TWENTIETH ANNUAL REPORT

OF THE

Kentucky Agricultural Experiment Station

OF THE

State College of Kentucky

LEXINGTON, KY.

FOR THE YEAR 1907

021169

Vault 3
639.2
IT3786eb
1907
cop. 2.

Letter of Transmittal

To His Excellency,

HON. AUGUSTUS E. WILLSON,

Governor of Kentucky.

Sir:—

Under the authority of the Board of Control, and in accordance with an act of Congress, approved March 2, 1887, entitled "An Act to establish Agricultural Experiment Stations in connection with the Agricultural Colleges established in the several States under the provisions of an act approved July 2, 1862, and under the acts supplementary thereto," and of the act of the Legislature of the State of Kentucky, approved February 20, 1888, and entitled "An Act to accept the provisions of an Act passed by the Congress of the United States, approved March 2, 1887, for the establishment and maintenance of Agricultural Experiment Stations in connection with Agricultural Colleges established by the several States and Territories under an Act of Congress, approved July 2, 1862," I herewith submit the Twentieth Annual Report of the Kentucky Agricultural Experiment Station.

Very Respectfully,

M. A. SCOVELL, *Director.*

Agricultural and Mechanical College

OF KENTUCKY

BOARD OF TRUSTEES.

His Excellency, Gov. Augustus E. Willson, ex-Officio Chairman.

James K. Patterson, President of the College, ex-Officio.

Judge William C. Bell, Harrodsburg, Mercer County.

Hon. Cassius M. Clay, Paris, Bourbon County.

Judge George B. Kinkead, Lexington, Fayette County.

Judge John McChord, Lebanon, Marion County.

Hon. Charles W. Metcalfe. Pineville, Bell County.

Basil W. Brooks, Esq., Slaughtersville, Webster County.

David F. Frazee, Esq., Lexington, Ky.

Hon. Frank A. Hopkins, Prestonsburg, Floyd County.

Charles B. Nichols, Esq., Lexington, Fayette County.

Judge Robert L. Stout, Versailles, Woodford County.

Judge Henry S. Barker, Louisville, Jefferson County.

Hon. Tibbis Carpenter, Scottsville, Allen County.

Judge William T. Lafferty, Cynthiana, Harrison County.

Denny P. Smith, Esq., Cadiz, Trigg County.

Hon. Claude B. Terrill, Bedford, Trimble County.

#24
5855
135

List of Officers

BOARD OF CONTROL.

GEORGE B. KINKEAD, Chairman, Lexington, Ky.
D. F. FRAZEE, Lexington, Ky.
C. B. NICHOLS, Lexington, Ky.
C. M. CLAY, Paris, Ky.
J. K. PATTERSON, President of the College.
M. A. SCOVELL, Director, Secretary.

STATION STAFF.

M. A. SCOVELL, Director and Chemist.
A. M. PETER, Chemist, Head of Chemical Division.
H. E. CURTIS, Chemist, Head of Fertilizer Division.
H. GARMAN, Entomologist and Botanist, Head of Entomological and Botanical Division.
W. H. SCHERFFIUS, Agronomist, Head of Agricultural Division.
R. M. ALLEN, Head of Food Division.
J. D. TURNER, Head of Feed Division.
J. O. LABACH, Chemist, Food Division.
MISS M. L. DIDLAKE, Assistant Entomologist and Botanist.
S. D. AVERITT, Assistant Chemist.
O. M. SHEDD, Assistant Chemist.
MISS LILLIE LISTON, Stenographer, Food Division.
E. C. VAUGHN, Assistant Entomolgist and Botanist.
GEORGE ROBERTS, Assistant Chemist, Fertilizers.
E. S. GOOD, Animal Husbandman, Head of Animal Husbandry Division.
J. W. NUTTER, Assistant in Dairying.
MISS O. L. GINOCHIO, Stenographer.
H. D. SPEARS, Assistant Chemist, Feeds.
W. D. NICHOLS, Assistant Animal Husbandman.
J. W. McFARLIN, Assistant, Fertilizer and Feed Divisions.
MISS ANNA WALLIS, Stenographer.
E. F. WORTHINGTON, Superintendent of Farm.

Address of the Station,
LEXINGTON, KENTUCKY.

THE KENTUCKY AGRICULTURAL EXPERIMENT STATION

In Account with the United States Appropriation.

	Hatch Fund.	Adams Fund.
To Receipts from the Treasurer of the United States, as per appropriations for fiscal year ended June 30, 1907, under acts of Congress approved March 2, 1887 (Hatch Fund), and March 16, 1906 (Adams Fund)....	$15,000.00	$7,000.00
Expenditures:		
By Salaries	$10,077.10	$4,908.32
Labor	935.59	6.15
Publications	288.65	
Postage and stationery.....	416.70	
Freight and express.....	187.33	
Heat, light, water and power....	586.87	
Chemical Supplies.....	440.82	458.99
Seeds, plants and sundry supplies	310.20	
Library	519.45	19.22
Tools, implements and machinery	124.68	218.00
Furniture and fixtures.....	667.10	260.00
Scientific apparatus.....	24.05	1,129.32
Traveling expenses.....	259.67	
Contingent expenses.....	15.00	
Buildings and land	146.79	
Total	$15,000.00	$7,000.00

We, the undersigned, duly appointed Auditors of the Corporation, do hereby certify that we have examined the books and accounts of the Kentucky Agricultural Experiment Station for the fiscal year ended June 30, 1907; that we have found the

same well kept and classified as above; that the receipts for the year from the Treasurer of the United States are shown to have been $15,000.00 under the act of Congress of March 2, 1887, and $7,000.00 under the act of Congress of March 16, 1906, and the corresponding disbursements $15,000.00 and $7.000.00; for all of which proper vouchers are on file and have been examined and found correct.

And we further certify that the expenditures have been solely for the purposes set forth in the acts of Congress, approved March 2, 1887, and March 16, 1906, and in accordance with the terms of said acts, respectively.

(Signed)
GEORGE B. KINKEAD,
D. F. FRAZEE,
Auditors.

(Seal)

Attest:
D. F. FRAZEE.

ANNUAL REPORT OF THE

Kentucky Agricultural Experiment Station

FOR THE YEAR 1907.

REPORT OF THE DIRECTOR

The Station as now organized consists of the following divisions:

Division of Correspondence,
Division of Chemistry,
Division of Entomology and Botany,
Division of Agronomy,
Division of Animal Husbandry,
Division of Fertilizer Control Work,
Division of Food Control Work,
Division of Feed Control Work,
and other inspection work.

The scope of the Station work has been broadened by new duties imposed. The Adams Act, approved March 16, 1906, has given us opportunity for original research work. This Act, as is known, provides additional appropriations for experiment stations throughout the country, but the funds are available for original research work only and the line of work undertaken must be approved by the Secretary of Agriculture. For the fiscal year beginning July 1, 1907, we receive under this Act $9,000.00; the next fiscal year we will receive $11,000.00, and an additional two thousand dollars each year until the amount of $15,000.00 is reached, when this sum will be appropriated annually.

Obviously, only a few projects can be planned for at present, under this Act, as they should be large, important undertakings involving considerable expense, and it is essential that sufficient

funds be allotted each, so that the investigation may be carried out in a thorough and effective manner.

Under this Act, our Station has undertaken several lines of work. Dr. Peter is making a systematic study of the soils of the State and experimenting, both in the chemical laboratory and in plots in field and greenhouse, to ascertain, if possible, some quick chemical method of analysis by which the wants of a soil, so far as plant food is concerned, can be readily learned. It is planned to extend the work on soils in co-operation with the State Geological Survey until a soil map of the State shall have been completed. A large number of samples have already been collected for this purpose.

Professor Garman is studying the nodule bacteria on the various clovers and other leguminous plants for the purpose of learning if the nodule bacteria of one species of plant can be appropriated by others, and to find out through this work, if possible, the cause of "clover sickness."

Mr. Good is studying the question of contagious abortion in domestic animals, with the object of learning whether or not animals can be made immune to the abortion germ.

The Adams Fund has given to the Stations a research fund and thus given them an opportunity to undertake work, the results of which may, or may not, be successful and which may take years to accomplish. But, if one important discovery is made, it will be worth all the money and effort given.

A law passed two years ago, entitled "An Act regulating the sale of concentrated commercial feeding stuffs, defining same and fixing penalties for violations thereof," has also greatly increased the duties of the Station. The work became so heavy that a division was formed to carry it out properly, and Mr. Turner was placed in charge of the detail of the work. We have had some difficulty in thoroughly executing this law, but we hope that the recent imposition of several fines upon dealers in Louisville, Newport and Covington will bring good results. Our analyses show conclusively the necessity for such a law, as a large percentage of feeds were found on first inspection to be adulterated. The income from the feed work the past year was $14,146.00.

There is a great demand for Station workers to attend Farmers' Institutes, and we have had one or more members in institute work continuously during the past year.

We have also had numerous requests for some member of the Station force to inspect creameries and dairy plants and to make official tests of the butter and milk of dairy cows.

Improvements.—We have added greatly to our laboratories in the way of apparatus, such as microscopes, bacteriological apparatus, incubators for growing germs, etc.

A laboratory for the Agriculturist has been fitted up in the Station building for the mechanical separation of seeds and for other work connected with plant breeding investigations, thereby greatly increasing our facilities for this kind of work.

A new tobacco barn, for experimental purposes, has been erected on the Station farm and a small experimental laboratory has been fitted up in connection with it. The main object of these new buildings is to experiment as to the cause and prevention of "house burning" of tobacco. The buildings are equipped with a blower, engine, boiler, heating coils, and the like, so that the temperature can be kept at any degree desired, and the amount of air controlled perfectly and kept either moist or dry as the experiments may indicate.

A piggery of modern design has been erected for the purpose of making a number of experiments with pigs as to their growth, fattening, etc., including a study of the improvement which may be effected in the soil by feeding or pasturing hogs in feed and pasture lots.

A new greenhouse has been constructed, which will be used for the study of soil fertility as demonstrated by pot experiments and in growing and studying insects, plants, plant diseases, etc. This is a modern building in every respect, consisting of two fifty-foot steel frame glass houses and a spacious head house, with work room and storage space.

The Shelby Kinkead farm, consisting of forty acres, purchased last spring, is now in the possession of the Station, and it will be surveyed for the purpose of establishing plot work upon it.

Publications.—During the year we have published the following bulletins:

Bulletin No. 129.

Tobacco—

1. Selection of Seed Plants and Care of Seed.
2. Improved Methods of Handling the Crop.
3. Elimination of Undesirable Varieties.

Bulletin No. 131.
Concentrated Commercial Feeding Stuffs—
1. Operation of the Feeding Stuffs Law.
2. Analyses of Inspectors' Samples.
3. Registrations for 1907.

Bulletin No. 132.
Commercial Fertilizers.

The work of the several divisions of the Station during the year is herewith outlined:

Chemical Division.—The work includes the complete analysis of 630 samples, including soils, minerals, waters, wheat, ores, forage plants, limestones, etc. Some interesting results have been obtained in a study of the percentage of phosphorus in the soil of the Experiment Station farm at different depths. The differences observed at any given point were very considerable, and much larger percentages were obtained than had been anticipated. At one point on the farm the percentage of phosphorus pentoxide (P_2O_5) ranged from 1¾ in the first 6 inches to nearly 18 at the depth of 6 feet. The total amount of phosphorus pentoxide in the whole depth of 7 feet of soil at this point, if calculated to the acre, would correspond to about two million pounds.

As heretofore, many samples of rocks, minerals and other materials from all parts of the State have been tested, which are not counted in the foregoing number. The principal work of the laboratory, however, has been upon soils, and a large number of samples from different parts of the State have been analyzed to determine the fertilizer requirements and to aid us in making suggestions for their treatment. Also a study of the presence of toxic substances of the soil has been made, especially as to the influence of certain decomposition substances which act as poisons on tobacco plants.

Division of Entomology and Botany.—In this division the time of part of the force has been occupied with work under the Adams Act, as stated before. The inspection of nurseries carried out under the State law has afforded exceptional opportunities for the studying of pests of fruit trees, and a bulletin along this line has been prepared, No. 133 of the Station series. The testing of forage plants has been continued in the plots on the Experiment Station farm. Other plots in the same tract are devoted to entomological field work of different sorts, the

plots in all numbering one hundred and seventy-five. In addition, this division has conducted a series of experiments in farm rotation on twentieth-acre plots in co-operation with the United States Department of Agriculture, the latter paying for the labor and supervision and the Station furnishing the land, tools and teams necessary. The object of these experiments is to show the best methods of maintaining fertility in the soil in Kentucky by the rotation of crops. Under this division, we have recently established in Eastern Kentucky, at Hindman, thirty-two additional tenth-acre plots devoted to showing the forage plants best adapted to the mountain counties of Kentucky. The farmers of this section are particularly anxious to get pasturage, especially on the land from which the timber has been cut away. We will keep this up as a sort of sub-station for a few years, when we hope to reach results. We are desirous of making similar experiments in Western Kentucky, especially on those lands west of the Tennessee River, and if funds are available, we hope to begin our work there next fall.

The seed inspection has occupied considerable time of one or more members of the Division of Entomology and Botany during the fall, winter and early spring months. Since July 1, 1907, five hundred and nineteen samples of seeds have been collected and seven hundred and nineteen samples of seeds have been examined for impurities, some of these being collected prior to July first of last year. Fourteen samples were found to be adulterated and were reported to the prosecuting attorneys. Numerous samples sent us by farmers and seedsmen have also been examined for impurities, and in some cases tested for germination. This work has been done without charge.

The State Board of Health and the County health authorities have sent us a number of samples of drinking water, supposed to be contaminated, from which they desired, especially, bacteriological examinations. Professor Garman has had this work under his charge. The health authorities are beginning to realize the necessity of such examinations, and we are receiving more samples from year to year. As this increases, it will be a question as to whether it will not be necessary for the Station to make some restrictions regarding this work, otherwise, it will encroach upon our legitimate work bearing upon agricultural lines. While the food law does not contemplate the analysis

of waters, still I believe this work might properly be turned over to the State.

Division of Animal Husbandry.—Experiments in feeding pigs have been made during the year, especially with a comparison of feeding corn alone and corn in connection with tankage. The results of these experiments will be published in the form of a bulletin. The investigations relative to contagious abortion among horses and cattle have been continued. A study of the number of germs found in a given quantity of milk obtained from different dairies in the State is now under way. Investigations in regard to sheep scab are also in progress, this work being taken up in response to requests from a number of sheep breeders in the State. Mr. Good has attended a number of live stock meetings and farmers' institutes during the year.

The Station, under Mr. Good, has co-operated with the United States Department of Agriculture, Dairy Division, in placing a dairy expert in the State for the purpose of getting dairymen interested in testing their cows and keeping records of feeds fed; also to visit co-operative creameries to give aid and suggestions in all the problems confronting them. The department furnished a man for this work, subject to the order of the Director of the Station, the salary being paid by the former. The department, as well as the Station, desires to continue the work during the next year.

Division of Agronomy.—Mr. Scherffius, who is in charge of this division, has been conducting experiments on the Station farm and has also co-operative experiments with farmers in various parts of the State. Extensive experiments with tobacco have been conducted in co-operation with the United States Department of Agriculture. For this purpose the department furnishes two men and, in addition, pays three hundred dollars of Mr. Scherffius' salary. The co-operative experiments were conducted in several parts of the State and one in Tennessee last year. This year, on account of tobacco conditions in Kentucky, the only experiments in the Burley district will be at the Station farm. Besides tobacco experiments with farmers, there will be co-operative experiments with clover, which will be conducted at Bristow and Hopkinsville. Mr. Scherffius has also devoted considerable time to farmers' institute work.

Fertilizer Control Work.—During the past year 382 different brands of fertilizers have been registered, representing thir-

ty-five firms. Six hundred and thirty-six analyses have been made and 891,524 tags have been printed. From January 1 to December 31, 1907, we received for tags $25,742.50.

Food Control Work.—During the years 1906-1907, 1,420 samples of food have been taken from the various markets and submitted to analysis. Five hundred and fifty-nine samples were found to be adulterated. We reported four hundred and seventy cases to the various Commonwealth's Attorneys and two hundred and sixty-eight convictions were secured, while one hundred and fifty-three cases are still pending. Convictions were obtained for selling spirit vinegar as apple vinegar; catsups containing benzoic acid and anilin dyes; baking powders containing alum without being so labeled; French peas colored with copper; fruits colored with poisonous coal-tar dyes; artificial flavoring extracts; mince meats adulterated with glucose and antiseptics; sausages containing boracic acid and artificially colored; raspberry preserves containing apple stock, glucose and artificial coloring; black pepper adulterated with olive pits; soda fountain syrups containing artificial coloring and benzoic acid; milks containing formaldehyde and boracic acid; milks produced from cows kept in filthy barns, and unhygienic milk kept in unclean refrigerators and depots; oleomargarine sold as butter. Special attention has been given to milk. A thorough inspection of the milk supply of Louisville, Covington and Newport has been made. Eighty convictions were obtained in Louisville for feeding distillery slop to cows and keeping them in filthy stables. Each of the defendants was fined $100.00 and a jail sentence of fifty days, the latter being suspended pending a promise to cease feeding distillery slop.

Feed Control Work.—The work up to 1908 has been largely educational. Special attention has been given to impressing the feeding stuffs trade with the fact that the matter of nutrients in feeding stuffs is the all important question to the consumer. In this connection twelve circular letters have been sent out from time to time for the purpose of distributing information concerning the value of feeding stuffs and familiarizing the trade with the law, and nearly four thousand letters have been written concerning different question arising under the operation of the law. Up to December 31, 1907, three hundred and eighty-one samples of feed stuffs have been collected from stocks of different feeds on the market by our inspectors. These

samples have been examined chemically and microscopically and the results reported to the manufacturers, dealers and consumers, from whose stocks the samples were taken. Sixty-two samples of the number examined were found to be adulterated. Many analyses have been made of feeding stuffs sent by the trade for the purpose of educating them as to the composition of the various feeding stuffs. During the year there have been 1,416,418 tags printed and over 650 brands of feed have been registered, representing 335 firms. The amount received from January 1 to December 31, 1907, was $13,569.50. About sixty violations of the law have been reported for prosecution, and convictions have been obtained in Louisville, Covington, Newport, Paducah, Ashland and Hartford, and other cases will come up soon.

A thorough inspection was inaugurated on condimental stock and poultry foods the first of 1907, but a short time after the inspection had been started, the Director was enjoined in the Federal Courts, by the International Stock Food Company of Minneapolis, Minnesota, from performing his duties as required in the Feed Control Act relative to this class of feeds. The Attorney General at once took up the case for the Director and presented a brief to Judge Cochran, who now has the matter under advisement. In this connection, I will state that similar injunctions were taken out by the same company in the district courts of Indiana, Kansas, and South Dakota, and these courts all decided in favor of the law, refusing the injunctions.

Since the operation of the law, the sale of adulterated feeds in the State has greatly decreased. It has driven from the Kentucky market those feeds made up largely of materials of little or no feeding value. It has also increased the demand for high class feed by the protection it gives to the consumer under the guaranty required of the manufacturer. Moreover, it has been a source of education to the manufacturer, seller and consumer. On account of the large number of small dealers throughout the State, most of them ignorant of what a feeding stuff should be, we find it difficult to make a thorough inspection with the force we now have, and it will require the division of the State with several inspectors working continuously.

Station Staff.—Mr. H. Woosley, Superintendent of the Farm, resigned his position last August to accept a Govern-

ment position as tobacco expert. Mr. E. F. Worthington has been acting as Farm Foreman since Mr. Woosley's resignation. Mr. Charles Mahan, Professor Garman's assistant in plot work, received an appointment from the United States Department of Agriculture as special agent in tobacco work, and resigned his position with the Station. Mr. E. J. Kinney of the University of Ohio was elected to fill the vacancy.

The Director's reports to the Government on the enforcement of the Pure Food and Feed Laws follow. After these are appended the bulletins published during the year and the analyses of mineral waters made in the general work of the Station that are deemed of most interest. Following this the Meteorological data will be found.

