed. Dwight E. Hamlin, Pittsburgh, Pa.	<i>Norwich:</i> Chas. Slosberg.. Guaranty.....
9787	Pul Mor Horse Feed. Chas. A. Krause Mill. Co., Milwaukee, Wis.	<i>Bridgeport:</i> Susman-Feuer Co. Guaranty.....
9803	Badger Stock Feed. Chas. A. Krause Mill. Co., Milwaukee, Wis.	<i>West Cheshire:</i> G. W. Thorpe Guaranty.....
9833	Dairy Feed. Chas. A. Krause Mill. Co., Milwaukee, Wis.	<i>Meriden:</i> August Grulich.. Guaranty.....
9834	Stock Feed. Chas. A. Krause Mill. Co., Milwaukee, Wis.	<i>Meriden:</i> August Grulich.. Guaranty.....
9836	Crescent Horse Feed. Chas. A. Krause Mill. Co., Milwaukee, Wis.	<i>Meriden:</i> August Grulich.. Guaranty.....
9838	Larro-feed. Larrowe Milling Co., Detroit, Mich.	<i>Meriden:</i> Meriden Grain & Feed Co. Guaranty.....
9858	Atlas Horse Feed. The Meader Atlas Co., New York.	<i>Hartford:</i> Loydon, Northam & Loydon.... Guaranty.....
9813	Meadowland Dairy Ration. Metropolitan Mills, New York.	<i>New London:</i> P. Schwartz Co. Guaranty.....
9857	Monogram Feed. Metropolitan Mills, New York.	<i>Hartford:</i> Loydon, Northam & Loydon.... Guaranty.....
9781	Peerless Horse Feed. Omaha Alfalfa Mill. Co., Omaha, Neb.	<i>Wallingford:</i> E. E. Hall.. Guaranty.....
9831	Stevens 44 Dairy Ration. Park & Pollard Co., Boston, Mass.	<i>Wallingford:</i> Gallagher Bros. Guaranty.....
9869	King Corn Horse & Mule Feed. M. C. Peters Mill. Co., Omaha, Neb.	<i>New Haven:</i> R. G. Davis & Son. Guaranty.....
9809B	King Corn Horse & Mule Feed. M. C. Peters Mill. Co., Omaha, Neb.	<i>Shelton:</i> Ansonia Flour & Grain Co. Guaranty.....
9785	Emerald Horse Feed. Prairie State Mill. Co., Chicago, Ill.	<i>Bridgeport:</i> Standard Feed Co. Guaranty.....
9786	Green Cross Horse Feed. Quaker Oats Co., Chicago, Ill.	<i>Southport:</i> C. Buckingham & Co. Guaranty.....
9783	Schumacher's Stock Feed. Quaker Oats Co., Chicago, Ill.	<i>Milford:</i> E. L. Oviatt.... Guaranty.....

SAMPLED IN 1917—Continued.

Station No.	Pounds per Hundred.						Price per ton.
	Water.	Ash.	Protein. (N. x 6.25)	Fiber.	Nitrogen-free Extract. (Starch, gum, etc.)	Ether Extract. (Crude Fat)	
9818	7.94	3.97	9.94	10.40	60.97	6.78	\$60.00
.....	.....	.....	9.00	9.50	60.00	4.00	.....
9784	10.01	5.25	14.06	11.53	55.34	3.81	65.00
.....	.....	.....	18.00	16.00	.....	5.00	.....
9790	8.39	4.28	11.44	9.30	61.55	5.04	70.00
.....	.....	.....	10.00	.....	.....	3.00	.....
9821	8.46	9.36	13.56	15.67	50.56	2.39	58.00
.....	.....	.....	14.00	16.00	58.00	3.50	.....
9787	9.47	7.84	10.69	15.71	54.92	1.37	55.00
.....	.....	.....	9.00	.....	.....	1.00	.....
9803	8.40	4.65	8.63	15.97	58.02	4.33	47.00
.....	.....	.....	10.00	.....	.....	4.50	.....
9833	7.19	6.31	24.88	11.16	43.73	6.73	58.00
.....	.....	.....	24.00	.....	.....	5.00	.....
9834	7.39	4.90	9.19	13.17	59.01	6.34	60.00
.....	.....	.....	10.00	.....	.....	4.00	.....
9836	9.25	7.89	10.94	14.97	55.33	1.62	58.00
.....	.....	.....	10.00	.....	.....	1.00	.....
9838	8.54	5.11	20.50	11.82	49.47	4.56	55.00
.....	.....	.....	20.00	14.00	50.00	3.00	.....
9858	7.72	8.52	7.31	17.04	56.95	2.46	50.00
.....	.....	.....	8.00	.....	.....	1.00	.....
9813	7.76	5.58	20.69	21.25	39.36	5.36	58.00
.....	.....	.....	18.00	.....	.....	3.50	.....
9857	8.58	6.95	13.13	16.43	51.90	3.01	56.00
.....	.....	.....	14.00	.....	.....	3.00	.....
9781	10.03	7.16	12.06	14.10	55.12	1.53	56.00
.....	.....	.....	10.00	12.00	55.00	2.00	.....
9831	7.03	4.87	23.88	13.29	43.38	7.55	58.00
.....	.....	.....	24.00	.....	.....	5.00	.....
9869	9.58	7.98	12.13	16.95	51.92	1.44	58.00
.....	.....	.....	10.00	18.00	50.00	1.50	.....
9809B	8.45	5.72	11.94	16.98	55.62	1.29	58.00
.....	.....	.....	10.00	.....	.....	1.50	.....
9785	7.60	7.83	12.56	16.56	53.48	1.97	60.00
.....	.....	.....	10.00	12.00	50.00	2.00	.....
9786	9.94	5.10	9.69	13.18	59.26	2.83	57.00
.....	.....	.....	10.00	.....	.....	2.50	.....
9783	8.55	5.65	11.75	11.32	58.46	4.27	60.00
.....	.....	.....	10.00	.....	.....	3.25	.....

TABLE VI.—ANALYSES OF COMMERCIAL FEEDS

Station No.	Brand.	Retail Dealer.
	PROPRIETARY MIXED FEEDS— <i>Concluded.</i> <i>Horse Dairy and Stock Feeds—Concluded.</i>	
9770	Big Q Dairy Ration. Quaker Oats Co., Chicago, Ill.	North Haven: Co-operative Feed Co. Guaranty.
9775	Schumacher's Calf Meal. The Quaker Oats Co., Chicago, Ill.	North Haven: Co-operative Feed Co. Guaranty.
9867	Purina Calf Chow Feed. Ralston Purina Mills, St. Louis, Mo.	New Haven: Crittenden-Benham Co. Guaranty.
9861	Good Luck Feed. Ralston Purina Mills, St. Louis, Mo.	So. Norwalk: S. Roodner. Guaranty.
9826	Ryde's Cream Calf Meal. Ryde & Co., Chicago, Ill.	Willimantic: Willimantic Grain Co. Guaranty.
9819	Biles Ready Ration. Union Grains. Ubiko Mill. Co., Cincinnati, O.	Yantic: A. R. Manning. Guaranty.
	POULTRY FEEDS.	
9807	Bufceco Poultry Mash. Buffalo Cereal Co., Buffalo, N. Y.	Ansonia: Ansonia Flour & Grain Co. Guaranty.
9870	Globe Egg Mash. Albert Dickenson Co., Chicago, Ill.	New Haven: R. G. Davis & Sons. Guaranty.
9788	Laying Mash. John W. Eshelman, Lancaster, Pa.	Bridgeport: Susman-Feuer Co. Guaranty.
9800	Blue Ribbon Laying Mash. Globe Elevator Co., Buffalo, N. Y.	West Cheshire: G. W. Thorpe Guaranty.
9707	M. & S. Dry Mash. Meech & Stoddard, Inc., Middletown, Conn.	Middletown: Meech & Stoddard, Inc. Guaranty.
9862	Lay or Bust Dry Mash. Park & Pollard Co., Boston, Mass.	Norwalk: C. E. Slauson & Co. Guaranty.
9863	Growing Feed. Park & Pollard Co., Boston, Mass.	Norwalk: C. E. Slauson & Co. Guaranty.
9829	Platco Laying Mash. Frank S. Platt Co., New Haven, Conn.	New Haven: Frank S. Platt Co. Guaranty.
9866	Purina Chicken Chowder. Ralston Purina Mills, St. Louis, Mo.	New Haven: Crittenden-Benham Co. Guaranty.
9830	Chic Chuck. Russia Cement Co., Gloucester, Mass.	New Haven: Frank S. Platt Co. Guaranty.