M. A. Scovell, Director.

REPORT OF THE DIRECTOR OF THE KENTUCKY AGRICULTURAL EXPERIMENT STATION TO THE GOVERNOR OF KENTUCKY, ON THE ENFORCEMENT OF THE STATE PURE FOOD LAW.

Hon. Augustus E. Willson, Governor,
Frankfort, Kentucky.

Dear Sir:—

Section 6 of Chapter 13 of the Acts of the General Assembly of the Commonwealth of Kentucky of 1900, known as the State Pure Food Law, provides as follows: "Said Station shall make an annual report to the Governor upon adulterated food products, in addition to the reports required by law, which shall not exceed one hundred and fifty pages, and said report may be included in the report which said Station is already authorized to make, and such annual reports shall be submitted to the General Assembly at its regular session."

Under the above provision, as Director of the Kentucky Agricultural Experiment Station, I submit herewith a report of the pure food work of the Station for the years 1906 and 1907.

Samples Inspected and Analyzed.—During this time 1,420 samples have been taken from various markets throughout the State and submitted to analysis. Five hundred and fifty-nine samples were found to be adulterated. In addition to this, 332

miscellaneous and unofficial samples have been examined, making a grand total of 1,750 samples inspected.

Foods Inspected.—Our investigations have covered various classes of food products taken from the markets as follows:

Product.	No. Samples Not Found Adulterated.	No. Samples Found Adulterated.
Baking Powder	4	5
Butter and Oleomargarine	19	6
Canned Goods	41	10
Catsups and other Tomato Sauces	5	31
Ciders and Soda Pop	32	125
Coloring Matter	..	2
Flavoring Extracts	6	27
Ice Creams	3	34
Meat Products	79	20
Milk	493	154
Molasses, Syrup and Honey	24	10
Olive Oil	6	..
Oil (table)	1	..
Oysters and other Fish Products	32	..
Pickles, Pepper and other Spices	25	31
Preserves	6	28
Food Served in Restaurants	15	9
Soda Fountain Syrups	34	48
Vinegar	36	15
Water from Pop Factories	..	4
Total, not found adulterated	861	
Total, found adulterated	559	

Inspection.—Inspections have been made in Ashland, Bardstown, Bardwell, Beattyville, Benton, Bloomfield, Bowling Green, Brownsville, Campbellsville, Carrollton, Clay City, Clinton, Corydon, Covington, Cynthiana, Danville, Dixon, Edmonton, Elizabethtown, Elkton, Eminence Falmouth, Fisherville, Franklin, Frankfort, Fulton, Georgetown, Ghent, Glasgow, Greensburg, Hazel, Henderson, Hickman, Irvine, LaGrange, Latonia, Lawrenceburg, Lebanon, Lexington, Louisville, Lynnville, Marion, Mayfield, Maysville, Midway, Morganfield, Murray, Newport, Nicholasville, Owenton, Owensboro, Paducah, Paris, Russellville, Shelbyville, Springfield, Stanton, Taylorsville, Uniontown, Versailles and Warsaw.

Cases Reported and Convictions Obtained.—We have reported 470 cases to the various Commonwealth's attorneys and 268 convictions have been secured, while 153 cases are still pending. Convictions have been obtained for selling spirit vinegar as apple vinegar; canned corn sweetened with saccharin; catsups containing anilin dye and an antiseptic; baking powder not labeled to show its class and character; French peas colored with copper; fruit coloring made from poisonous coal-tar dyes; artificial flavoring extracts; mince meats adulterated with glucose and an antiseptic; sausages adulterated with boracic acid and artificially colored; sweet mixed pickles adultered with saccharin; oleomargarine adulterated with boracic acid; maraschino cherries adulterated with coal-tar dye and an antiseptic; raspberry preserves aduterated with glucose, apple stock, saccharin and artificial color; black pepper adulterated with ground olive pits; soda fountain syrups adulterated with artificial color and antiseptics; milk adulterated with formaldehyde and boracic acid; milk adulterated with added water and by skimming; milk adulterated by being produced in barns and from cows kept in filtthy conditions; and unhygienic milk being kept in unclean refrigerators and unclean depots.

Special attention has been given to milk. As it is a product so extensively used as a food for invalids and infants, it not only should be free from adulterants but should reach the consumer pure and clean. The milk should be produced from healthy cows; the stables should be in a sanitary condition; the milk utensils and milkers should be clean and, if the milk is delivered to depots, it should be kept in clean refrigerators until delivered. We have made a thorough investigation of the milk supply of Louisville, Covington and Newport, and the work is being extended to other places.

Dairies Feeding Distillery Slop.—We found the conditions in dairies feeding distillery slop in and around Lousville very unsatisfactory. The cows were kept in close, unventilated, badly drained barns and rarely, if ever, taken out. The primary object was to fatten the cows and sell them for beef, the milk being a by-product. An investigation showed that these conditions had existed for a long time, and that the city health authorities seemed unable to cope with the situation.

Finding such conditions, Mr. R. M. Allen, in charge of the Food Division of the Station, went to Louisville with instruc-

tions to examine thoroughly the entire milk supply, beginning with the slop-fed dairies. After thorough investigation, such evidences were accumulated as to show that the conditions were deplorable; that the cows were kept in stables in filth; that they were fed nothing, in most part, but watery acid-slip. Distillery slop is so dilute that cattle fed on it exclusively have to drink such a large quantity of it in order to get a full food ration that sooner or later it causes derangement of the digestive tract. When this occurs, the milk becomes abnormal, generally poor in fat and unfit for consumption. The cows were milked standing in their filth, and while the utensls were often clean to begin with, the milk was not in condition after it left the barns for human consumption. With these facts before us and with the assistance of the Milk Commissioner of the Jefferson County Medical Society and the Health Departments of the city of Louisville and the county, and with the hearty co-operation of Mr. Bingham and Mr. Page, County Attorneys, we had all parties, eighty in number, feeding distillery slop to cows cited before Squire S. S. Hollis. Upon pleading guilty, fines of $100.00 each and a jail sentence of fifty days were assessed, the latter being suspended pending a promise to cease feeding distillery slop within two months and to put all dairies in a thoroughly sanitary condition. These conditions were complied with and I am glad to report that the feeding of distillery slop as it existed in Louisville has now ceased altogether.

We further inspected the milk depots in Louisville, finding many of them in an unsanitary condition, some so bad that the facts were reported to the County Attorney and convicfions obtained. The investigation was extended through all the counties shipping milk into Louisville, and the data collected have been edited and the matter is now in press and will be issued as a bulletin of the Station.

Ice Cream.—A number of samples of ice cream have been analyzed and an inspection made of the ice cream plants. The profitable constituent in milk or cream is the butter fat, and it has long been the practice of many restaurant keepers and ice cream dealers to thicken and color milk and, sometimes, skimmed milk, in imitation of genuine cream. This is unfair both to the consumer who pays the price of cream, and to the dairyman who is required both by the dealer and the law to supply a standard quality of cream. When an ice cream is made from a reason-

ably good grade of cream, it will stand up and have naturally sufficient thickness and body; but when attempt is made to make the product out of milk, gelatine and artificial color are necessary to make the finished product appear like ice cream. The use of gelatine will also cause the product to appear like fresh ice cream for many days after freezing, and the danger from ptomaines, in addition to the frauds, makes it necessary that the consumer should know the exact character of the product. The law does not prohibit the sale of any wholesome frozen mixture, but it does require that such mixtures shall be sold under their proper names, and that consumers shall be informed whenever the product is not of the quality represented or supposed.

Inspection of Foods on Tables of Hotels and Restaurants.—Inspections were made of the milk and cream served at hotels and restaurants, and in order to know just exactly the quality of product being served to the consumer, samples were taken from the table instead of from the kitchen or pantry. In each instance, where it was found that the milk or cream being served to patrons was skimmed or otherwise adulterated, and where it was found that the dairyman or milk depot had supplied the hotel or restaurant with good milk or cream, the facts were reported to the courts. At the same time samples of other food products served to consumers were taken and where the product differed from the representation made in the menu, or where it was found that a product which the restaurant had bought labeled "adulterated," was not in turn so represented to the consumer, the facts were reported to the courts.

Vinegar.—Before the law went into effect in 1898, there was very little pure cider vinegar sold in the cities and larger towns of our State, but most all vinegar was sold as "cider vinegar." Most of it was distilled vinegar made from weak alcohol and artificially colored and sold as "apple" or "cider" vinegar. It was furnished to the jobber at a few cents per gallon and to the retailer at from eight to twelve cents per gallon, and sold to the consumer as "cider" vinegar from twenty-five to forty cents per gallon. During the last year we found none of the distilled vinegar sold to the retailers as "cider" vinegar, but we found instances where the retailer sold vinegar properly labeled on the barrel "distilled vinegar" as "apple" or "cider" vinegar, but

this is being done less and less, as the consumer is now beginning to ask for what he wants and to insist upon getting it.

Labels on Food Products.—Special attention has been given to the labels of various food products. The law permits the sale of any food product which is put up and prepared in a wholesome manner and which contains nothing injurious to health, provided it is labeled so as to show its exact character to the purchaser or consumer. For example: It allows the sale of artificial flavoring extracts, such as vanillin, provided it is labeled "vanillin" extract, or "artificial flavor of vanilla," but it does not allow the label to read vanilla and then in smaller type elsewhere on the label, the statemnt that this extract is made from artificially prepared vanillin. On account of the profits resulting, there is always a general temptation to the trade to give an inferior product the name and descriptive terms, either in whole or in part, of another product which consumers may prefer. All manner of attempts are made to comply with the letter of the law and still maintain a label which is in some way misleading to consumers. For example: One manufacturer wished to put upon the market a product labeled, "COMPOUND PEPPER, PEPPINA," the same being a mixture of pepper, ground olive pits, cereal and lamp black. This label clearly does not show that the pepper is adulterated and its use was refused, as under the law it was evidently adulterated pepper and must be so labeled. Another manufacturer put a cane sugar syrup upon the market labeled "PURE VERMONT SYRUP," Vermont being famous for its maple syrup and the only source of its syrup being the maple tree. It was evidently the intention of the manufacturer to try to sell this syrup as "maple syrup," yet without violation of law. He was required to change his label. In the labeling of imitation extracts, syrups, jellies, jams, preserves, salad oil, fountain syrups, bottled drinks, baking powders, and so on, similar labeling questions constantly present themselves. Heretofore, artificial flavors have been extensively used in soda fountain drinks, but under the law they can not be sold except when plainly labeled artificial and a large label showing this is displayed over the soda fountain.

Bottled Pops.—There is a very large trade all over the State in soft summer drinks and investigations showed that in many instances these drinks are dangerous to health, and especially is

this true in reference to bottled pops. Most of the pops examined were found to be a mixture of artificial ethers colored with a coal-tar dye in imitation of the fruit named in the label, sweetened with saccharin and made tart with an acid, and more dangerous yet, in many cases the water supply of these pop factories was found dangerously contaminated. In some instances, the water used came from springs contaminated with sewage and in such cases, parties were notified to change water supply and the attention of the health departments was called to the matter.

Keeping of Meats.—We are making an investigation of the slaughtering houses, especially as to the character of the slaughtered meats, the equipment and cleanly condition of the plant; methods of cold storage; and whether or not preservatives or artificial colors are being used; and in the retail meat shops, the source of the meat supply; methods of handling and facilities for keeping the meats.

Bakeries.—The bakeries are also being examined to determine the character and purity of materials used; the cleanliness of the plant; methods of handling the dough; and how the flour, eggs, fruits and other ingredients used are being kept and the facilities for protecting and handling the dough, the bread and the other bakery products both in the bakery and in the markets. Results of our inspection are far from satisfactory. Generally speaking, there is a lack of cleanliness in handling the products at the bakery, at the place of sale and in the delivery to the consumer. These products are generally not heated before use and handled as they are, are likely to be contaminated by germs of disease.

The Pure Food Committee of the State Federation of Woman's Clubs has especially requested the inspection of dairies, bakeries and meat stores and desires that the reports on same be distributed.

Investigations made so far show the necessity for a constant inspection of dairies and creameries furnishing the milk supply of cities and towns, an inspection not only for weeding out plants in which wholesome milk can not be produced, but for the purpose of pointing out to milk dealers and dairymen dangers to be guarded against in the production and keeping of milk. The bleaching of flour, the present system of refining molasses, the long continued storage of meats, the sulphuring

of dried and canned fruits are a few of the questions which are pressing for investigation.

Standards of Purity.—In order to equitably enforce the food law a standard of purity or a basis of what constitutes adulteration must be established as to the various food products. A joint committee from the Association of Official Agricultural Chemists and the Association of State and National Food and Dairy Departments has, in co-operation with the National Department of Agriculture, adopted standards for a number of food products. I have been a member of this committee from the first and have adopted these standards for use in the enforcement of the Kentucky Pure Food Law. These standards have been established after carefully examining thousands of analyses and investigations of food experts all over the country and after giving full hearing to the manufacturers interested, who have personally come before this committee to present their views. These standards also form a basis of uniformity between the States and between the States and the Federal government. Such uniformity and co-operation are necessary and but just to the manufacturer, and this Station has used its influence from the first toward this end, and we note with pleasure the sentiment expressed in President Roosevelt's recent message to Congress, in which he says:

"Incidentally, in the passage of the pure food law, the action of the various State food and dairy commissioners showed in striking fashion how much good for the whole people results from the hearty co-operation of the Federal and State officials in securing a given reform. It is primarily to the action of these State commissioners that we owe the enactment of this law; for they aroused the people, first to demand the enactment and enforcment of State laws on the subject, and then the enactment of Federal law, without which the State laws were largely ineffective. There must be the closest co-operation between the National and State governments in administering these laws."

In order to effectively carry out the work under the provisions of this law, the work has been given a division in the station, and Mr. R. M. Allen is head of the division and has immediate charge of the work and especially of court work. Mr. J. O. LaBach is chief chemist and has charge of the chemical work. Mr. B. F. Scherffius is chief inspector. The microscopical

examinations have been made under the direction of Professor Garman, Entomologist and Botanist of the Station.

Recommendations.—The present food law of Kentucky is general in its terms. Its provisions are simple and it is one of the best food laws that have been enacted by any of the States. It is effective so far as food products are concerned and we have but little complaint on the part of the manufacturers as to its enforcement. However, it does not apply to drugs and spirituous, vinous and malt liquors. It is a well known fact that drugs and liquors are extensively adulterated and the law should either be amended to cover all substances intended for human consumption, or separate laws should be enacted to apply to both drugs and liquors.

To deal effectively with the lines of inspection indicated in my report and which are of great importance to the people of the whole State, it will be necessary to have a larger appropriation than we are now receiving. The most important, as well as the most beneficient, work of our State is in safe-guarding human life and a careful inspection of the food supply is one of the safe-guards. The people of the State through organizations and individuals are approving the work and demanding still greater work of us. The work should be made thorough and inspections should be made in all parts of the State. This is not only just to the people, but it is only justice to those manufacturers and dealers who comply with the law for us to see that the law is strictly enforced.

The State now appropriates $10,500.00 annually for this work, but we should have at least $25,000.00 annually, and this amount is small compared with the annual appropriations for food control work in many of the States. With the amount indicated and with the co-operation of the United States Government under the Federal law and with the facilities we already have at the Experiment Station, I feel that good and effective work can be accomplished.

Respectfully submitted,

M. A. Scovell, *Director.*

REPORT OF THE DIRECTOR OF THE KENTUCKY AGRICULTURAL EXPERIMENT STATION TO THE GOVERNOR OF KENTUCKY ON THE ENFORCEMENT OF THE KENTUCKY CONCENTRATED COMMERCIAL FEEDING STUFFS LAW.

HON. AUGUSTUS E. WILLSON, Governor,
Frankfort, Kentucky.

Dear Sir:—

Chapter 48—An Act to regulate the sale of concentrated commercial feeding stuffs, defining same and fixing penalties for violations thereof, known as the Feeding Stuffs Control Law, was passed by the last Legislature, and the Director of the Kentucky Agricultural Experiment Station was charged with its enforcement. As Director of the Experiment Station, I submit herewith a report under the operations of the law from June 11, 1906, the time the law went into effect, to December 31, 1907:

Organization.—Immediately after the law went into effect the organization of the work was taken up. Copies of the law and letters of instruction were sent to the various manufacturers and dealers and the trade in the State, giving the provisions of the law and its requirements. Inspectors were sent out from the Station and visited as many of the manufacturers and dealers as possible, explaining in detail the provisions and requirements of the law and the system and plan adopted in carrying them out. Special attention has been given to distributing information and familiarizing the trade with the law. In this connection ten circular letters have been sent out from time to time to the trade and over 2,500 letters have been written concerning different questions arising under the operation of the law.

The Trade in Kentucky.—Before the law was passed, Kentucky was being made a "dumping ground" for inferior and adulterated feeding stuffs. All sorts of adulterants were being sent into the State and mixed with bran, shipstuff, cotton seed meal, corn meal and other feed stuffs. So common had the mixing of feeding stuffs with aduterants become that the Millers' Association took the matter up. They stated that they were compelled to adulterate their products or lose their trade almost entirely, as they could not compete with adulterated products sold as pure feeds. It was reported that as many as three car-

loads of ground peanut hulls were shipped into the State daily, and a number of carloads of corn cob meal were used daily as adulterants to mix with bran, shipstuff, etc. Cotton seed meal, containing fully half cotton seed hulls, was being shipped into the State and sold as pure cotton seed meal.

Adulterants.—The adulterants commonly used were rice hulls, peanut hull meal, corn cob meal and oat hulls. These adulterants were sold to the mixers of concentrated feeding stuffs, or millers, at $6.00 to $8.00 per ton, with the claim that they could be mixed to fully 25% without being detected by the consumer.

An investigation showed that feeds were being sold often bearing misleading names and their prices were no indication of their feeding value. Often feeds were found bearing the same name and widely apart in their feed value. Many of the feeds were adulterated with substances injurious to the health of animals. In Louisville we found mixed feeds composed almost entirely of oat hulls and corn cob meal and cotton seed meal sold as pure to contain 50% cotton seed hulls. In Lexington, cotton seed meal was found to be adulterated to over half its feeding value; and in some cases mixed feed to be made up largely of corn cob meal. In Ashland, wheat bran was adulterated with as much as 40% corn bran and in some instances with 20% to 30% cob meal. This was the case also in Paducah, Henderson, Hopkinsville, Bowling Green, and in most of the large towns in the State. We also found a large amount of inferior and adulterated feed being shipped to the rural parts of the State and especially along the river courses.

Condimental Stock and Poultry Foods.—The sum expended annually in Kentucky for this class of goods amounts to nearly half a million dollars. The prices paid for these goods vary considerably, ranging from a few cents to as much as twenty-five cents per pound. Most every drug store, grocery store and feed store, besides a large number of agents, are offering these preparations to the consuming public.

The term "condimental stock and poultry foods" covers a variety of names of like preparations which are only mixtures of some well known materials—such as shipstuff, or shorts, or bran, or middlings, or oil meal, etc., with a number of simple herbs, roots and ground barks which are claimed to possess medicinal properties; common salt, Epsom salt, sulphur, char-

coal, and sometimes coloring matters are added for their claimed medicinal effects, or to disguise the real composition of the feed. These "foods" are supposed to act as condiments or medicines and are not foods proper and are sold through misrepresentation, under a false name, and with directions for feeding the same which show the claim to be false. The claims made for these feeds are very numerous, and if the "virtue" lying in them is true to the claim made by most of the companies, it will help the animal get the very thing it needs regardless of what that thing is. The diseases that these preparations will cure include all to which animals are subject, and under such conditions it is a wonder that the veterinarians are able to make a living with all the preparations on the market. It is difficult to treat seriously this question of claims made for stock foods, as it does not seem possible that any one could believe them. Diseases of entirely different nature and caused by different conditions in the system of the animal are claimed to be cured by the same remedy. A careful survey of our agricultural literature on the experimental evidence bearing on this question shows conclusively that such claims are extravagant in the least, and in the main are without foundation.