SAMPLED IN 1917—Concluded.

Station No.	Pounds per Hundred.						Price per ton.
	Water.	Ash.	Protein (N. x 6.25)	Fiber.	Nitrogen-free Extract. (Starch, gum, etc.)	Ether. Extract. (Crude Fat)	
9770	8.71	5.26	19.00	10.37	50.71	5.95	\$59.00
.....	.....	.....	21.00	10.50	.....	6.00	.....
9775	7.14	4.14	19.00	1.91	57.02	10.79	80.00
.....	.....	.....	18.00	.....	.....	8.00	.....
9867	10.02	3.59	33.69	3.40	45.85	3.45	94.00
.....	.....	.....	33.00	.....	.....	4.00	.....
9861	10.02	6.20	11.69	5.17	64.19	2.73	58.00
.....	.....	.....	9.00	.....	.....	1.50	.....
9826	10.82	5.85	24.50	7.10	48.10	3.63	90.00
.....	.....	.....	25.00	.....	.....	5.00	.....
9819	7.35	5.60	24.06	10.04	46.41	6.54	62.00
.....	.....	.....	24.00	10.00	50.00	7.00	.....
9807	9.11	4.42	16.13	5.62	59.37	5.35	69.00
.....	.....	.....	15.00	5.00	.....	4.00	.....
9870	10.42	5.37	16.63	7.59	55.28	4.71	72.00
.....	.....	.....	15.00	.....	.....	3.00	.....
9788	8.73	9.61	21.75	6.60	46.48	6.83	75.00
.....	.....	.....	20.00	7.00	.....	5.00	.....
9800	8.69	6.59	20.88	8.23	50.47	5.14	70.00
.....	.....	.....	20.00	.....	.....	3.00	.....
9707	9.26	8.32	17.63	7.03	52.60	5.16	68.00
.....	.....	.....	12.00	.....	.....	3.00	.....
9862	9.95	12.07	19.81	7.04	46.09	5.04	75.00
.....	.....	.....	18.00	.....	.....	1.50	.....
9863	10.45	6.66	16.06	14.30	48.83	3.70	75.00
.....	.....	.....	10.00	.....	.....	1.50	.....
9829	9.00	14.40	18.63	5.12	46.37	6.48	65.00
.....	.....	.....	20.31	.....	.....	5.54	.....
9866	10.29	7.10	18.75	7.16	53.33	3.37	77.00
.....	18.00	4.00
9830	5.59	39.44	50.63	1.37	82.00
.....	50.00	2.00

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State of Connecticut
PUBLIC DOCUMENT No. 24

Forty-first Annual Report

OF

The Connecticut Agricultural
Experiment Station

Being the annual report for the year ended October 31

1917

and including Bulletins Nos. 196 to 206

=====
PRINTED BY ORDER OF THE LEGISLATURE
=====

NEW HAVEN
PUBLISHED BY THE STATE
1918

PUBLICATION
APPROVED BY
THE BOARD OF CONTROL

PRESS OF
THE WILSON H. LEE CO.

CONNECTICUT AGRICULTURAL EXPERIMENT STATION.

OFFICERS AND STAFF.

SEPTEMBER 30, 1917.

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Plant Breeding.	DONALD F. JONES, M.S., <i>Plant Breeder</i> . C. D. HUBBELL, <i>Assistant</i> .
Vegetable Growing.	¶HOWARD F. HUBER.

* Died April 18, 1917.

† Appointed May 1.

‡ Appointed April 19.

‡ Appointed May 28.

¶ Resigned March 1.

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CORRECTION.

It is stated on page 167 of Bulletin 200 (being the Food and Drug Report of this Station for 1917), that the Calomel Tablets numbered 11609 were made by the Tailby-Nason Company.

This statement is incorrect and was based on misinformation given to this Station. The name of the manufacturer cannot be ascertained, but the aforesaid company is not responsible for them.

E. H. JENKINS, Director.

Report of the Board of Control

OF

THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION

To His Excellency, Marcus H. Holcomb, Governor of Connecticut:

As required by law, the Board of Control of The Connecticut Agricultural Experiment Station herewith respectfully presents its annual report for the year ended October 31, 1917.