A thorough inspection was inaugurated on this class of feeds the first of 1907, and a number of towns throughout the State inspected. A short time after the inspection had been started, a suit was filed in the United States Court by the International Stock Food Company of Minneapolis, Minnesota, restraining the Director from performing his duty required in the Feed Control Act relative to this class of feeds.

The inspection has been suspended temporarily, pending the decision of the court.

System of Tagging.—The law requires that each package of feeding stuff shall be tagged, showing the number of net pounds of concentrated commercial feeding stuff in the package, the name, brand or trade mark under which the feeding stuff is sold, the name and address of the manufacturer and the guaranteed analysis, stating the percentage of fat and the percentage of protein, and the ingredients from which it is compounded. In accordance with the law, these tags are issued by the Station and to assist the consumer when buying feeds to ascertain the grade of feed he is getting, even without carefully reading the tag, the Station issues three kinds of tags.

First, a manila tag printed in black ink denotes a straight feed, that is, a feed made of one grain only—such as wheat, or corn, or cotton seed.

Second, a manila tag printed in red ink denotes a mixed feed, that is, a feed made of two or more grains—such as wheat and corn, or wheat, oats and corn, or wheat, corn, oats and cotton seed.

Third, a yellow tag printed in black ink denotes that a feed contains an adulterant, or a substance of little feeding value or not classed as a feeding stuff, such as cotton seed hulls, corn cob meal, oat hulls, grit, etc.

Samples Collected.—Three hundred and eighty-one samples have been collected from the different feeds on the market in the State and examined chemically and microscopically and the results reported to the manufacturers, dealers and consumers from whose stock the samples were taken. Practically all of the samples were taken during the year 1907.

Dealers' and Manufacturers' Samples.—To assist the manufacturers and dealers to ascertain the nutrients of their feeds in order to register them for sale in this State, the Station has been making free analyses for this purpose. Eight hundred and seventy-seven analyses of this character have been made. During 1906, 280 firms, and in 1907, 335 firms registered feeds for sale in this State.

Tax Fee.—From June 11 to December 31, 1906, the Station issued 809,184 tags. From January 1 to December 31, 1907, 1,416,418 tags were issued. Under the operation of the law for 1906 were received $7,605.85. For 1907, $13,569.50.

Violation Found.—Of the 381 samples collected, 62 were found to be adulterated. Besides the feeds we found to be adulterated, a large percentage of these feeds was of an inferior quality and in many cases far below guaranty. Many shipments were found untagged, giving no guaranty as to the character of the feed whatever. Often feeds were found misbranded, the tag calling for a high class feed and a certain brand, but on examination proved to be inferior goods and entirely different brand of feed. In many cases the official tags were changed, with pen or pencil, to represent high classes of feeds when the feeds were of a low grade. We found a number of cases where short weights were given, 80 pounds and sometimes as low as 70 pounds were given for 100 pounds.

Violations Reported.—Some sixty violations in Louisville, Paducah, Ashland, Covington, Newport and Hartford have been reported for prosecutions. These violations reported cover, principally, adulterations, misbranding and not tagging goods.

Results Obtained.—Since the operation of the law, the sale of adulterated feed in the State has greatly decreased. It has driven from the market those feeds largely made up of corn cob meal, peanut hull meal, cotton seed hulls and other substances of little or no feeding value. It has also increased the demand for high class feed by the protection that it gives to the consumer under the guaranty required of the manufacturer and dealer. I believe it has also been a great source of education to both the consumer and the manufacturer as to the true value of commercial feeding stuffs.

We have issued a bulletin setting forth the operation of the feeding stuffs law; analyses of inspectors' samples; and registrations for 1907. This bulletin, No. 131 of the Station series, is herewith made a part of this report.

Respectfully submitted,

M. A. Scovell, *Director.*

KENTUCKY

Agricultural Experiment Station

OF THE

State College of Kentucky.

BULLETIN No. 129.

TOBACCO.

1. Selection of Seed Plants and Care of Seed.
2. Improved Methods of Handling the Crop.
3. Elimination of Undesirable Varieties.

LEXINGTON, KENTUCKY.
February 1, 1907.

KENTUCKY
Agricultural Experiment Station

BOARD OF CONTROL.

GEO. B. KINKEAD, Chairman, Lexington, Ky.
D. F. FRAZEE, Lexington, Ky.
C. B. NICHOLS, Lexington, Ky.
J. K. PATTERSON, President of the College.
M. A. SCOVELL, Director, Secretary.

STATION OFFICERS.

M. A. SCOVELL, Director and Chemist.
A. M. PETER, Chemist.
H. E. CURTIS, Chemist, Fertilizers.
H. GARMAN, Entomologist and Botanist.
W. H. SCHERFFIUS, Agronomist.
R. M. ALLEN, Secretary, Food Division.
J. D. TURNER, Secretary.
J. O. LaBACH, Chemist, Food Division.
Miss M. L. DIDLAKE, Asst. Entomologist and Botanist.
S. D. AVERITT, Asst. Chemist.
O. M. SHEDD, Asst. Chemist.
H. WOOSLEY, Supt. Farm Experiments.
Miss LILLIE LISTON, Stenographer, Food Division.
H. W. TAYLOR, Asst. Entomologist and Botanist.
E. C. VAUGHN, Asst. Seed Inspection.
B. R. HART, Asst. Chemist, Feeds.
GEORGE ROBERTS, Asst. Chemist.
E. S. GOOD, Animal Husbandman.
J. W. NUTTER, Asst. in Dairying.
Miss O. L. GINOCHIO, Stenographer.

NOTICE.

The Bulletins of the Station will be mailed free to any citizen of Kentucky who sends his name and address to the Station for that purpose.

Correspondents will please notify the Director of changes in their postoffice address, or of any failure to receive the bulletins.

Address:
KENTUCKY AGRICULTURAL EXPERIMENT STATION,
Lexington, Ky.

BULLETIN NO. 129.

TOBACCO.

By W. H. SCHERFFIUS, Tobacco Expert,

Bureau of Plant Industry, Plant Breeding Investigations, Washington D. C., in Co-operation with Kentucky Agricultural Experiment Station.

INTRODUCTION.

Kentucky has an enviable heritage which is predominant in the various avenues of her economic development; not least of these, is her tobacco industry. Western Kentucky and a considerable district in Western Tennessee centering around Clarksville, comprising the principal area known as the Regie or Dark Tobacco District, produce an article which not only supplies a ready market at home, but also finds its way into the French, German, Italian, and many other European markets.

Central Kentucky comprising principally the area known as the White Burley District, is world-renowned for the quality and quantity of this particular variety of tobacco which it produces.

The natural advantages which these districts possess for the production of tobacco and the variety of uses to which their product is appropriated shows the importance of developing this industry in the State to the highest degree of perfection.

It should be of some interest to the tobacco growers to know into what product most of the Kentucky tobaccos are manufactured. The largest consumption, of both the White Burley and the Dark types, is in the manufacture of plug tobacco,

it being used both as wrapper and filler, depending to some extent on the color, texture and size of the leaf. There is considerable variation in the quality of the tobacco used for plug alone. We find it grading in color from light yellow to mahogany and brown in the Burley tobaccos; and from a pie-bald to a dark red and dark brown, including the heavy Green River filler in the Dark Tobacco District.

Large quantities of Kentucky tobacco are used in the manufacture of smoking tobacco, cigars and snuff. The yellow cured Burley is used largely in the manufacture of cigarettes, plug wrappers and smoking tobacco. The red and brown types from both the Burley and Dark Tobacco Districts, are used largely for plug wrapper and filler. The United States consumes a considerable quantity in the manufacture of plug tobacco, smoking tobacco, low grade cigars and snuff. Great Britain imports large quantities which are used in the manufacture of Birdseye Cutter, Shag, Heavy Cutter, Navy Plug, etc. France imports both the heavy and light types of dark brown tobacco principally for plug tobacco. Italy imports the dark brown, heavy types of Western Kentucky and Clarksville, Tenn. They use it in the manufacture of cigars, smoking tobacco and snuff. The best grades are used for cigar wrapper. The common leaf is used for cigar filler and binder. Poorer grades are used in making smoking tobacco and snuff. Spain imports common and medium grades of lugs from Western Kentucky and uses it as filler for cigars and for smoking tobacco. Germany, second to Great Britain in the importation of Kentucky tobacco, buys Green River filler and the dark brown tobacco of the Clarksville, Tenn., District. They use it principally in the manufacture of plug tobacco and in German spinner. Several other countries of Europe and Africa import Kentucky tobacco in limited quantities.

A comparison of the annual production of tobacco in Kentucky to that of other leading tobacco producing states and also of the total production of the United States, demonstrates very forcibly that Kentucky is destined to be the center of importance in the tobacco industry of the United States for many years to come. Statistics from the Year Book of the Department of Agriculture show that Kentucky produces on the average 267,633,630 pounds

annually, while North Carolina and Virginia, the two next leading states, produce jointly 221,866,435 pounds annually. From these figures it will be seen that Kentucky produces in round numbers 45,000,000 pounds annually more than the combined production of these states. Again, she produces more than one-third of the entire out-put of the United States. She averages 325,948 acres annually, which is more than one-third of the acreage of the entire United States. The average farm value of the tobacco crop in Kentucky for the past six years on December first was $16,439,538, which is double that of any other state and one-fourth of the farm value of the entire tobacco crop of the United States.

Extensive experiments in tobacco breeding have been done in some of the Eastern and Southern States, notably Connecticut, Maryland and Florida, which have resulted in substantial improvements of the tobacco plant. Mr. A. D. Shamel found that plants which had their flowers self-fertilized produced seeds which gave a more vigorous off-spring than were obtained from plants which had their flowers cross-fertilized with pollen from the flowers of other plants within the variety. In two instances he observed that crosses between two distinct varieties gave an earlier germination of seed a more vigorous growth and the property of resisting drought better than either of the parent varieties. His discussion of this subject may be found in the Year Book of the Department of Agriculture, 1905, page 377-392. In all of the experiments that have been conducted on tobacco breeding the results thus far obtained all agree that by complete in-breeding and careful selection of the best parent plants for seed, that a more uniform crop may be had, and the quality and quantity may be materially improved. The very gratifying improvements that have been obtained elsewhere, and the possibility of similar accomplishments in this district, have stimulated the Honorable Secretary of Agriculture to extend the Department's investigations into this territory. It is our purpose to outline in this bulletin a simple practical plan by which the tobacco growers may begin the improvement of their tobacco crop.

SELECTION OF SEED PLANTS AND CARE OF SEED.

Too much stress can not be placed on the importance of using the

greatest caution in selecting and bagging the very best plants for seed. By controling the fertilization of the flowers perfectly, as will be explained in the following pages, one may expect the offspring to have the same general shape, texture, number of leaves, in fact all of the characteristics of the parent plant.

The method of selecting the seed plants and caring for seed as practiced by Mr. A. D Shamel, of the U. S. Department of Agriculture, with experiments conducted in the Connecticut valley, and which we found to be practical and successful in our operations this summer, is as follows: Go over the field carefully before topping time and select quite a number of plants which approach nearest the ideal and continue to do this during the first topping. Label the plants so selected with a tag or strip of cloth, so that they will not be topped by oversight. By this time one will have several times as many heads selected as he will actually need. As the plants develop, undesirable features in some of them will become prominent. For example, one plant might develop a coarse venation and badly crimped leaf; (see plate VIII.); another might develop the condition known as mosaic or french, (see plate IX.). In such cases it is best to top the plants so affected, and prevent them from making seed. This elimination might go on, not only throughout the growing season, but after the crop has been housed, cured and fermented. It will be found that an interesting comparison can be made between the leaves of the different plants as to elasticity, color, texture, weight, and in the case of smoking tobaccos, as to their burning quality. By having the leaves and the seed heads properly labeled, we can take for seed only those which come from the plants having the fewest defects.

Protect the Seed Heads From Cross Fertilization.

Cross fertilization brought about by insects carrying the pollen from one plant to another, is apt to be harmful, in that it has a tendency to break up desirable varieties into many types. It is brought about in the following way: The bees in their search for nectar visit the flowers on a number of plants. As they crawl in and out of the tubes of the corollas, they pass over the anthers which have recently discharged their pollen, the fertilizing element. Some of these fine grains of pollen become attached to their bodies and

are carried to other plants. On entering the tubes of the flowers of this plant, some of the pollen grains that were brought from other plants are brushed off on the sticky surface of the pistil, the receptive part. This starts a growth which fertilizes the ovules at the base of the pistil and the seeds thus produced are a cross. In the case of tobacco, when the pollen is brought from an inferior plant, the hybrid produced will be of an inferior quality. Again, if the pollen is brought from a plant low in vitality, the crop of tobacco grown from them will have a tendency to degeneracy. This can be avoided by protecting the flowers in the following way, as practiced by the Bureau of Plant Industry. Strip off carefully the leaves and suckers from the "crow foot" down some distance. Then, just before the flowers begin to open, (see plate III.), procure some light but strong paper bags about the twelve pound size, such as are ordinarily used at groceries, and slip them down over the seed heads and tie below. See plates IV and V. If we should have a very damp season, there might be some danger of the seed molding in the pods on account of an excess of moisture that is retained in the bag. As a safe-guard against this, it is advised that the bags be punctured with a sewing machine needle to admit the passage of air.

For the first few days after the bags have been placed around the heads, they must be slipped up frequently to accommodate the rapid growth of the stalk of the seed head. It is desirable, though not necessary, to occasionally remove the paper bags and shake out the withered flowers, then replace the bags as before. It has usually been the custom of experimenters to allow the bags to remain over the heads till and after harvesting the seed; though splendid and possibly better results were obtained at the Kentucky Station by allowing the bags to remain over the heads only about five weeks, which gave ample time for a good number of pods on each head to set seed. Then the bags were removed permanently permitting the pods to mature in the sun-shine and other natural conditions. After this, it is important to watch the seed heads closely and pinch off any flowers that may come, otherwise, one might get some cross-fertilized seed in the pods developed after the bags were removed.

Male and Female In the Tobacco Plant.

The fact that there are male and female in every species of plant

life, just as there are in the animal kingdom, makes it important that the farmer familiarize himself with these conditions, which are of such vital importance, and understand their absolute necessity and relation to plant life. He will then be prepared to intelligently control the breeding and improve the crop. There are a number of methods of reproduction in many of the lower forms of plant life, which need not enter into this discussion. But that large class known as the Angiosperms or flowering plants, to which tobacco belongs, might be divided into those which have the male and female parts on separate plants, those having the male and female parts in separate flowers on the same plant and those having both male and female in the same flower. In hemp, for example, some of the plants are staminate only, and others pistilate, i. e. some of the plants have only the male parts and others have only the female parts In the case of the corn plant the male side of the family is the tassel, while the silks represent the female. The tobacco plant has both the male and female in the same flower.

The tobacco flower, which should be familiar to every tobacco grower, may be separated into four parts, namely: the calyx, corolla, stamens and pistil. The calyx is the green covering over the ovary and base of the corolla and is about one-third the length of the corolla. It serves as a covering which is probably some protection to the ovary during its development into a seed pod.

The corolla is a peach blossom colored tubular envelope about two inches long which serves as a protection to the essential organs, the stamens and pistil.

The stamens are usually five in number, which form a circle around the pistil. Each stamen is composed of a filament or stalk, which is attached to the inner surface near the base of the corolla, and a small organ somewhat the shape of a grain of wheat at the apex of the filament, (see plate II.), which is the anther and represents the male side of the tobacco plant. The fertilization is accomplished by the anthers dehiscing or opening and discharging the fine dust like substance called pollen on the crown or female part, the pistil. This starts a growth which goes down the stem of the pistil to the enlargement at the base and sets the seed pod.

The pistil consists of the stigma, style and ovary. (See plate II.).

The stigma is the enlargement at the apex of the pistil, the surface of which is moist, rendering it receptive and retentive of the grains of pollen which fall on it and start the growth that fertilizes the ovules in the ovary. The style is the stem connecting the stigma and ovary. The ovary is the enlargement at the base of the pistil which contains the ovules or rudimentary seed.

In plate III., (a) shows a flower that has been opened and the stamens cut out to expose the pistil. (c) shows a flower that has been opened and the pistil taken out showing the anthers in position. Though these organs are small, by using the magnifying glass, one can see a difference in the appearance of anthers before and after dehiscence. (See plate II.).

Control the Breeding.

Sometimes it is desirable to introduce new blood, or fix a new and improved type of tobacco by hybridization. This can be accomplished successfully only by affecting the cross by hand. To illustrate: three years ago Dr. M. A. Scovell conceived the idea that he might develop a cigar wrapper by introducing into the Standup Burley some Sumatra blood. This was done by allowing flowers to develop under bag on both Standup Burley and Sumatra plants. Before the female part of the burley plant was ready for the pollen dust, the anthers, or male parts, were clipped out with a pair of scissors. About two days later, when the pistil or female part was ready to be fertilized, anthers, or male parts, were taken by hand from the Sumatra flowers and dusted on the crown of the Burley pistil. Seed pods were successfully set, giving a cross, the seed of which were one-half Standup Burley, and one-half Sumatra. The hybrid obtained from this cross, though not very promising the first year, showed a decided improvement in the second crop. See leaves on plate X.

This proposition of crossing varieties is a rather dangerous one for farmers to practice, especially where hired help is used. If the seed from one of those heads that have been crossed should get mixed with the rest of the seed to be sown, one might have an almost endless task to get rid of a lot of nondescript types that might develop. Therefore, it is advisable if any farmer should attempt to do hy-

bridizing, that he exercise the greatest caution to keep those heads separate from the remainder of his crop.

Seed Separator.

The importance of good seed in every crop has been demonstrated so often that every farmer should know that it pays him well to plant only the best. Tobacco is no exception to this rule. It has been demonstrated here and elsewhere, that the lack of uniformity in the size of the plants in our tobacco fields is largely due to poor seed. Light, chaffy seeds that are low in vitality, give us plants that are weaklings with slow growth. Various schemes for separating the light from the heavy tobacco seed have been suggested, but the most satisfactory and thoroughly practical method is by means of a piece of apparatus introduced by the Bureau of Plant Industry (see plate I.) and a current of air which is generated with the foot bellows as shown in the cut. The air passes through the rubber tube, then through the valve, which can be regulated to admit of the passage of the desired amount of air, to accomplish the best separation. The air passes up through a piece of half-inch iron tube, thence through a larger glass tube and out at the top, carrying with it the light, chaffy seed. At the base of the glass tube, which is about an inch in diameter, and five or six feet long, is a metallic joint which has a piece of fine wire gauze in it to prevent the seed from falling into the valve below. Using about an ounce of seed for each charge, only a few minutes are required to separate a considerable quantity.

This piece of apparatus can be made by most any mechanic, or it can be purchased from any chemical supply house. Every community should own one of these machines for the benefit of its farmers.

IMPROVED METHODS OF HANDLING THE CROP.

This topic is of such magnitude that we deem it expedient at this writing not to go into detailed discussion of this phase of the subject. But, by making some comparisons of methods of handling the tobacco crop which are in vogue in different sections of the

state, our readers will see the need of improvements which will be for the betterment of the industry.

Although the white burley and dark tobaccos are different types, the same general methods employed for handling the crops are similar. It is desirable, and usually the custom, to select a piece of virgin soil for a seed bed. During the winter or early spring it is heated to a depth of two or three inches, by burning brush, wood or similar material on it, to kill any weed seeds that would germinate and hinder the growth of the young tobacco plants. After the plot of ground is cool it is then dug up, slightly raised into beds, raked and put in good condition for the seed. Although the cultural methods and mechanical manipulations of seeding, canvassing the beds, transplanting, cultivation and housing, are adjusted to suit each locality, they are all carried out on the same general plan. There is often from two to two and one-half times as much Burley tobacco set on the ground as is put on the same area in the Dark Tobacco District.

Burley tobaccos are transplanted in rows about four feet apart one way, and usually drilled the other way, standing from eighteen to twenty-four inches apart in the drill. The sand or ground leaves are usually left on the plants throughout the season. The plants are topped to about twelve to fifteen leaves, depending on the vigor of the plant, which is governed to some extent by the inherent qualities of the plant and also by soil and climatic conditions On account of the burley tobaccos being air-cured they are capable of absorbing a little more moisture than fired cured tobaccos, which gives it an advantage for making certain plug tobaccos. The tobaccos of the Dark Tobacco District are usually transplanted in checks which are about four feet apart each way. The ground leaves are ordinarily taken off at topping time. The plants are topped to eight to twelve leaves. After the tobacco has been housed for three or four days, and has commenced to yellow nicely, slow fires are started under it, beginning with sawdust or other material which will not produce much heat. The temperature is gradually raised till heavy firing drives the moisture out of the tobacco stems and stalks. This is the product which meets the demands of the European market.

Paris Green.

It has been our observation and experience for the past few years, that by the use of Paris green the destruction by worms has been greatly reduced in those fields where it has been applied. The most successful method of applying it is by dry spray. Wet spray has a tendency to form puddles in the pockets on the leaves and make damaged spots. Frequently fields of tobacco are damaged by too heavy an application of Paris green, and often whole leaves are ruined by such application. It is a risk to put Paris green on the tobacco after the first suckers have been taken off. In that case the rain frequently washes it down on the sores or fresh wounds made by removing the suckers and is readily taken into the sap of the plant. This causes rot to set in and many of the leaves to drop off. If a person is going to use Paris green, it is best to make light applications and make them often, using from one-half to one pound to the acre depending on the size of the tobacco, and to be cautious about using it after taking off the suckers. Care should be taken in the handling of Paris green. Avoid getting much of it on the skin as it is very poisonous. Some people object to the use of it, fearing that enough might remain on the tobacco to poison the consumer. While the amount of poison in Paris green, which remains on tobacco, is only equal to a very small per cent of the amount of poison in the natural composition of tobacco in the form of nicotine, we are hardly justified in reaching the conclusion that no harm can come from it. For this reason, as well as those already mentioned, it is important that we exercise great caution in its use.

Cutting and Housing.

Improved methods of handling and housing the crop will greatly reduce the percentage of damaged and broken leaves. To illustrate: Plate XI shows a load of green tobacco in a very desirable frame for hauling it to the barn, and a decided improvement over the common crude way as shown in Plaate XII. which is practiced in some localities in our State.

There is a gradual improvement in the construction of our tobacco barns. Some attention is being given to ventilation and

protection against snow and rain, but there is still room for greater improvement. Plate XIII shows a typical old log barn still in use in some of the rural districts. Plate XIV. shows a frame barn which is an improvement over the log barn, but which has poor ventilation. Plate XV. shows a modern barn with a splendid system of ventilation.

House-burn.

It is generally known that poor ventilation, especially during warm wet seasons, encourages house-burn. It is, therefore, important that we construct our drying sheds and barns so that they will give us the very best ventilation. Experiments have been commenced by the Director of the Kentucky Station, in a specially prepared drying shed, to ascertain at what temperature and humidity burley tobacco will cure to give an article free from house-burn. The shed is composed of eight chambers which were constructed so as to apply independently of each chamber, heat, moisture and air, or, to apply at will, either one, any two or all three of them at once. On September the 28th all the chambers were filled with tobacco and the experiment started as is indicated in the accompanying table. On October 3rd a disagreeable odor was noticed in compartment No. 8. On October 4th a trace of house-burn was discovered in No. 8. On October 5th both No. 7 and No. 8 showed house-burn, No. 8 being badly affected with it. On the same date about 10 degrees of dry heat were applied to both No. 7 and No. 8 for an hour or more which completely stopped the house-burn. In those chambers where heat was continually applied no house-burn developed. It was observed that where considerable heat was applied, increasing the temperature from 100 degrees to 120 degrees Fahrenheit, that the tobacco cured with a greenish cast. This was improved by applying moisture at the same time. These experiments were only commenced last season and will be continued next fall, with the hope that we may be prepared to offer a practical remedy for house-burn. The accompanying table gives the tabulated record of the experiment. Mr. H. Woosley should be given credit for carrying out the details of this experiment.

Table of Records taken in House-burn Experiments.

DATE 1906	No. 1 Moisture No Forced Air		No. 2 Moisture and Forced Air		No. 3 No Moisture No Forced Air		No, 4 Moisture No Forced Air		No. 5 Moisture and Forced Air		No. 6 Moisture No Forced Air		No. 7 No Moisture Forced Air		No. 8 Ordinary Temperature Forced Air	
	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Mnximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
September 29	98°	74°	108°	65°	102°	72°	106°	70°	92°	72°	Attempted to keep same temperature as No. 5. No record kept		Temperature of out doors the same as No. 8.		90°	70°
" 30	102	68	108	66	104	66	104	64	94	63					68	55
October 1	114	70	111	60	114	66	98	62	100	66					71	56
" 2	114	72	111	64	116	70	100	62	92	66					85	70
" 3	116	72	116	66	118	72	112	64	110	68					93	69
" 4	114	72	116	68	424	72	124	70	114	72					89	69
" 5	122	60	124	62	121	60	121	60	125	69					81	63
" 6	120	50	124	52	118	46	118	48	120	60					69	51
" 7	124	62	108	44	118	46	131	48	120	62					82	51
" 8	124	61	110	52	118	54	128	58	108	61					77	66
" 9	120	45	112	40	114	42	118	44	112	40					63	45
" 10	120	34	116	32	120	32	118	34	110	34					66	36

ELIMINATION OF UNDESIRABLE VARIETIES.

There is some question as to whether Broad-leaf Stand-up Burley, Hanna's White Burley, Red Twist Bud, etc., should be regarded as varieties of White Burley tobacco or only as types of the original Brown County, Ohio, White Burley. In this discussion we have chosen to speak of them as varieties. There are a dozen or more varieties of Burley tobacco with physical characteristics predominant, grading from a rather narrow leaf drooping plant to a broad leaf stand-up plant. The same may be said of the dark tobacco in Western Kentucky and Tennessee. See plates VI., VIIA. and VIIB. In the White Burley District, we have varieties known as Red Twist Bud, Broad-leaf Stand-up, Hulett's, White Twist Bud, Narrow-leaf, Hanna's, Hope's Stand-up, Renacher's Stand-up, etc. In the Dark Tobacco District, there are varieties known as Little Mammoth, Yellow Pryor, Blue Pryor, Little Yellow,, Bunch Talley, Improved Bunch Talley, One Sucker, Boyd, Thickset, Madole, Oronoco, etc. These varieties have, no doubt most of them, taken their names from some physical characteristic of the plant or from some man who has given some attention to developing by selection certain features in the growth and habit of the plant. With such a great number of varieties of tobacco grown and even the variations within the variety, there is ample opportunity for one to substantially increase his net earnings by judiciously selecting the variety of tobacco to plant. This is forcibly illustrated in the variety tests made on the Experiment Station farm last season. With eleven varieties of White Burley grown under as near uniform conditions as were obtainable, the maximum estimated yield for a variety was 2137 pounds per acre. The minimum estimated yield was 1479 pounds per acre, giving a difference of 658 pounds per acre. It is important that one should not lose sight of the improvement of the qualty in his attempt to increase the yield, since they are both obtainable. These extreme variations both as to quality and yield impress us with the importance of improving the better varieties and eliminating the poorer ones until we approach a uniform type, giving an article which is of greatest demand.

021169

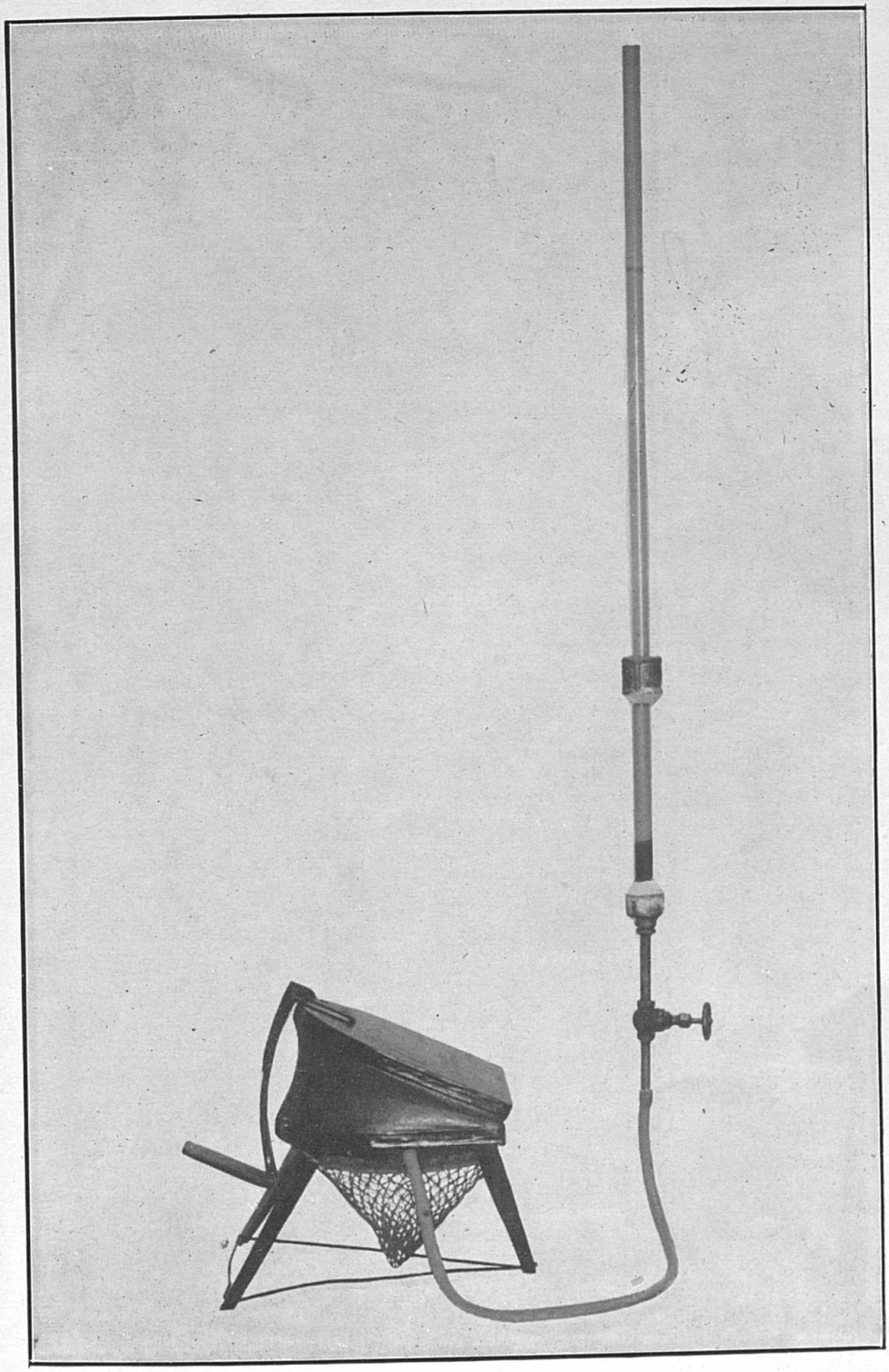
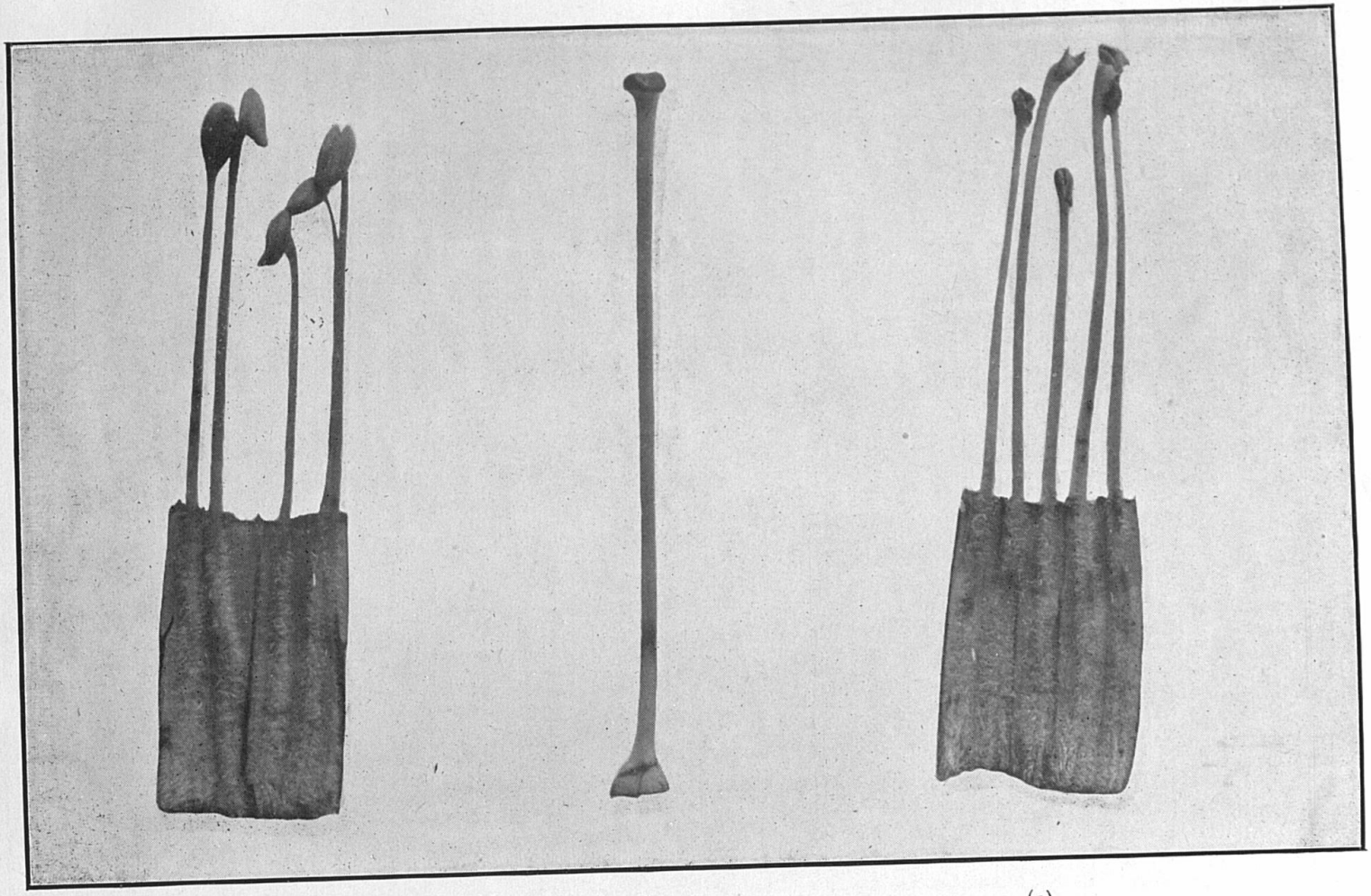


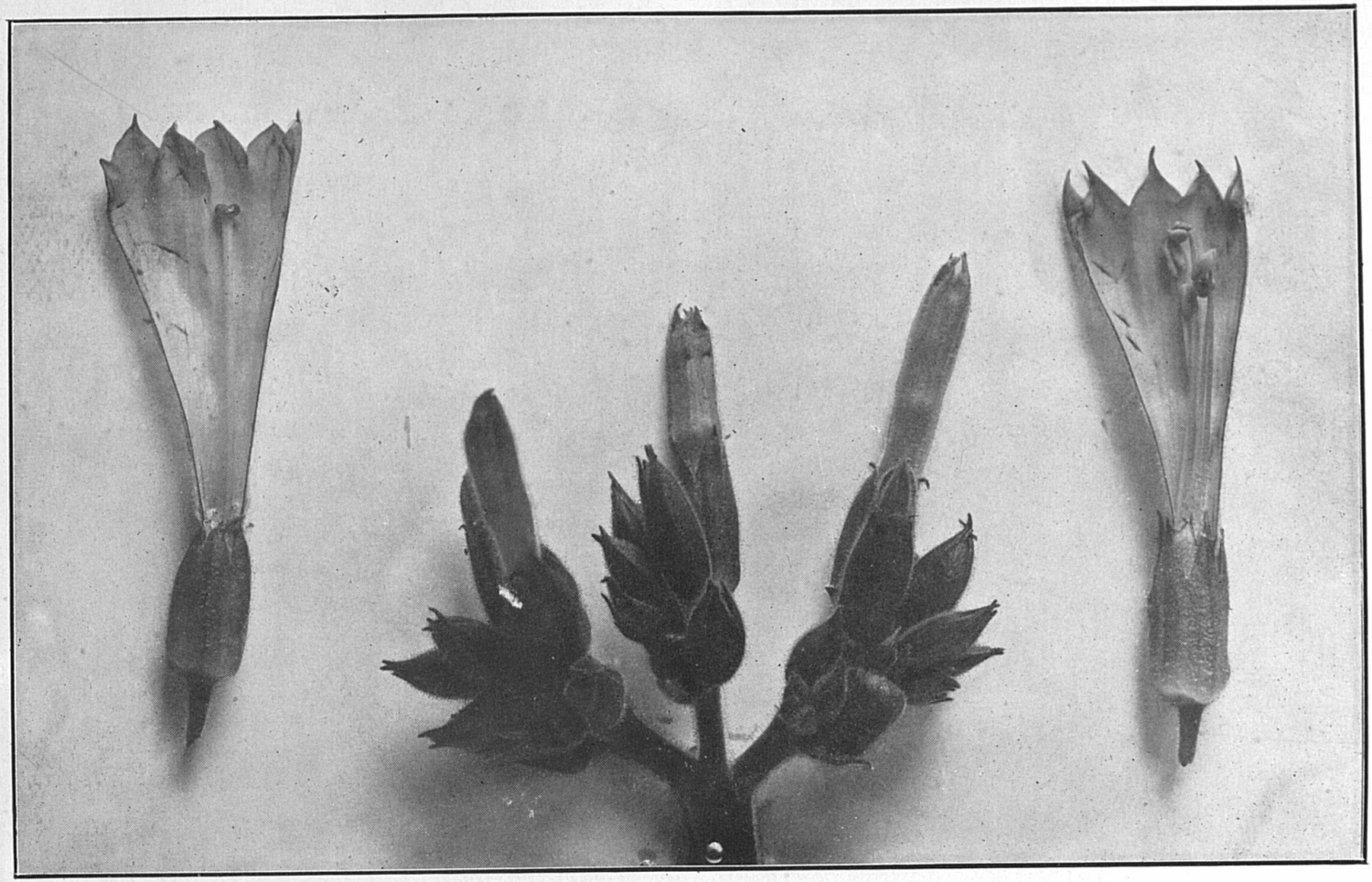
PLATE I.
Tobacco Seed Separator, for Grading Seed.



(a) (b) (c)

PLATE II.

(*a*) Anthers before dehiscense.
(*b*) Pistol showing stigma, the enlargement at the apex.
(*c*) Anthers after dehiscence.



(a) (b) (c)

PLATE III.

The flower (*a*) has the anthers cut out leaving the pistil in position, exposed. The one indicated by (*c*) has the pistil cut out leaving the anthers in position, exposed. The center figure (*b*) is a seed head ready for bagging.



PLATE IV.

Plant of Stand-up Burley, Showing Method of Saving Seed under Bag to Prevent Crossing.



PLATE V.

Field of Stand-up Burley Showing Seed Heads under Bag.



PLATE VI.
A Field of Typical White Burley.



PLATE VII A
A Field of Typical One-Sucker.



PLATE VII B.
Plant of One-Sucker, Showing Long Narrow Leaves.