The following minute, adopted by the Board, records the death of one of its members:

Professor H. W. Conn, for ten years a member and the vice-president of the Board of Control of this Station, died at his home in Middletown, Connecticut, April 18, 1917.

Professor Conn was the professor of biology in Wesleyan University and the director of the State Board of Health Laboratory, which he organized in 1905 and of which he continued to be the director until the time of his death.

Perhaps his highest public service was rendered by his studies on milk and its various preparations, from the standpoint of the sanitarian and the humanitarian. He was especially interested in all means of protecting infant life by reasonable control of the milk supply, and gave time and talents without reserve to the work. In 1911 he was appointed by the New York Milk Committee as a member of the National Commission on Milk Standards and retained that position as long as he lived.

The members of this Board desire to place on its records their appreciation of Dr. Conn's faithful and efficient service as a member of their organization, and their recognition of the wider public service which he rendered to the State and to the whole country as a specialist whose interests were not bounded by his laboratory but embraced the every-day needs of the whole community, with a special regard to the most needy and helpless portion of it.

LEGISLATION AFFECTING THE STATION.

The General Assembly, at its last session, increased the biennial appropriation to the Station for current expenses by \$2500 and to the State Entomologist by \$4000.

It also appropriated \$40,000 for the suppression of the gipsy and brown-tail moths and for inspection of imported nursery stock, \$15,000 for the control of the white-pine blister rust, \$5,000 for the purchase of land for State forests, and \$9,000 for the Forest Fire Warden service.

A special appropriation of \$28,000 was also made to the Station for the building of a heating plant.

The General Assembly also added considerably to the duties of the Station by the following Acts:

Chapter 23 provides that the Director shall have charge of all matters pertaining to the official control of insects or diseases which are, or threaten to be, serious pests, and gives him power, with approval of the governor, to make rules for the destruction of infested stock and to prohibit or regulate transportation of plants which may carry dangerous pests. He may also establish quarantines against other States or section of this State, after giving a public hearing on the matter.

Chapter 262 authorizes the Director to investigate and control the white-pine blister rust or currant rust and to destroy all pines, gooseberries, or currants infected with the disease. He may designate districts within which all wild species which are liable to infection may be destroyed.

Chapter 402 amends Chapter 264 of the Acts of 1915 and places the work of drainage of marshes for mosquito elimination in charge of the Director, wherever the State is to bear a share of the expense. It provides for due notice in advance to property owners whose land is to be ditched, for hearings in case of grievance, for assessment of benefits and damages, etc. It further provides that the Director shall maintain and keep in repair ditches, tide-gates, etc., which have been constructed hitherto with his approval, the State paying one-fourth and the town or borough three-fourths of this expense.

A special law also required the Director to assess damages resulting from the ditching of marsh land with each of eight citizens of Branford who made a claim to the Assembly for

damages. In case of disagreement, an arbitrator was to be appointed and the decision of two of the three was to be final. One-half of any assessed damage was to be paid by the State and one-half by the town of Branford.

The work on the suppression of the gipsy and brown-tail moths, on the inspection of imported nursery stock, and on the control of the white-pine blister rust will be reported by those members of the staff to whom the work was assigned, when the entire work of the calendar year is completed.

The Act providing for a heating plant did not make the appropriation available until October 1, 1917, which exposed us to the danger of being obliged to close the institution at any time during the winter when our worn-out heater might give out completely.

Arrangement was finally made by which we were able to begin construction on July 8th. Various delays in the work will make it impossible to provide heat until the latter part of November. This results in much discomfort and a large expense for heating with gas, but we hope with no other material loss.

The new building is a one-story structure of brick and concrete, provided with a coal capacity of 180 tons and an 88 horse-power tubular boiler which supplies heat to all the Station buildings, the condensed water returning by gravity.

Under the powers granted by Chapter 23, it has not yet been necessary for the Director to order destruction of stock or establish quarantines of any kind.

Under the provisions of Chapter 262, the Director appointed Dr. Britton to have charge of the fall inspection of pines and *ribes* in all nurseries and to help, as far as possible, in the spring inspection; Dr. Clinton to have entire charge of all botanical studies relating to the nature and spread of the pine blister rust, and Mr. Stoddard to work under his direction on botanical studies; Mr. Filley to have charge of the work of scouting and destroying the blister rust and to employ the necessary laborers, with the assistance of Mr. Moss. Mr. Filley also kept the accounts of all expenses incurred in the work.