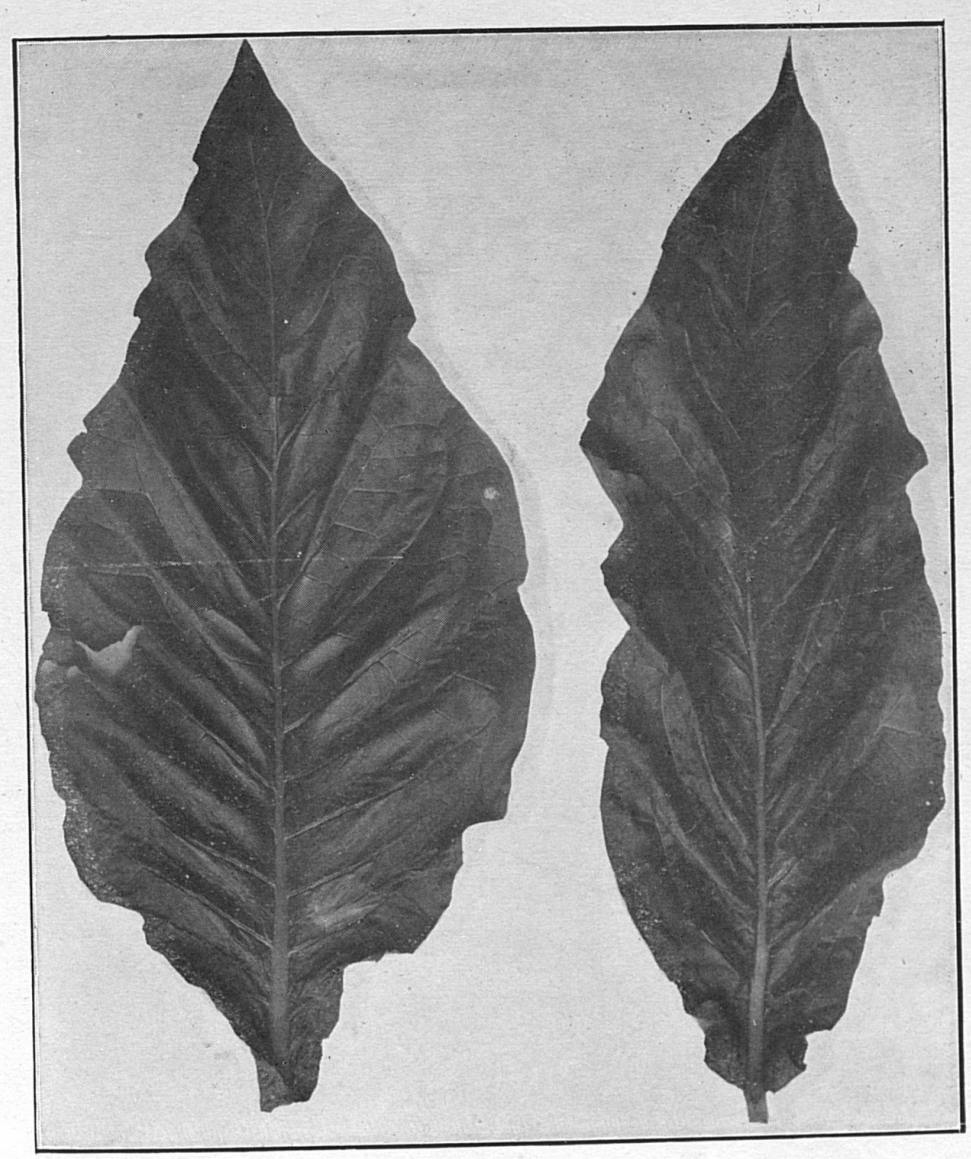


PLATE VIII

Badly Crimped Leaves. They Render a Plant Undesirable.

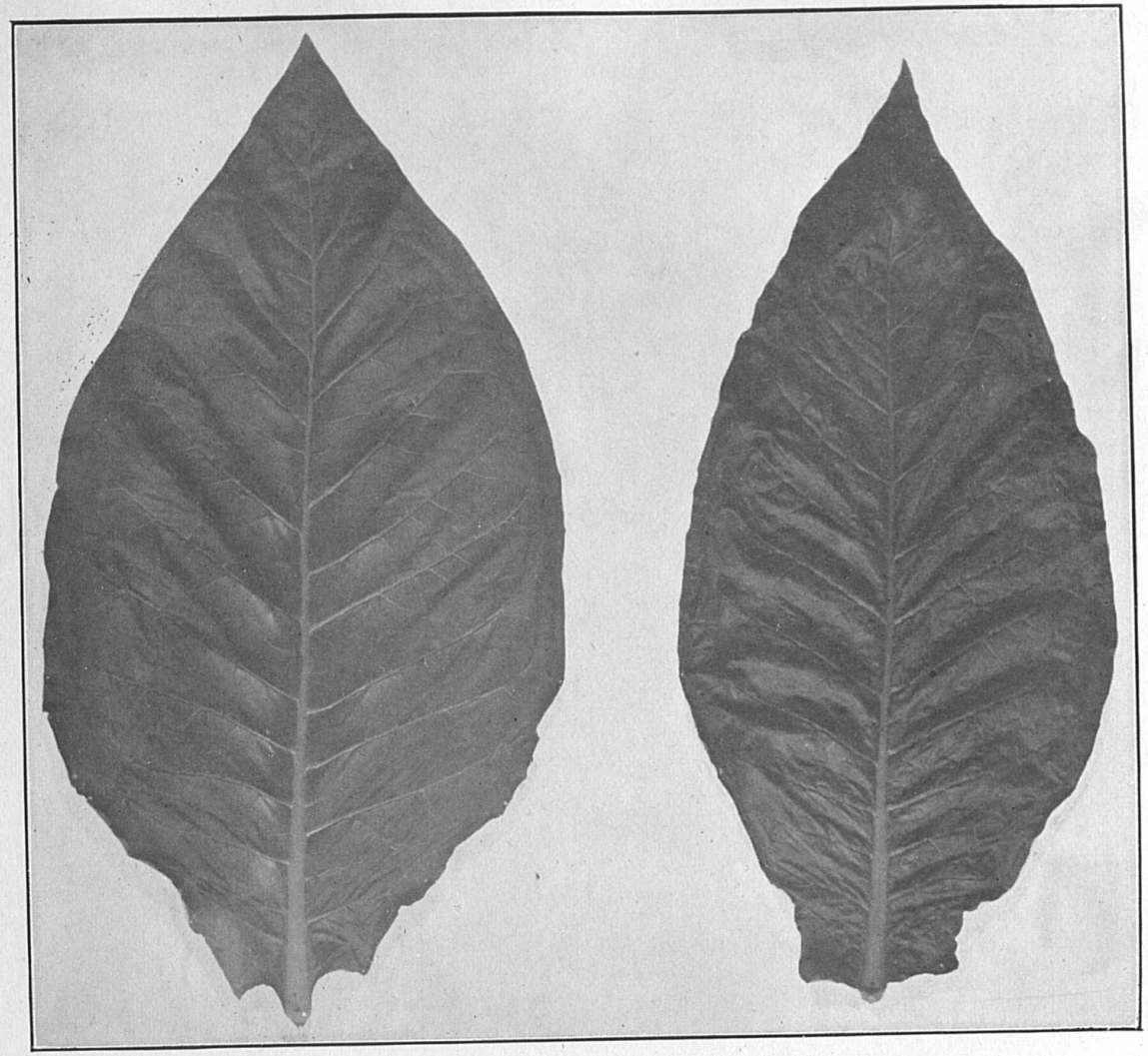
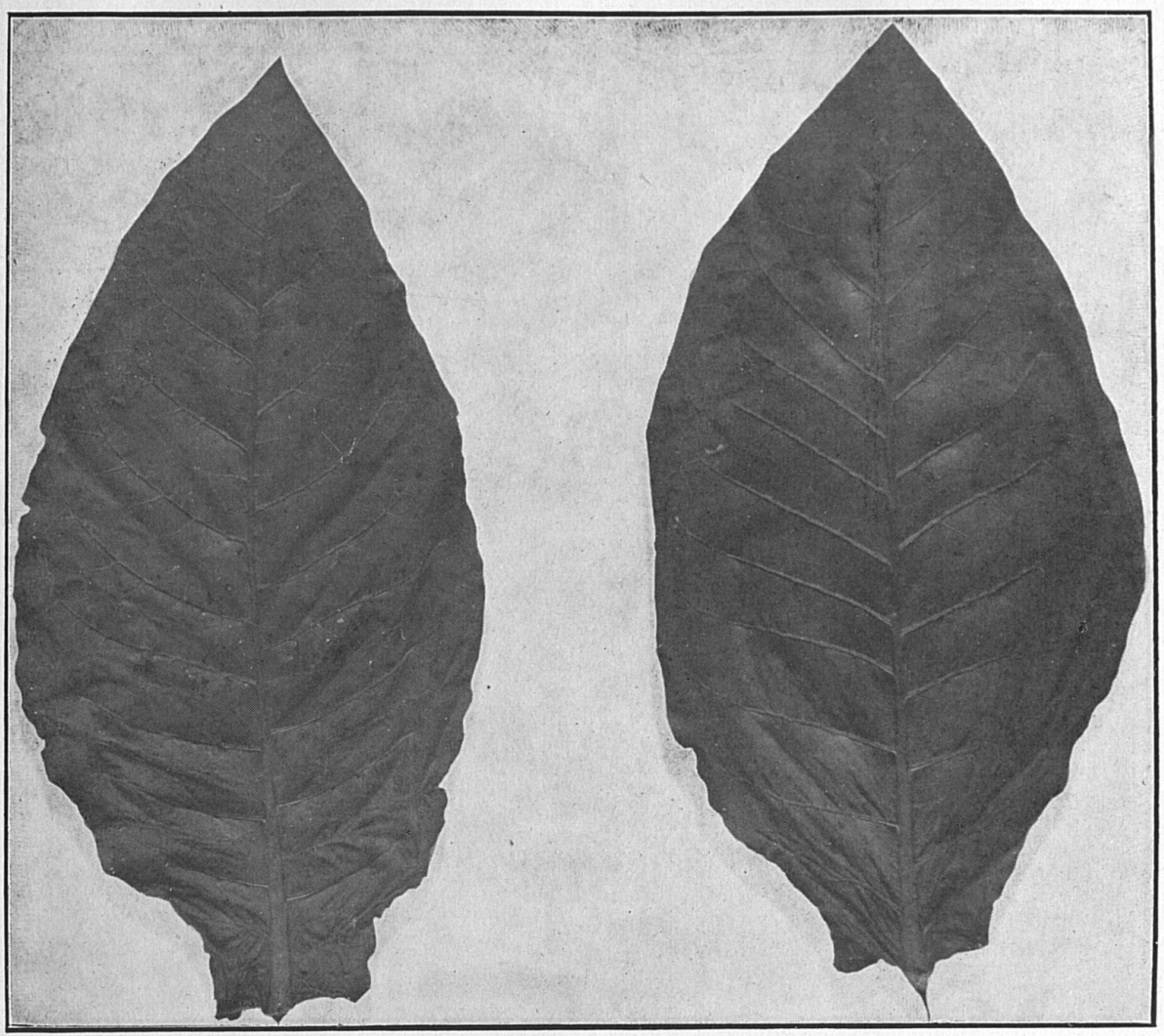


PLATE IX.

Two Leaves from Plants of Stand-up Burley. (a) (a) is a Well Shaped Leaf. (b) (b) is Badly Affected with Mosaic or French.



(a) (b)

PLATE X

Leaves from two hybrids. (*a*) is a cross between stand-up Burley and Sumatra. (*b*) is a cross between Stand-up Burley and Connecticut-Havana.

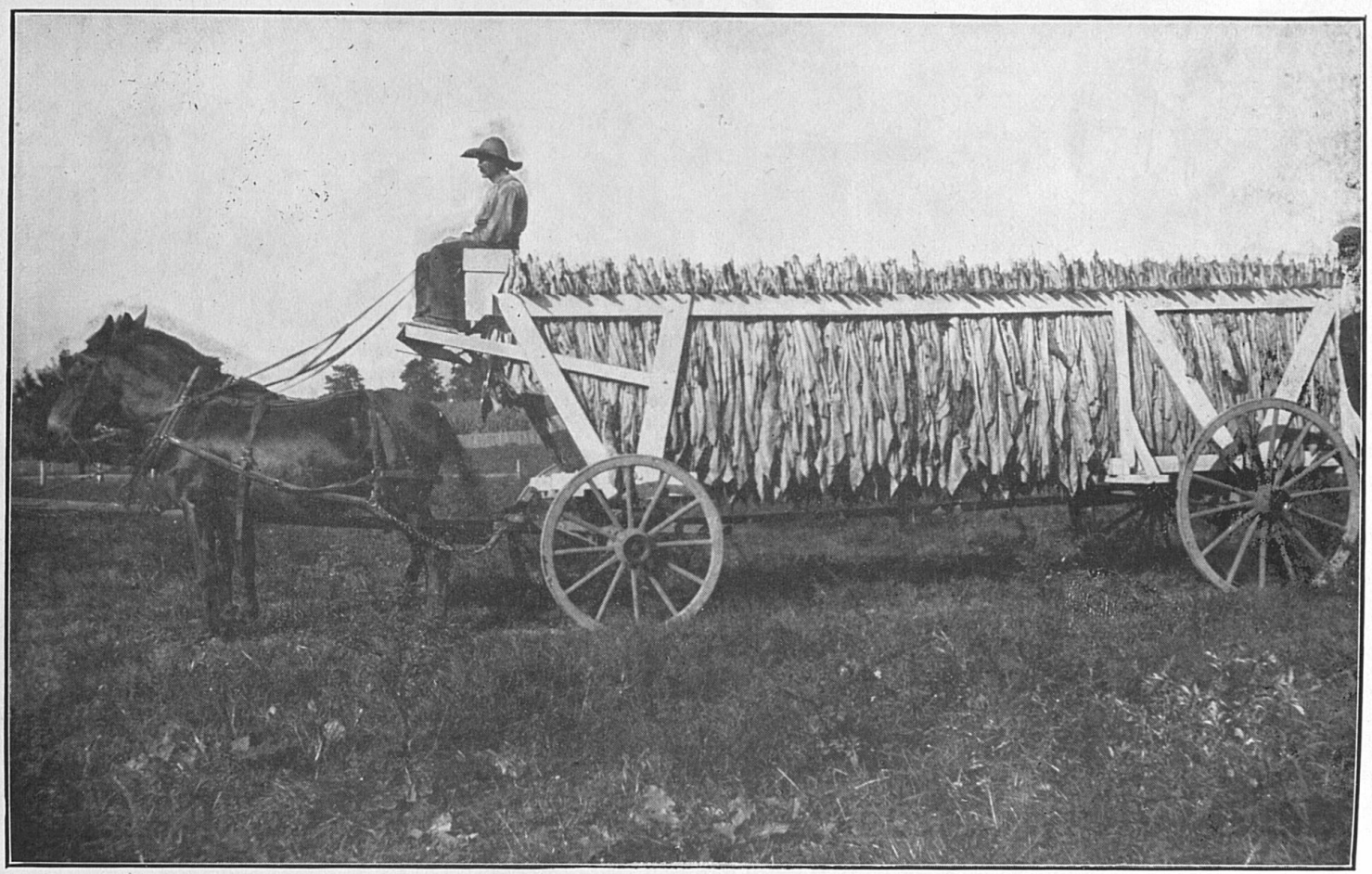


PLATE XI.
A Good Frame for Hauling Green Tobacco.



PLATE XII.

A Poor Method of Hauling Tobacco, which is Practiced in Some Communities.

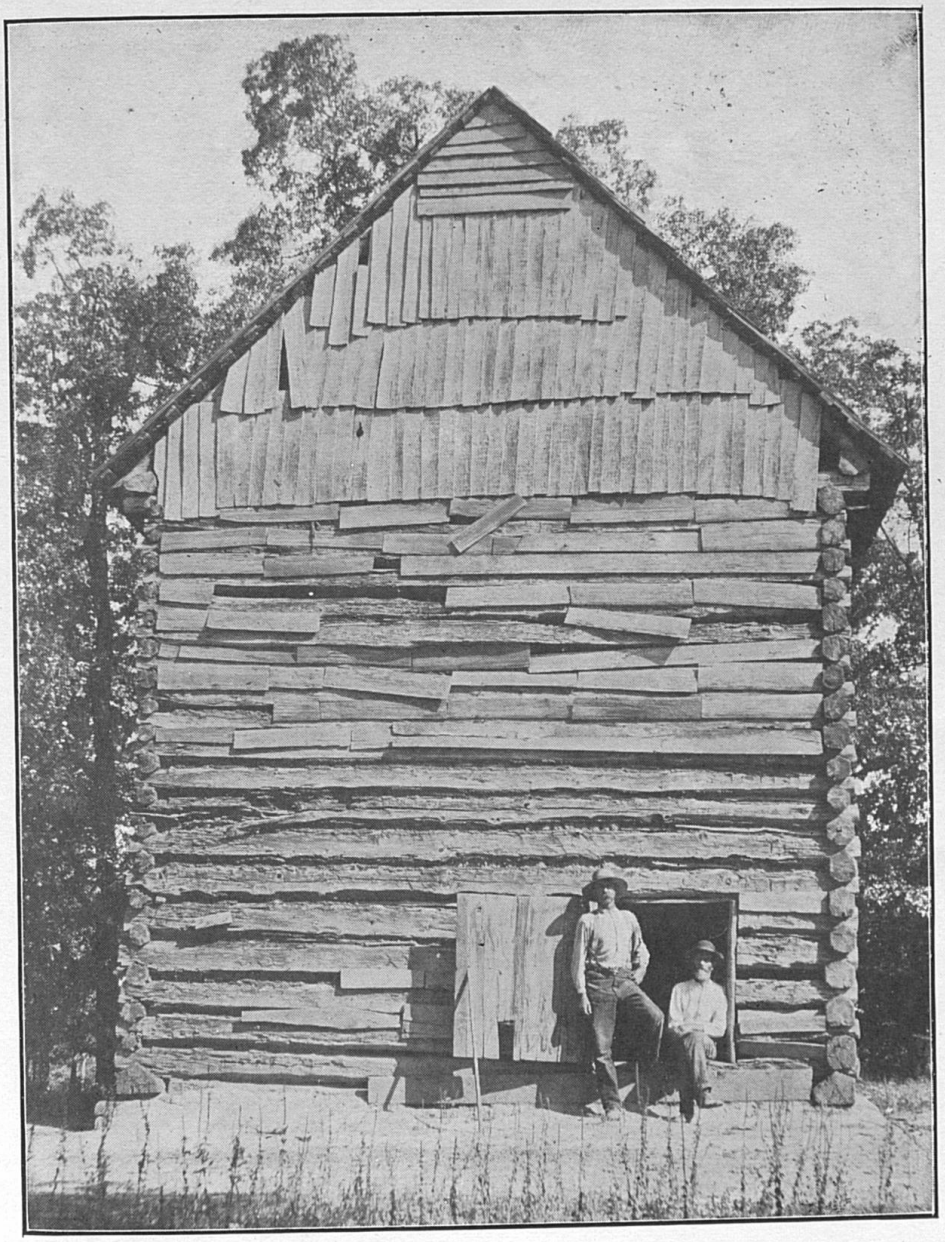


PLATE XIII.

A Typical Old Log Barn, still in use in some of the Rural Districts.