Under the requirements of Chapter 402, the director had to supervise during the summer both the ditching and other work of mosquito elimination on 600 acres of salt marsh, and the clearing and maintenance of ditches and culverts on 4108 acres of marsh previously drained.

As authorized by law, Mr. B. H. Walden was appointed the director's deputy to take immediate charge of the work. The law was not effective until May 16, 1917, by which time much of the spring clearing should have been done. It was extremely difficult to get labor of any kind to do the necessary work and almost impossible to get efficient labor. There was also much delay and added difficulty with labor because the work cannot be carried on steadily to a conclusion but has to be suspended during certain perigee tides.

Under such conditions work was greatly delayed and much not wholly unreasonable irritation developed among marsh-owners, because of the trampling of marsh grass by the workers, which would have been avoided if the work could have been seasonably finished.

Finally, the special Act above referred to made necessary an examination of eight different tracts of land in company with their owners, and considerable correspondence and conference. This having proved ineffective, an arbitrator was agreed upon at the last moment, all the tracts were again examined, damages were fixed by the agreement of the arbitrator and the owner of the land, and within the prescribed time the findings were filed by the Director with the Superior Court.

The Commission of Public Health, acting for the Board of Health Council, finding it desirable to locate in New Haven the Bureau of Laboratories of the Council, and having asked whether it would be possible for the Station to provide adequate quarters, this board arranged to give the Council, for a nominal rental, the use of the first floor and basement of what was formerly the botanical laboratory building. The Bureau of Laboratories took possession on September first. The arrangement is proving to be mutually satisfactory.

As the work of the different departments, so far as ready for publication, will be described in the forthcoming bulletins, we give here only a brief summary of the work of each.

BOTANY.

Dr. Clinton in Charge.

The principal projects have been: Studies of the effects of various fungicides on fungous diseases, and their injurious action, if any, on peaches and apples; the effect of different

fertilizers on the health, longevity and production of peach trees; a study of the nature and methods of spread of peach yellows; control of black rust of cherry; selection and spraying experiments with muskmelons; effects of different fertilizers on the diseases of certain vegetables; special studies of downy mildew and certain heteroecious rusts.

Special studies of the white-pine blister rust have occupied much of the time of this department.

Studies of the causes and prevention of the partial failure of tobacco crops on certain areas in tobacco plantations have been continued.

This department has also co-operated with the County Farm Bureau in demonstrations of potato spraying.

CHEMISTRY.

Mr. Street in Charge.

The work required by Statute has involved examination of 595 fertilizers, 259 feeds, 675 farm products, 1350 foods and drugs, and 1412 pieces of Babcock glassware. Expert evidence in court has been required in 7 cases. Some co-operative work has been done on analytical methods.

The chemist in charge has also been called upon for much public service, because of his experience in matters relating to food control. Thus, he is serving as a member of the National Committee to establish food definitions and standards, of the Committee on Revision of Analytical Methods of the American Association of Official Agricultural Chemists, as chairman of the Committee of the American Public Health Association on Nostroms, and as expert of the American Medical Association on diabetic foods. During the year he has prepared a book on The Composition of Certain Patent and Proprietary Medicines, published by the American Medical Association.

ENTOMOLOGY.

Dr. Britton in Charge.

The inspections required examination of 84 nurseries covering 1461 acres of land planted to nursery stock, 682 cases of imported stock, and 473 apiaries containing 4506 colonies.

The work on suppression of the gipsy moth has been actively carried on through the year. 6182 egg masses have been found and destroyed, more than 17,000 trees banded, 37,800 larvae found and destroyed, and 91 of the worst infestations sprayed with lead arsenate.

The mosquito control work, to which reference has been made, was in immediate charge of Dr. Britton's assistant, Mr. Walden.

A study of the very destructive European pine sawfly has been made and the results have been prepared for publication. Means have been devised for destroying a subtropical cockroach which was ruining roses and Easter lilies in one of the large green-houses of the State. Various studies of other insects of economic importance are being made.

The Hymenoptera of Connecticut (Bulletin 22 of the Connecticut State Geological and Natural History Survey), a volume of 824 pages, 15 text figures and 10 plates, prepared by a number of contributors, under the direction of Dr. Britton, has been issued.