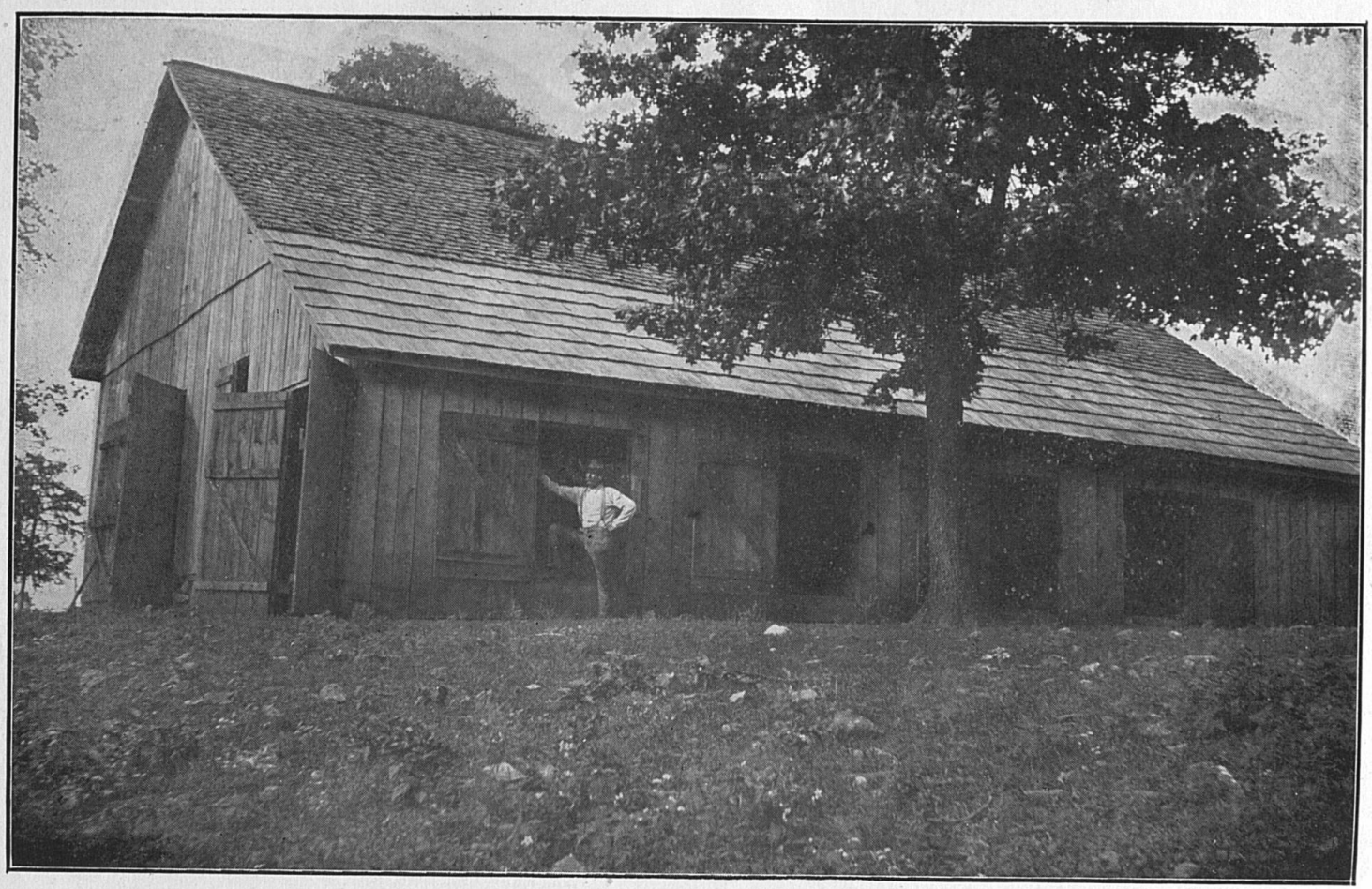


PLATE XIV.
A Good Tobacco Barn, but Poorly Ventilated

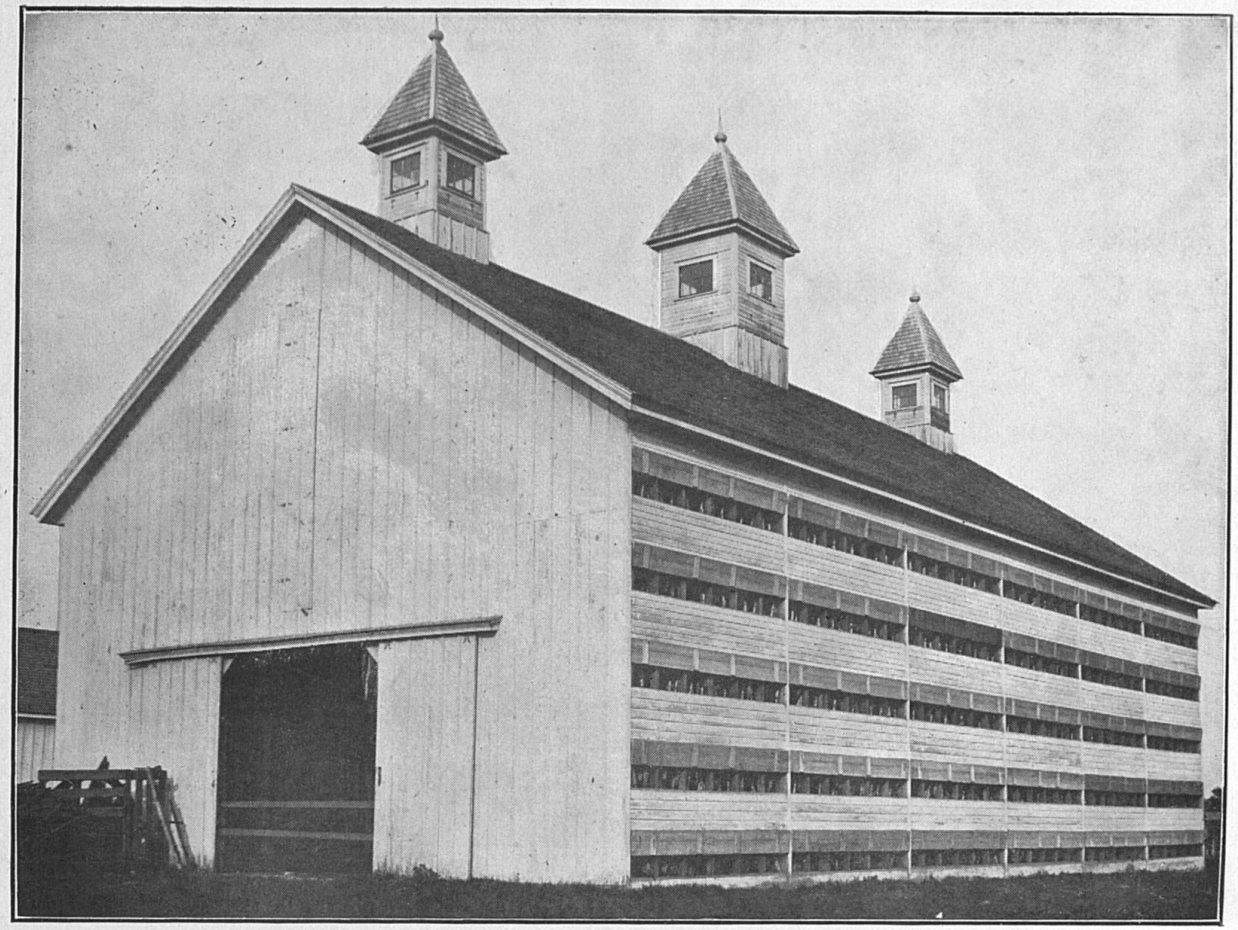


PLATE XV.
A Tobacco Barn with Good System of Ventilation

KENTUCKY

Agricultural Experiment Station

OF THE

State College of Kentucky.

BULLETIN No. 130.

---

1. The Food of the Crow Blackbird.
2. The Corn Root-worms.

LEXINGTON, KENTUCKY.
June, 1907.
17

KENTUCKY

Agricultural Experiment Station

BOARD OF CONTROL.

GEO. B. KINKEAD, Chairman, Lexington, Ky.
D. F. FRAZEE, Lexington, Ky.
C. B. NICHOLS, Lexington, Ky.
J. K. PATTERSON, President of the College.
M. A. SCOVELL, Director, Secretary.

STATION OFFICERS.

M. A. SCOVELL, Director and Chemist.
A. M. PETER, Chemist.
H. E. CURTIS, Chemist, Fertilizers.
H. GARMAN, Entomologist and Botanist
W. H. SCHERFFIUS, Agronomist.
R. M. ALLEN, Secretary, Food Division.
J. D. TURNER, Secretary.
J. O. LaBACH, Chemist, Food Division.
Miss M. L. DIDLAKE, Asst. Entomologist and Botanist.
S. D. AVERITT, Asst. Chemist.
O. M. SHEDD, Asst. Chemist.
H. WOOSLEY, Supt. Farm Experiments.
Miss LILLIE LISTON, Stenographer, Food Division.
H. W. TAYLOR, Asst. Entomologist and Botanist.
E. C. VAUGHN, Asst. Entomologist and Botanist.
B. R. HART, Asst. Chemist, Feeds.
GEORGE ROBERTS, Asst. Chemist, Fertilizers.
E. S. GOOD, Animal Husbandman.
J. W. NUTTER, Asst. in Dairying.
Miss O. L. GINOCHIO, Stenographer.

NOTICE.

The Bulletins of the Station will be mailed free to any citizen of Kentucky who sends his name and address to the Station for that purpose.

Correspondents will please notify the Director of changes in their post-office address, or of any failure to receive the bulletins.

Address:
KENTUCKY AGRICULTURAL EXPERIMENT STATION,
Lexington, Ky.

BULLETIN No. 130

I. THE FOOD OF THE CROW BLACKBIRD.

— BY —

H. Garman, Entomologist and Botanist.



Fig. 1. – The Crow Blackbird or Purple Grackle (*Quiscalus quiscula*). From Division of Biological Survey, U. S. Dep. Agr.

While not more common than several other birds in Kentucky, the Crow Blackbird from its habit of assembling in large flocks is one of the most conspicuous and generally known of the birds occurring in the State. It spends much of the time from March or late February, when it

appears here, until November, when commonly it retires a little farther south, in flocks which forage in the fields and gather each night with others, forming immense assemblages, to roost in evergreens about farm houses or at the edges of cities. The period during which this flocking habit is suspended comes in May and June. During the latter month, the birds become so shy that it is difficult to get specimens, though at most other times they may be secured in large quantities. It has come to be a custom for gunners about Lexington to lie in wait for the birds as they approach their roosts in the evening and shoot them for food. Thousands are thus disposed of, yet the birds persist in gathering year after year at the same places, and thus seem destined to final destruction.

One of the largest gatherings in the suburbs of Lexington is in a clump of evergreens on the premises of Judge James Mulligan. From this roost each morning during the flocking period go out thousands of birds, and as regularly each evening they return and after making for a time a tremendous clatter settle down among the evergreens. Most or all of the birds roosting here fly southward to forage during the day. In going to and from the roost, many pass over the Station building, and their constant movement to and fro has for several years impressed me with the important part they play in the agriculture of the surrounding country. If, as I have been led to suppose, they are largely graminivorous and feed upon crops in the fields, they may be a very great burden to the farmers of this and adjoining counties. If, on the contrary, they are in any degree insectivorous and their vegetable food is waste grain and seeds, they must from their great numbers and long sojourn with us each year be effective agents for the suppression of insect pests.

Our game law enacted in 1902 forbids the killing of all "song birds" except when engaged in destroying crops, but permits at all times the shooting of English sparrows, crows, Crow Blackbirds, and some others, the assumption being

that these birds are in the main destructive and not worthy of preservation. I have had no doubt about the evil character of the English sparrow. Its perniciousness in fouling the roofs and gutters of buildings from which rain water is collected, by which it becomes a serious menace to health, would warrant its destruction if it were otherwise beneficial. But here in Bluegrass Kentucky it is, besides, exceedingly destructive to ripening wheat, continuing its attacks on this grain after it is in the shock with a pertinacity that even constant watching with a shotgun in hand does not daunt. Whole crops near cities would undoubtedly be completely devoured by it, if no measures were taken to prevent. About the crow I have felt more doubt, but the testimony of good farmers and careful observers well known to me is mostly against it, and perhaps the law decreeing its destruction is a just one.

My chief doubt has been about the assumed mischievousness of the Crow Blackbird. I was willing to believe it as destructive to grain as had been claimed, in sections of the country with which I was not very familiar; but observation made here both by myself and by farmers tended to give it a good character, and it was with the idea of getting a more reliable foundation for judgment with special reference to this locality that it was decided in the fall of 1905 to have examples collected each month for a year and make a study of the stomach contents. This was done, beginning in November, 1905, and ending in October, 1906. I should have felt some compunctions about having the bird shot even for such a purpose were it not that it seems very likely to be exterminated in a short time by gunners in Kentucky, if our law permitting its destruction is not amended.

In considering the food of a bird, it is not enough to determine merely the relative bulks of insect and vegetable food. After this is done the question confronts us as to the bulk of one constituting an equivalent for a given bulk of the other. Equal bulks of grain and insect food in stomachs do not necessarily imply that a bird is neutral in value. The

grain eaten may be the more valuable of the two, or the reverse may be true. Seventy-five, eighty-five, or ninety-five per cent. of grain food would not show beyond question that the bird is injurious, and this is so even if all the grain were taken from crops. In short, everything depends on the character of both the vegetable and the insect food. If the grain eaten has no value to the farmer, the bird should be acquitted of wrong doing at once, even though it eats very little insect food or none at all. If some portion of the grain has a value, the questien as to the usefulness or injuriousness becomes more difficult, for it is essential before a perfectly satisfactory conclusion can be reached, to know what proportion of the vegetable food is of value and what ratio this value bears to the value of the insect food.

These ratios are of such character that they can only be determined finally, if at all, by the joint work of the botanist and entomologist, and it is not with any thought of rendering judgment as to the value of this bird for the whole country that I am publishing the data given below, but rather to reopen the question for Kentucky and claim for the Crow Blackbird more careful consideration than it has received; for I am well satisfied that it has not in this State received exact justice at our hands, and that its case is at the least entitled to a rehearing.

The seeds eaten by the Crow Blackbird are generally of a rather large size. It does not feed at all largely on weed seeds, and indeed does not eat a great variety of seeds of any sort. Probably it did so before the period of extensive grain fields. At present it shows a special fondness for four or five seeds the rest being eaten only occasionally and seemingly when chanced upon. Corn among grains is the chief food. It is eaten from spring to fall whenever it can be found. Yet I never saw a complete grain in a stomach, every one having been broken into bits either by the stout beak of the bird or by some other agency before it was eaten. Wheat is next to corn as an element of the food, and here again the grain is always broken, as is rye, which is some-

times found in stomachs. Other smaller seeds are often devoured whole, and are then easily determined. Among these hemp and sorghum seed are frequent. The only weed which appears to be more than an accidental element is pigeon grass (*Chætochloa glauca*) which was several times found among the food. There is nothing in the food as seen in the stomach to demonstrate that any of it was taken from growing crops or from shocks of grain, and from observation of the birds while feeding, I am sure that much of it was picked up in the fields and by roadsides, for the bird is so far as its grain diet is concerned a gleaner rather than a marauder.

Any one familiar with insects would know at once from examining the contents of stomachs of this blackbird that it fed chiefly or wholly while on the ground. The remains of sod-infesting insects are frequent among the food. But unfortunately the insects eaten are broken up into fragments so small that it is generally very difficult to do more than determine the orders or families to which they belong. This makes a satisfactory estimate of the value of the insect food more difficult than it is with many other birds. But by fragments of femora, elytra, and other hard parts of the body it is possible to get a good general notion of the insects eaten, and thus obtain an idea of the benefit done by the birds, so far as this element of the food will show it.

The percentages given below are in each case the result of examination of the stomach contents with a magnifier or compound microscope. The nature of the vegetable food was determined generally by the starch grains, since these afforded a more reliable means of determination than small fragments, often partially digested, of the seed itself. The determinations of insect species might have been made much more frequently if I had felt that I could devote the time necessary to determine them by means of the small fragments which often afforded the only means of deciding. I have therefore determined species chiefly when the fragments were of such size that it could be done without an un-

reasonable sacrifice of time; and while this has reduced the number of species determinations, it leaves no doubt about those given as a foundation for judgment on the importance of the bird as an insect eater.

FOOD OF *QUISCALUS QUISCULA*.

April, 1906.

No. of Bird.	Per Cent. of Vegetable Food.	Per Cent. of Insect Food.	Date Collected.
8	99	1	April 2
9	75	25	" "
10	75	25	" "
11	33	67	" "
12	75	25	" "
13	90	10	" "
14	75	25	" "
15	trace	100	" "
16	75	25	" "
17	95	5	" "
Averages for April 2:	69.2	30.8	
18	15	85	April 26
19	85	15	" "
20	--	100	" "
21	5	95	" "
22	70	30	" "
23	35	65	" "
24	96	4	" "
Averages for April 26:	43.71	56.29	
Averages for the month:	58.70	41.30	

May, 1906.

No. of Bird.	Per Cent. of Vegetable Food.	Per Cent. of Insect Food.	Date Collected.
25	40	60	May 29
26	—	100	" "
27	50	50	" "
28	15	85	" "
29	5	95	" "
30	10	90	" "
31	90	10	" "
Averages for the month:	30	70	

June, 1906.

No birds were secured in June. They became very scarce and shy, perhaps because moulting. But an average of the food for May and July may be supposed to approximate that for June and is given below.

Per Cent. of Vegetable Food.	Per Cent. of Insect Food.
Averages for the month: 33.84	66.16

July, 1906.

No. of Bird.	Per Cent. of Vegetable Food.	Per Cent. of Insect Food.	Date Collected.
32	50	50	July 7
33	97	3	" "
34	40	60	" "
35	75	25	" "
36	4	96	" "
37	25	75	" "
Averages for July 7:	48.50	51.50	

July, 1906—Continued.

No. of Bird.	Per Cent. of Vegetable Food.	Per Cent. of Insect Food.	Date Collected.
38	—	100	July 24
39	10	90	" "
40	1	99	" "
41	1	99	" "
42	50	50	" "
43	80	20	" "
Averages for July 24:	23.66	76.34	
Averages for the month:	36.08	63.92	

August, 1906

No. of Bird.	Per Cent. of Vegetable Food.	Per Cent. of Insect Food.	Date Collected.
44	99	1	August 24-29
45	95	5	" " "
46	97	3	" " "
47	97	3	" " "
48	97	3	" " "
49	97	3	" " "
Averages for the month:	97	3	

September, 1906.

No. of Bird.	Per Cent. of Vegetable Food.	Per Cent. of Insect Food.	Date Collected.
50	95	5	Sept. 17
51	98	2	" "
52	98	2	" "
Averages for the month:	97	3	

October, 1906.

No. of Bird.	Per Cent. of Vegetable Food.	Per Cent. of Insect Food.	Date Collected.
53	98.5	1.5	October 4
54	80	20	" "
55	50	50	" "
56	5	95	" "
57	40	60	" "
58	98	2	" "
Averages for October 4:	61.91	38.09	
59	80	20	October 24
60	60	40	" "
61	50	50	" "
62	85	15	" "
63	98	2	" "
64	97	3	" "
65	99	1	" "
66	99	1	" "
67	75	25	" "
Averages for October 24:	82.55	17.45	
Averages for the month:	74.3	25.7	

November, 1905.

No. of Bird.	Per Cent. of Vegetable Food.	Per Cent. of Insect Food.	Date Collected.
1	99.5	00.5	November 2
2	100	trace	" "
3	100	trace	" "
4	99.5	00.5	" "
5	99.5	00.5	" "
6	100	trace	" "
Averages for the month:	99.75	00.25	

For the Whole Period Represented (8 Months).

Per Cent. of Vegetable Food.	Per Cent. of Insect Food.
63.08	36.92

Including June as averaged from May and July the percentages are: Vegetable Food, 59.45; Insect Food, 40.55.

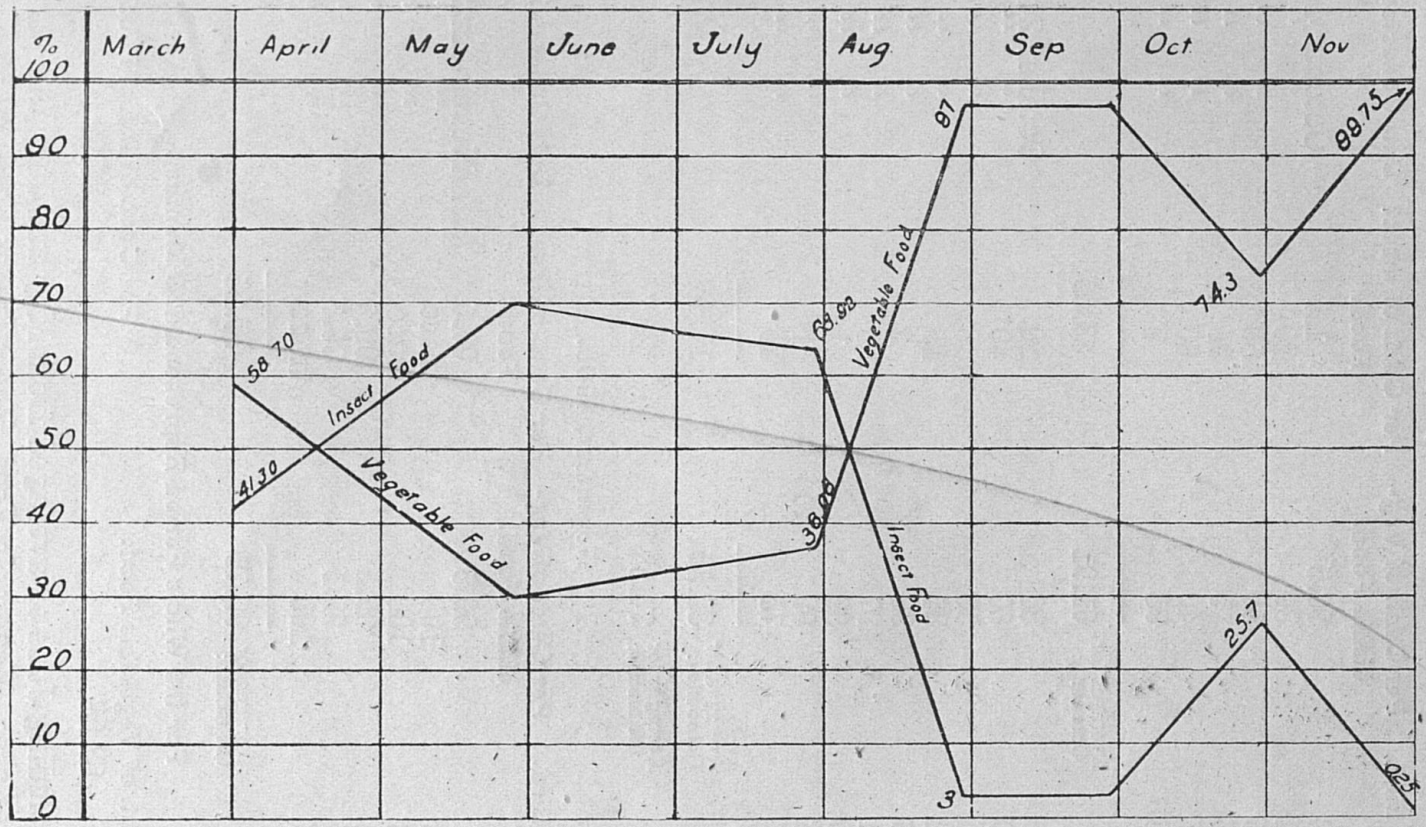


Fig. 2.—Diagram Showing the Relations of Vegetable and Insect Food of the Crow Blackbird from May to November, Inclusive.

It will be noticed from an examination of the percentages given above that there are some rather abrupt changes in the character of the food within short periods, and that it becomes almost completely vegetable during August. These changes seem in some measure influenced by the weather as well as by changing conditions of food supply. Thus in June and July the weather was very near to the average for these months in both temperature and rainfall. In August both temperature and rainfall were above the average, twenty-three days being cloudy, with thunder showers on 14 days. In September these exceptional weather conditions became even more pronounced, the mean temperature being two degrees above the average and the rainfall 2.49 inches above. Twenty-two days of this month were cloudy or partly so, while there were thunder storms on 14 days.

Insects suffer from excessive moisture which encourages their fungus parasites. They are, too, less inclined to stir abroad in cloudy and wet weather, and it seems probable that the birds ate more grain at this time because it was the easier of the two kinds of food to find. In October the rainfall for the month fell to 0.74 inch, which is 1.41 inches below the average for the month. The temperature was close to the average. It was during the period of clear weather that the percentage of insect food rose again, while the grain food declined.

A similar change is to be observed in April when cloudy weather prevailed in the first half of the month and the last half was largely clear, the per cent. of insect food rising correspondingly from an average of 30.8 for the first 17 days to 56.29 for the remainder of the month.

The rather abrupt change in the insect food in July appeared to be due to the emergence at this time of large numbers of the common green June bug (*Allorhina nitida*). The blackbirds are very fond of them.

These variations are leveled by averaging the food for the year, and are chiefly interesting as showing how mistakes might be made as to the value of the bird from an ex-

amination of the food from birds collected only during a short period.

If all my birds had been collected during August and September, the examination of the food would appear to show the Crow Blackbird not an insect eater of great importance. If the food of birds shot in May or July, was studied it would appear to show this blackbird decidedly insectivorous and useful.

The Average for the Whole Period.

The averages 63.08 per cent. of vegetable food and 36.92 per cent. of insect food may prove nearly right for this locality even when more material is studied, but there should, reasoning from what is known of average conditions here, be no decline in the insect food between May and July. June is of all the months the one of greatest activity and abundance of insects, and in the absence of material to study, it has seemed to me fair to consider it a period during which the proportion of insect food remained high. By doing this we get for the whole eight months 59.45 per cent. vegetable food and 40.55 per cent. of insect food, which seem fairer averages than the others. However, this is only put forward for what it is worth, the real yearly averages so far as this study goes are those first given.

Beetles (Coleoptera) Eaten.

The most conspicuous element of the insect food of the Crow Blackbird consists of beetles. They could generally be easily recognized by fragments of the wing covers when no other insect fragments were of such character as to permit of their identification. Sixty of the sixty-seven whose stomach contents were examined had fed upon these insects. All of those recognized belonged to one or the other of the following families: Carabidæ (ground beetles), Chrysomelidæ (plant beetles), Elateridæ (click beetles, wire worms), Scarabæidæ (June bugs), Curculionidæ and Calandridæ (snout beetles, weevils). These are just the groups of beetles represented best in corn and other grain fields.

The family Carabidæ is to be regarded as generally beneficial. It contains a large number of active, black or metallic beetles, many of which hide under grain shocks, stones, boards, etc., during the day, and come out at night to feed upon other insects. They are actively predatory in the grub stage also, the young commonly living in the soil, or under rubbish. Some of the species are, however, known to feed on seeds and pollen, though the quantity of this food is probably not great and hence the injury done is not of much importance to the farmer.

The Elateridæ are injurious, the grubs being the wire-worms* so well known for their destruction of corn and other crops.

The Chrysomelidæ (plant beetles) contain many of our worst insects enemies, such as the potato beetle, the striped cucumber beetle, the corn root-worm, etc. *Colaspis brunnea*, determined from one of the stomachs, is a troublesome root-eating insect.

The Scarabæidæ is another family containing notable injurious species, and even including the scavengers is to be regarded as on the whole injurious. The green June bugs are favorite food of the birds. Quite frequently jaws of grubs were found in the food, of such character that it is probable they were from white grubs. In one case the jaws present represented six grubs. These soft bodied insects are so quickly digested that only such hard structures as the jaws remain to show the quantities in which they are eaten.

The snout beetles belonging to the two families Curculionidæ and Calandridæ are decidedly injurious. Both were well represented in the food, though from the bird's habit of breaking its insect food into small bits the species could not be determined, except in the case of *Sphenophorus parvulus*. Some of the fragments looked very much like parts of *Sitones hispidulus* or *S. flavescens*, both known to be injurious to clover.

Considering that five of the families represented are largely or wholly injurious, while only the Carabidæ may be

*The two species identified are *Monocrepidius bellus* and *M. auritus*.

considered largely beneficial, it appears that the blackbird is useful in so far as its food consists of beetles.

Other Insects Eaten.

The only insects of the order Hymenoptera which had been eaten were ants, found in the stomachs of three birds. The family bears a rather bad reputation because of depredations some of its members commit in dwellings at times. It is charged also with harboring certain root-lice, the corn root louse being among them. Some of these pests are believed to be absolutely dependent on ants, which thus indirectly become noxious as enemies of corn and other plants. On the whole I think ants must be regarded as injurious and in so far as blackbirds destroy them, the birds become beneficial.

Of the true bugs the only species determined was the 17-year locust, unquestionably an injurious insect, from its attacks on the roots of forest and fruit trees and also because of its serious local injuries to young fruit trees in orchard and nursery during locust years.

The grasshoppers and crickets representing the families Acrididæ and Gryllidæ are unquestionably injurious. *Schistocerca americana* was the only species positively identified, but some young belonging to one of the species of Melanoplus almost certainly represented the red-legged grasshopper.

Of caterpillars, remains were noted in two stomachs.

Eleven out of twelve families of insects recognized are injurious in the main or entirely, while the remaining family represented contains some vegetable feeding species. The Crow Blackbird is certainly beneficial, if its insect food alone be taken as a basis for judgment..

Other Animal Food Eaten.

Some fragments in two stomachs were derived from thousand legs while in another stomach a single spider was

noted. Both groups may be regarded as beneficial, since they feed upon insects.

Quite frequently the remains of small land snails were found in the stomachs, generally mere fragments, but in several cases large enough to permit recognition of the group to which they belong. So far as we know they are unimportant from the standpoint of the farmer. Possibly the shells were eaten like bits of brick, cinders, and gravel, sometimes noted among the food, and probably taken as an aid in digesting grain.

Vegetable Food Eaten.

The vegetable food recognized was as follows: Corn, 57 stomachs; hemp, 7; wheat, 3; sorghum, 4; rye, 1; clover seed, 1; ragweed, 1; smartweed, 1; squirrel grass (*Chætochloa glauca*), 1.

As already stated the grain was invariably fragmentary, and bore evidence of having been obtained from the refuse left by stock and by wagons along roadsides, etc., rather than from the crops.

Not a single bird had eaten vegetable food exclusively. Those which ate most were shot November 2, and in three of them it was only after careful search with the microscope that small fragments of insects were found. They constituted no appreciable percentage of the food, which would under ordinary examination have been regarded as wholly vegetable.

Birds that had eaten only insect food were collected April 26, May 29 and July 24, one at each date, though some of the other birds ate so largely of insects that to ordinary inspection the food would have appeared to consist wholly of insects.

CONCLUSION.

It thus appears that the blackbird eats a larger proportion of vegetable than of insect food, taking the season as a whole; that the per cent. of insect food rises highest from

May to July and then falls suddenly in August, while vegetable food is eaten in greater quantity from this latter month until the end of the season; that the proportion of insect food increases and the vegetable food declines whenever insects become common and easy to secure in the situations most frequented by the birds. This willingness to eat insects when they can be secured is shown by the large numbers of June bugs eaten in July, and again by the rise in the per cent. of insect food during a period of clear weather in October. We may fairly assume from these facts that the blackbird relishes its insect diet, and would in case of the insects it eats most becoming exceptionally common and destructive, increase the per cent. of its insect food correspondingly and thus serve as a check upon the insects. Considered in connection with the fact that much of the grain eaten is certainly gleaned and of no value, the insect food in the stomachs seems to show that the bird is a useful one. Further study may lead to some modification of this view, but at the present time it is my opinion that the shooting of the Crow Blackbird should not be permitted, except, as in the case of other small birds, when it is found actually engaged in destroying crops.

With a view to learning the opinions of farmers as to the value of the bird, inquiries were addressed recently to a number of them residing in different parts of the State. The following are the replies received.

Eminence, Ky., March 2, 1907.

Dear Sir:

"Yours of the 1st inst. to hand. We never regarded the blackbird an enemy at all, and have never seen him eat anything but waste grain.

On the other hand we sometimes see hundreds in the fields apparently picking up insects and weed seeds. Have counted as many as fifty following the plows in one field in the springtime to pick up the worms as they are turned up.

Altogether we think they do a great deal more good than harm and the only thing we have against them is that they seem to drive off some other birds from nesting in the pines in our yard."

(Signed) R. R. GILTNER.

Fig. 3.—The Crow (*Corvus americanus*). From Division of Biological Survey, U. S. Dep. Agr.

Lexington, Ky., March 3, 1907.

Dear Sir:

"Crow and Blackbird have so greatly diminished in numbers since my childhood! The crow is a voluble bird, given to corn stealing from the belated husker, for whom I have no sympathy. Then he is a brazen egg thief who despoils every exposed nest, even quite near the house. This is his greatest sin.

The blackbirds built in the cedars around my father's house by the dozen and I know them intimately since childhood. They will follow a plow closely and are certainly insectivorous. They are confiding and if not molested become very gentle. They may eat corn in the milk or dough, but the wood-pecker and yellow hammer are the real thieves. Sugar corn, very early and quite late, is apt to have worms in the end of the ear, and these I conceive the blackbird seeks rather than the grain. The blackbird is to my mind absolutely harmless, and when the great gathered flocks of August and September settle down on my woodlands and fields, I feel that it is to my profit rather than loss."

Very truly yours,
(Signed) H. F. HILLENMEYER.

Lancaster, Ky., March 4, 1907.

Dear Sir:

"In reply to yours of the 1st ult. will say, my experience has been that the blackbirds at certain stages are very injurious to certain crops, especially as you say corn in dough stage, and wheat after cutting, when in shock or in stack. On the other hand, I'm confident that they do great good by also feeding on certain insects, bugs, worms, etc., that are also a great pest to the farmer."

Very truly,
(Signed) JOHN M. FARRA.

Lexington, Ky., March 5, 1907.

Dear Sir:

"Your favor of recent date to hand and noted in regard to the common crow blackbird destroying corn or other grains. I think it is a mistaken idea, as I never saw them destroy any grain whatever in all my farm life. Much to their credit, I have seen them follow the plowman's fresh-turned furrow all day. I will say, though, that I have seen them late in summer or early in fall do a very slight damage to corn in the ear. I think they do a great deal more good by destroying insects and worms than by destroying anything."

Yours very truly,
(Signed) GEO. D. KARSNER.

Visalia, Ky., March 5, 1907.

Dear Sir;

"The crow is a blackbird, but a blackbird is not a crow. If you refer in your inquiry of 1st inst. to the common crow, it does great damage to corn by taking up the plantings, and by eating it from the ears in the fields. I have never observed the ordinarily called "blackbird," which migrates in great flocks doing any damage, nor have I heard any complaints of damage from them that I can recall. They are saucy, cheerful little optimists, though their song is not so melodious as some."

Respectfully,
(Signed) F. B. THRELKELD.

Lexington, Ky., March 5, 1907.

Dear Sir:

"Yours of 1st inst. received. I will say in regard to the food of the crow blackbird that I have never known them to do any damage to grain of any kind while in the dough stage or when ripe. They seem to feed on the ground upon insects. So eager are they for this kind of food that they will fly down at the heels of the ploughman to search the new-turned furrow.

I have seen great droves of them in fields where there were sorghum and millet in shocks and ricks, down on the ground, busy gathering some invisible something, but never on the ripe grain. My observation of this bird extends over a period of 40 years, and I have no condemnation to offer. When in big flocks it has always been an interesting sight to me to see possibly a thousand or more headed in one direction and then all as one bird turn within a hobble from center to circumference. I never knew them to do any harm to any grain or fruit when in pairs rearing their young. I think it would be a mistake to destroy them."

Yours respectfully,
(Signed) M. L. TRIBBLE.

Winchester, Ky., March 6, 1907.

Dear Sir:

"Your letter in regard to the blackbird received. In answer will say that I have always considered the blackbird the farmers' friend, and think they destroy a great many insects. Of course they sometimes attack corn in the dough stage, but I do not think much harm is done. I do not think they could do any damage to corn when cut and put in the shock. I have never noticed the blackbird feeding on any other of the grains."

Yours very truly,
(Signed) BOSWELL FOX.

Tip-Top, Ky., March 6, 1907.

Dear Sir:

"Yours of 5th to hand. I have never known of the common blackbird bothering anything to amount to much here and, in fact, there are very few of them here now. There used to be a considerable quantity, but they have disappeared of late years. I never knew of them bothering corn in the shock."

Yours truly,
(Signed) G. C. SCHEIBLE.

Bayou, Ky., March 7, 1907.

Dear Sir:

"Yours of March 1st received a few days ago. I have delayed answering to consult other farmers in the matter of the common crow blackbird. I haven't found a man who says he ever saw them eating corn or any other grain except the points of corn when in the dough stage, and all seem to agree that they destroy a great many insects.

Last fall I had a field of corn alongside my pasture field, and they were in the pasture field by the hundreds and never bothered the corn at all, which was cut and shocked. What they fed on in the pasture I do not know. I have often noticed them walking over ploughed fields and picking up worms, I suppose."

Your friend,
(Signed) G. N. MCGREW.

Hartford, Ky., March 9, 1907.

Dear Sir:

"Regarding the blackbird, I suppose it is the species that are seen in flocks in the early spring. I know of no harm done by this bird, and I regard it as a friend of the farmer. Its food consists mostly of insects."

Yours truly,
(Signed) J. R. PIRTLE.

Leitchfield, Ky., March 11, 1907.

Dear Sir:

"In reply to yours of March 5th will say that I have never seen the blackbird commit or do any damage to corn or any other product. Further I have never heard of them doing any damage."

Yours etc.,
(Signed) J Q. A. RAHM.

Somerset, Ky., March 11, 1907.

Dear Sir:

"Yours of the 7th is received. I hardly think the blackbird does any mischief on the farm. They come here in large droves or flocks. They pick up things along the public road, fly up into trees, sing and jabber and seem to have a good time in general. They like a pine or cedar forest or orchard best. Real jolly fellows."

Respectfully,
(Signed) J. W. SEARS.

Hopkinsville, Ky., March 12, 1907.

Dear Sir:

"Replying to your favor of the 8th inst. Everything I said in mine of the 6th in reference to the crow, will apply to his smaller cousin, which we call the blackbird. He has never done me any damage, but on the other hand, I am sure that taken as a whole, he is of considerable benefit. I have often talked with my neighbors about him, and all agree that he is a friend."

Yours truly,
(Signed) J. B. WALKER.

Clinton, Ky., March 12, 1907.

Dear Sir:

"Your letter received and in reply will say that we have plenty of blackbirds here, or, at least in the spring. I have seen these birds in large droves and when they would fly up would sound like an approaching train.

As to the injury these birds do, will state that I think the only harm they do is in the spring. They follow after the plow and if seed is dropped by hand they will pick it up, and when cowpeas are sown by hand, they feed on them and I suppose they feed on wheat in the fall, but I am willing that they should have some grain, for I think they eat insects, such as grubs etc. They never bother fruit."

Respectfully,
(Signed) O. PIPER.

Owensboro, Ky., March 18, 1907.

Dear Sir:

"I received your letter of March 1st a day or two ago at Smithland. As to injuries of the blackbirds, if they ever did me any at all, I was unable to detect it. At certain periods of the year they are very numerous, but I could never tell that they bothered anything at all.

In the spring when farmers are sowing oats, where the land is fresh-plowed I have seen them in large numbers, but they seem to walk about and pick up different things and I never missed the grain, if they got any. They follow in the furrows behind the breaking plows and pick up something, but I do not know what they get, unless it is worms or insects of some kind. They always build nests at my father's in the cedars in the yard, and when the garden is plowed in the spring the birds are thick in the furrows picking up worms and such bugs as they can find. I have seen them pick up worms and fly to their nests with them. I think they are very beneficial rather than injurious. In the fall they follow the cattle and I suppose pick up waste grain. I have seen them thick around the droppings of cattle, like chickens; but they never seem to bother the corn at all or any other grain in the shock, or in the heap after it is shucked out."

Yours truly,
(Signed) JNO. W. MCFARLIN,
(of Franklin, Simpson County.)

Greendale, Ky., March 18, 1907.

Dear Sir:

"Your letter of March 12 in regard to the blackbird or crow blackbird received. I take pleasure in telling you what I know of the blackbird. During the latter part of summer, first fall months each year, we have a blackbird roost in our yard. I consider the bird one of my special friends and very interesting. Thousands roost in the trees around me each night, coming in about sun-down from all directions in small droves of four to eight, and leaving the roost about daylight in the morning, going out to feed in some manner. I have a splendid chance to observe them, habits and manner of food-getting. Of course the blackbird is graminivorous and insectivorous. Comes to us about middle of March, and as soon as the plow starts he hovers along the fresh upturned furrows, devouring the grubs, beetles, bugs and worms in sight. I think the blackbird destroys fully or very nearly as many injurious insects as the robin; nevertheless a good portion of the food of the blackbird consists of grain, his favorites being oats, rye and millet—German.