A check list of Connecticut Insects has been prepared by Dr. Britton and awaits publication.

Considerable progress has been made also on the Hemiptera of Connecticut, under Dr. Britton's direction. Even where written by other authors, these publications involve much work by the staff in preparing plates, indexing, proof-reading and typing.

FORESTRY.

Mr. Filley in Charge.

From the Mount Carmel grounds about 43,500 pine transplants have been supplied to the State forests.

About 52,000 two- and three-year old transplants are ready for setting next spring.

Observations have been begun on the pine stands of A. D. Bridge Sons Co., of Hazardville, to determine if possible the cause of the increasing weakness of mature trees, shown in loss of needles and ultimate death of the trees.

The work on the white-pine blister rust required the attention of the Forester for most of the spring and summer. During May

and June eight men scouted sixty-eight pine plantations, covering 1100 acres. During July and August seven men scouted the State for infected *ribes*, in an endeavor to find by this means infected pines. As a result, eighteen pine infections were discovered.

In 35 towns, most of them east of the Connecticut River, *ribes* infections were found, but no serious pine infection, except at Pomfret.

In the region about Norfolk the native pine is most seriously threatened. Here, in the last two years, the gangs of men employed by Mr. Filley have endeavored to destroy all *ribes* on an area of 4300 acres. In addition, 600 acres were scouted for infection on pine. This is more expensive and probably less effective than work on *ribes*.

It is clear that on such badly infected areas a large proportion of the work of eradication must be done by private owners, with such co-operation as the State can supply.

A bulletin on the blister rust has been prepared, but, owing to difficulty in getting it approved by the Bureau of Plant Industry, under the co-operative agreement, its publication is postponed.

PLANT BREEDING.

Mr. Jones in Charge.

The investigations on the laws of inheritance in maize and tobacco, which have been carried on for years and which have contributed much of value to our knowledge of these laws, are still continued, being supported by the Federal grant made exclusively for research work.

The production of improved varieties of tobacco, by the crossing of good varieties and continued selection from their offspring, has now fixed several selections which are to be finally tested as to their merits by growing them on a considerable scale.

Of more immediate practical interest are the co-operative tests of the most promising corn varieties, made at Storrs and at Mount Carmel. These have now yielded results which justify recommendations to farmers, regarding choice of varieties for planting in 1918 and regarding sources of seed.

PROTEIN RESEARCH.

Dr. Osborne in Charge.

The Station's support of this work comes from the Federal research fund, known as the Adams Fund, but because of the value of the work, the Carnegie institution has for years contributed generously to its support.

The scope and results of this investigation cannot here be adequately set forth. It is enough to say that it is a fundamental study of nutrition, specially in relation to the efficiency of the protein components of food. The results are being published in technical journals, and it is intended shortly to issue a bulletin giving a popular account of some of the facts regarding feeding which these investigations have established.

Some further idea of the Station's work may be gathered from the following statistics:

Number of letters written.....	9,898
Public addresses.....	79
Papers in scientific journals.....	15
Papers in other journals.....	15
Specimens of insects and fungi identified for inquirers.....	485
Specimens added to herbarium.....	656
Samples of seed tested.....	112

The annual field meeting was held, as usual, at the Mount Carmel farm, on August 21, 1917, and brought together between four hundred and five hundred people. This experiment field which is used by all departments, has proved to be of very great service and is efficiently managed by Mr. Hubbell.

CHANGES IN THE STATION STAFF.

Mr. H. F. Huber, the vegetable expert, resigned on March 1, 1917, to take a position in New Jersey. Mr. W. C. Pelton has been appointed in his place and will shortly enter on his work here.

Miss Florence McCormick was appointed as botanical assistant, to be principally employed in studies of the pine blister rust, and began her work here in May, 1917.

Mr. Waldo L. Adams was engaged as assistant chemist on May 1, 1917.

Mr. M. D'Esopo was engaged as assistant chemist on April 19, 1917.

PUBLICATIONS.

During the time covered by this report the Station has issued four bulletins of the regular series and one bulletin of immediate information, aggregating 62 pages, with 26 figures and plates, and the annual report of 472 pages, with 20 plates.

All of which is respectfully submitted.

GEORGE A. HOPSON,
Secretary.

New Haven, Conn., Oct. 31, 1917.

REPORT OF THE TREASURER, 1917.

E. H. JENKINS, in account with THE CONNECTICUT AGRICULTURAL
EXPERIMENT STATION for the fiscal year ended September 30, 1917.

RECEIPTS.

Balance on hand, October 1, 1916 (Analysis Fees)	\$199.27
State Appropriation (Agriculture).....	\$17,500.00
State Appropriation (Food).....	2,500.00
State Appropriation (Insect Pest).....	4,000.00
United States Appropriation (Hatch).....	7,500.00
United States Appropriation (Adams).....	7,500.00
Analysis Fees.....	9,197.25
Sale of Automobile to State Forester.....	125.00
Connecticut Agricultural College.....	600.00
Miscellaneous Receipts.....	163.81
Lockwood Trust Income (including sale of wood and Mt. Carmel Farm produce, \$1,710.05)...	10,910.05
	<u>\$59,996.11</u>
	<u>\$60,195.38</u>

DISBURSEMENTS.

E. H. Jenkins, director, salary.....	\$2,800.00
E. H. Jenkins, treasurer, ".....	400.00
V. E. Cole, salary.....	1,018.51
L. M. Brautlecht ".....	613.50
J. P. Street, ".....	2,600.00
T. B. Osborne, ".....	2,400.00
E. M. Bailey, ".....	1,845.00
C. B. Morison, ".....	1,435.00
C. E. Shepard, ".....	1,127.50
W. E. Britton, ".....	2,600.00
G. P. Clinton, ".....	2,600.00
E. M. Stoddard, ".....	1,487.50
W. O. Filley, ".....	2,400.00
A. E. Moss, ".....	1,825.00
E. L. Ferry, ".....	1,320.00
H. F. Huber, ".....	625.00
D. F. Jones, ".....	1,537.50
W. L. Adams, ".....	541.67
Michael D'Esopo, ".....	402.78
B. H. Walden, ".....	125.00
A. J. Wakeman, ".....	208.33
C. S. Leavenworth, ".....	116.66
Florence McCormick, ".....	409.88

Hugo Lange, salary.....	\$971.25
V. L. Churchill, ".....	997.50
William Veitch, ".....	735.00
Etta L. Avery, ".....	504.00
C. D. Hubbell, ".....	840.00
G. E. Graham, ".....	892.50
L. S. Nolan, ".....	90.00
Mrs. L. D. Kelsey.....	441.00
Henry Kiley.....	819.00
Frank Sheldon.....	819.00
O. J. Welch.....	819.00
T. F. Barrows.....	478.50
Joseph Leschke.....	425.00
Labor.....	3,990.82
Publications.....	1,157.39
Postage.....	278.25
Stationery.....	410.88
Telephone and Telegraph.....	182.45
Freight and Express.....	165.90
Gas, Electricity and Kerosene.....	894.18
Coal.....	410.90
Water.....	120.20
Chemicals and Laboratory Supplies.....	1,154.85
Agricultural and Horticultural Supplies.....	150.81
Miscellaneous Supplies.....	741.02
Fertilizers.....	950.85
Feeding Stuffs.....	413.01
Library and Periodicals.....	559.86
Tools, Machinery and Appliances.....	1,146.97
Furniture and Fixtures.....	399.22
Scientific Apparatus.....	332.41
Live Stock.....	2.50
Traveling by the Board.....	284.39
Traveling by the Staff.....	1,000.77
Gasoline for Automobiles.....	321.41
Traveling in connection with Adams Fund In- vestigations.....	125.67
Insurance.....	638.78
Insect Pest Appropriation to State Entomologist	4,000.00
Contingent.....	254.99
New Buildings.....	23.73
Betterments.....	150.66
Repairs.....	207.82
Total Disbursements.....	\$59,741.27
Balance on hand, Sept. 30, 1917 (Analysis Fees)..	454.11
	<u>\$60,195.38</u>

NEW HAVEN, CONN., Oct. 24, 1917.

THIS IS TO CERTIFY that we have audited the accounts of Mr. E. H. Jenkins, Treasurer of The Connecticut Agricultural Experiment Station, for the fiscal year ending September 30th, 1917, and have found them correct.

WILLIAM P. BAILEY,

JAMES P. TOBIN,

Auditors of Public Accounts.