He seems to be perfectly satisfied to clean up the loss, leavings and gleanings about the fields.

Have never observed damage that amounted to anything to shocks of ripened corn or wheat caused by the depredations of the blackbird. It is my opinion that one English sparrow will do twenty times more damage to all kinds of grain than a blackbird. On the whole I consider that we owe the blackbird a living and am not disposed to condemn him as under value.

I think what makes the blackbird appear so formidable to most people is when he collects in large droves or flocks late in the fall about seeding and corn shucking time, comes around to bid us a pleasant good-bye before starting for the south. The farmer gets shaky for fear the birds will alight and carry off a lot of grain, but I have never known of injury from the farewell visits of the blackbird. I am rather sorry to see him go, perhaps because I cannot go too."

Yours truly,
(Signed) WALLACE COOPER.

Nicholasville, Ky., March 26, 1907.

Dear Sir:

"Pardon my delay in answering your favor of March 1st, '07 in regard to the habits of the common crow blackbird. I have never felt that I have been injured to any extent by the blackbird, although they do make occasional raids on corn fields while the corn is in the dough state, but I have never seen them bother the corn in the shock or even after it was husked. I think they get their corn principally from the fields where the husked corn has been carried away, as there is usually from a pint to a half gallon of shattered or shelled corn at each shock that has been husked.

I have never had any small grain materially damaged by them. They seem to find a sufficient quantity of shattered or loose grains on the ground without attacking the shocks. I think they are more beneficial than destructive to planters. I consider them little scavengers that help us keep our fields clean and free from damaged seeds and from obnoxious insects as well."

Yours very truly,
(Signed) E. A. FARRA.

Owensboro, Ky., March 29, 1907.

Dear Sir:

"I received your letter asking for my observation on the food of the common crow blackbird. I delayed my answer somewhat to get the opinion of several men who are observers of such things. They agree with me that this bird often does much damage by pulling up young corn to get the sprouted seed grain. It also eats some wheat from the cap bundles of shocks standing in the field. I have seen it working on the ends of ears of corn in the dough stage standing in the field, but as this corn was badly infested with the worm that works on the corn in the ear, I am inclined to think the bird was after the worm and not the corn. I believe that pulling up young corn is the only serious damage it does.

As the forests are cleaned up the birds in this section are rapidly decreasing and the damage they do is becoming a negligible factor."

Yours very truly,
(Signed) GEO. M. TAYLOR,

2. THE CORN ROOT-WORMS.

Diabrotica 12-punctata and *D. longicornis.*

By H. Garman, Entomologist and Botanist.

In 1905 corn fell badly in Kentucky because of wind storms, helped by the injuries of a root-worm, the young of a spotted beetle described by me in the annual report of this Station for 1889 and in the entomological journal Psyche. This worm is generally known as the Southern Corn Root-worm (*Diabrotica 12-punctata*), and was treated by me under the title of Corn Root-worm of Kentucky. It is practically the only insect of its genus attacking the roots of corn in the State.

In the articles mentioned, an account of the habits and life-history of the beetle were given as far as they were then known to me. It was inferred from the fact that the worms were found at the roots of the late-planted corn in December, and that adults emerged just as winter came on and were again abroad as soon as the winter was past, that the mature beetle hibernates and that the eggs are not, like those of the northern species, left in the soil in corn fields during the winter months. This conclusion was strengthened by the observation that some of the worst injured corn was on land that had the preceding season been in oats or tobacco.

With a single-brooded species like the northern *D. longicornis* to deal with, knowing that its eggs are always left in corn fields and that the adults die in the fall, it is plain that one can avoid injury by planting this crop on land that has not recently been in corn. This suggestion we owe to Professor S. A. Forbes of Illinois, who years ago made a careful study of the Northern Root-worm. But our Kentucky Corn Root-worm is not single-brooded, does not pass the winter as an egg so far as we know; consequently rotation will have no such satisfactory effect in checking its injuries.

While the above conclusion seemed justified by the facts gathered by me in 1889 and 1890, yet the evidence as to the

manner of spending the winter was not completely satisfactory. We were not then provided with conveniences for keeping insects alive over winter under conditions approximating those prevailing out of doors. In the fall of 1906, the insect was taken up again, and large numbers were discovered, by sweeping with an insect net, to be feeding on alfalfa and red clover, where they were followed until severe cold in December compelled them to retreat into winter quarters, probably into crevices in soil, as is the case with the related striped cucumber beetle. Examples had been confined on young alfalfa growing in a bench in the Vivarium of the Division, where the conditions could be kept very close to those out of doors. These beetles remained alive over winter and are now actively feeding. On March 15th, 1907, the first really warm spring day, search was made among alfalfa in which the beetles had been abundant the preceding fall, and a living beetle was found there, thus proving that they had endured the winter weather out of doors also. At this date farmers had done no spring plowing, and it was not until more than a week later that people began gardening. No one was then thinking of planting corn. Adult beetles were found abroad January 15, 1890, and have now been collected every month in the year, except February.

We have thus secured satisfactory evidence that the beetle lives through the winter. Being active with both wings and legs, it is free to choose a place to deposit its eggs when the proper time for egg-laying arrives in April and May.

That the Northern Corn Root-worm does little harm to corn in Kentucky is shown by its distribution. It is an insect of the Northwest, and has a rather restricted distribution. Professor Forbes of Illinois asserts in a recent publication that it does no harm as a root-worm except in the north two-thirds of that State. Professor G. M. Bentley does not know of its occurrence in Tennessee. Professor Glenn W. Herrick of Mississippi states that it is not an inju-

rious insect in his State; he has not even observed it there, though a specimen of the beetle is in the Station collection. Professor Conradi has not collected the insect in Texas. Professor C. F. Adams of Fayetteville, Arkansas, stated in a letter written December 8th that he had received specimens from the northeastern part of the State. Professor J. M. Steadman writes that both the Northern and Southern Root-worms occur in Missouri.

In Kentucky the northern insect is certainly very rare. The adult beetle has been observed to my knowledge along the Ohio River in the western part of the State on two occasions, once at Paducah and again at Owensboro (August 8, 1899) where it was reported to be eating the silks of corn.

When insects, such as the Kentucky Corn Root-worm, become troublesome, in the absence of a knowledge of habits and life-history, it is well on general principles to resort to rotation as a means of avoiding injury. The facts given above show that complete immunity will not be secured in Kentucky by this practice; but it is worth trying. The avoidance of land furnishing pasturage for the adult beetles in late fall and early spring is to be strongly recommended from what we know of the winter history of the insect. The adults are ravenous feeders, and our observations show that they gather together in large numbers in late fall on succulent growths of clover and alfalfa, where they are abroad again as soon as severe cold weather is past. They are thus likely to do most of their damage to early corn in the vicinity of land furnishing such pasturage. The application of insecticides to the food plants during the summer months is impracticable on any large scale, because of the great variety of plants fed upon and the wandering habits of the beetles. A more complete study of the summer broods may afford a clue to other treatment, but at present the planting of corn at a distance from the winter resorts of the beetles seems to me the practice best calculated to lessen the injuries.

Summary of the Life-History of *Diabrotica 12-punctata*, the Corn Root-worm of Kentucky.

The life-history of the Kentucky Corn Root-worm as taken from my notes is as follows. Adults appear if the weather is mild, by the middle of March, and gravid females are abroad in April and May and begin to deposit their eggs by May 15, being common until June 20. The larvæ of this brood become pupæ in the latter part of June and these yield adults from about July 10 to 15. On the 19th of July, eggs from these adults have been secured and also recently hatched larvæ. Gravid females are at this time common again, and all of the adults seem to be out of the ground by July 21. Larvæ are to be found at the roots of corn from this time until fall, while pupæ are again found in September and on one occasion were collected in December at the roots of some late-planted corn.

Adults become very common in October and November on clover and alfalfa, where they remain until compelled by severe cold weather to conceal themselves. They come forth, however, when the temperature rises sufficiently in January and March, and probably also in February, though I have never secured examples during the latter month.

The beetles are specially fond of young and succulent growths of vegetation, and while eating a little of most plants upon which they occur, yet are partial to the more succulent ones, such as red clover, alfalfa, corn silks, egg plant, plantain and cabbage. I find them common in early spring on wheat, timothy and other grasses.

Summary of the Life-history of *Diabrotica longicornis*, the Northern Corn Root-worm.

As determined by the State Entomologist of Illinois, the beetle places its eggs in the soil of corn fields in the fall and then dies. The eggs appear not to hatch until after corn is

planted the following spring, but the worms have been observed by the tenth of June. The grubs are found thereafter throughout the summer at the roots of corn until September. It is probable, therefore, that they hatch at different times, or that the worms differ widely in rate of growth, since it is believed that but one brood develops each season.

The quiescent resting stage, known as the pupa, is sometimes seen in the latter part of June, but as some adults appear somewhat earlier, it is believed that the pupa stage is assumed by the middle of the month in some cases.

The adult beetles become abundant in Illinois and Iowa in August, and until cold weather continue common about the silks of corn ears and on various late summer flowers, such as thistles, golden rod, and red clover. Unlike the Corn Root-worm of Kentucky, they disappear at once when cold weather comes on, and no stage except the egg is seen thereafter until corn is up in the spring.

NOTE.—My attention has been recalled to the Kentucky insect by emphatic statements made by Professor Holden of Iowa in 1905 while engaged in institute work in this State to the effect that the Northern Corn Root-worm (*Diabrotica longicornis*) does great mischief in Kentucky and can easily be managed by rotation. In the Western Farmers Almanac and elsewhere I have called attention to this error, and wish here to reiterate what I have said, not with any desire to be critical, but with the object of getting farmers back again to the truth. It is not well to lead people into the belief that they have a sovereign remedy for a pest when they have no such remedy. In the end mistakes of this sort left uncorrected, lead to a lack of confidence in teachers.

The following is a list of the bulletins of the Kentucky Agricultural Experiment Station which are still available for distribution :

No. 14.—Analyses of Commercial Fertilizers. July, 1888.
" 17.—Corn Experiments. February, 1889.
" 19.—Experiments in Pig Feeding. May, 1889.
" 20.—Commercial Fertilizers. July, 1889.
" 22.—Potato Experiments. December, 1889.
" 25.—Strawberries. April, 1890.
" 26.—Corn Experiments. April, 1890.
" 27.—Experiments with Commercial Fertilizers on Hemp. April, 1890.
" 28.—Tobacco Experiments. May, 1890.
" 29.—Commercial Fertilizers. July. 1890.
" 30.—1, Wheat Experiments. 2, A New Wheat Insect. August, 1890.
" 31.—Some Strawberry Pests. December, 1890.
" 33.—Corn Experiments. April, 1891.
" 39.—Marls. March, 1892.
" 41.—Commercial Fertilizers. July, 1892.
" 42.—Experiments with Wheat; 2, Experiments with Oats. September, 1892.
" 43.—Commercial Fertilizers. December, 1892.
" 44.—Bordeaux Mixture for Apple Pests. January, 1893.
" 46.—Commercial Fertilizers. August, 1893.
" 47.—1, The Pests of Shade and Ornamental Trees; 2, An Experiment on Plum Rot. December, 1893.
" 49.—1, Destructive Locusts in Kentucky; 2, The Bud-Worm of Tobacco. March, 1894.
" 50.—1, Fruit Growing in Kentucky; 2, Notes upon Vegetables. April, 1894.
" 51.—Commercial Fertilizers. August, 1894.
" 52.—Commercial Fertilizers. 1, Official Analyses; 2, Analyses of Farmers' Samples and Samples Collected by Deputy Inspectors. December, 1894.
" 54.—Notes on Vegetables. March, 1895.
" 55.—Field Experiments with Fertilizers. 1, Corn; 2, Potatoes; 3, Tobacco; 4, Hemp. April, 1895.
" 56.—Analyses of Commercial Fertilizers. August, 1895.
" 57.—1, Wheat Experiments; 2, Oat Experiments. September, 1895.
" 58.—Cut Worms in Kentucky. November, 1895.
" 59.—Spraying Experiments in 1895. December, 1895.
" 60.—Analyses of Commercial Fertilizers. 1, Official Analyses; 2, Analyses of Farmers' and Inspectors' Samples. December, 1895.
" 62.—Strawberries. March, 1896.
" 64.—Analyses of Commercial Fertilizers. July, 1896.
" 65.—Analyses of Commercial Fertilizers. 1, Official Analyses; 2, Analyses of Other Samples. December, 1896.
" 66.—Tobacco. February, 1897.
" 67.—The San Jose Scale in Kentucky. May, 1897.
" 68.—Analyses of Commercial Fertilizers. May, 1897.
" 69.—Wheat. 1, Test of Varieties; 2, Test of Fertilizers; 3, Description of Varieties; 4, Treatment for Smut. September, 1897.
" 71.—Analyses of Commercial Fertilizers. 1, Official Analyses; 2, Analyses of Other Samples. December, 1897.
" 73.—Strawberries. February, 1898.
" 75.—Commercial Fertilizers. June, 1898.
" 76.—Commercial Fertilizers. August, 1898.
" 77.—Wheat. 1, Test of Varieties; 2, Test of Fertilizers; 3, Notes and Description; 4, Red Rust of Wheat. September, 1898.

No. 78.—Ginseng, its Nature and Culture. November, 1898.
" 79.—Commercial Fertilizers. December, 1898
" 80.—1, Some Pests Likely to be Disseminated from Nurseries; 2, The Nursery Inspection Law. March, 1899.
" 81.—1, A Method of Avoiding Lettuce Rot; 2, Potato Scab Experiments. March, 1899.
" 82.—Commercial Fertilizers. July, 1899.
" 83.—Wheat. 1, Experiments with Fertilizers; 2, Variety Tests; 3, Notes and Description. August, 1869.
" 84.—The Elms and Their Diseases. November, 1899.
" 85.—Commercial Fertlizers. December, 1899.
" 87.—1, Kentucky Forage Plants—The Grasses; 2, Analyses of Some Kentucky Grasses. May, 1900.
" 88.—Commercial Fertilizers. August, 1900.
" 89.—Wheat. 1, Test of Varieties; 2, Test of Fertilizers; 3, Descriptions of Varieties. September, 1900.
" 91.—1, Enemies of Cucumbers and Related Plants; 2, Experiments with Potato Scab; 3, The Food of the Toad. March, 1901.
" 92.—Grapes. April, 1901.
" 93.—1, Diseases of Nursery Stock; 2, Rabbits and their Injuries to Young Trees. June, 1901.
" 94.—Wheat. 1, Test of Varieties; 2, Description of Varieties. September, 1901.
" 95.—Commercial Fertilizers. September, 1901.
" 96.—1, The Hessian Fly; 2, Dangerous Mosquitoes in Kentucky; 3, Poisonous and Edible Mushrooms. November, 1901
" 97.—Commercial Fertilizers. December, 1901.
" 99.—Oats. 1, Test of Varieties; 2, Treatment of Smut; 3, Test of Fertilizers; 4, Relative Value of the Varieties for Feeding. April, 1902.
" 100.—Inspection and Analyses of Foods. February, 1902.
" 102.—Commercial Fertilizers. September, 1902
" 104.—Commercial Fertilizers. December 31, 1902.
" 108.—Some Results in Steer Feeding. July 18, 1903.
" 109.—Commercial Fertilizers. September. 1903.
" 110.—Nursery Inspection and San Jose Scale. December, 1903.
" 111.—The Hessian Fly in 1902-1903. December, 1903.
" 112.—Commercial Fertilizers. December 31, 1903.
" 113.—Protein-Content of the Wheat Kernel. February, 1904.
" 114.—Insects Injurious to Cabbage. June, 1904.
" 115.—Wheat. Field Test of Varieties. September 20, 1904.
" 117.—Commercial Fertilizers. December 31, 1904.
" 118.—Corn. Field Tests. March 1, 1905.
" 119.—Labels on Adulterated and Imitation Foods Sold in Kentucky. April 15, 1905.
" 120.—Some Tree-and-Wood-Infesting Insects; 2, Cabbage Snakes. May, 1905.
" 121.—Commercial Fertilizers. August, 1905.
" 122.—Corn—Method of Selecting Seed Corn; Chemical Study of the Composition of a Number of Varieties of Kentucky Corn. December, 1905.
" 123.—Commercial Fertilizers. December 31, 1905.
" 124.—On the Adulterants and Weed Seeds in Kentucky Samples of Bluegrass, Orchard Grass, Timothy, Red Clover and Alfalfa Seeds. March, 1906.
" 125.—Observations and Experiments on Clover, Alfalfa and Soy Beans. March, 1906.
" 126.—Soils—Method and Uses of Soil Analyses; Analyses of Soil in 1904 and 1905; On the Determination of Humus in the Soil. April, 1906.
" 127.—The Inspection of Seeds under the Kentucky Pure Seed Law. September 25, 1906.
" 128.—Commercial Fertilizers.
" 129.—Tobacco. 1, Selection of Seed Plants and Care of Seed; 2, Improved Methods of Handling the Crop; 3, Elimination of Undesirable Varieties. February 1, 1907.

KENTUCKY

Agricultural Experiment Station

of the

State College of Kentucky.

BULLETIN No. 131.

Concentrated Commercial Feeding Stuffs.

1. Operation of the Feeding Stuffs Law.
2. Analyses of Inspectors' Samples.
3. Registrations for 1907.

LEXINGTON, KENTUCKY,
DECEMBER 1, 1907.

Kentucky Agricultural Experiment Station.

BOARD OF CONTROL

GEO. B. KINKEAD, Chairman, Lexington, Ky.
D. F. FRAZEE, Lexington, Ky.
C. B. NICHOLS, Lexington, Ky.
C. M. CLAY, Paris, Ky.
J. K. PATTERSON, President of the College.
M. A. SCOVELL, Director, Secretary.

STATION OFFICERS

M. A. SCOVELL, Director and Chemist.
A. M. PETER, Chemist, Head of Chemical Division.
H. E. CURTIS, Chemist, Head of Fertilizer Division.
H. GARMAN, Entomologist and Botanist, Head of Entomological and Botanical Division.
W. H. SCHERFFIUS, Agronomist, Head of Agricultural Division.
R. M. ALLEN, Head of Food Division.
J. D. TURNER, Head of Feed Division.
J. O. LaBACH, Chemist, Food Division.
MISS M. L. DIDLAKE, Assistant Entomologist and Botanist.
S. D. AVERITT, Assistant Chemist.
O. M. SHEDD, Assistant Chemist.
MISS LILLIE LISTON, Stenographer, Food Division.
E. C. VAUGHN, Assistant Entomologist and Botanist.
GEORGE ROBERTS, Assistant Chemist, Fertilizers.
E. S. GOOD, Animal Husbandman, Head of Animal Husbandry Division.
J. W. NUTTER, Assistant in Dairying.
MISS O. L. GINOCHIO, Stenographer.
H. D. SPEARS, Assistant Chemist, Feeds.
W. D. NICHOLS, Assistant Animal Husbandman.
MISS ANNA WALLIS, Stenographer.
E. F. WORTHINGTON, Superintendent Farm.

NOTICE

The Bulletins of the Station will be mailed free to any citizen of Kentucky who sends his name and address to the Station for that purpose.

Correspondents will please notify the Director of changes in their postoffice address, or of any failure to receive the bulletins.

Address:
KENTUCKY AGRICULTURAL EXPERIMENT STATION,
Lexington, Ky.

Bulletin No. 131.

Concentrated Commercial Feeding Stuffs

By

J. D. Turner.

---

1. *Operation of the Feeding Stuffs Law—*

The following bulletin is the first issue of the Station on Concentrated Commercial Feeding Stuffs and the operation of the Feeding Stuffs Control Law which was passed by the last Legislature and went into effect June 11, 1906. The matter treated in this bulletin relates to the methods adopted in carrying out the provisions of the law; the system of tagging; the method of inspection; results obtained; the effect of the law on trade; composition of feeds; function of nutrients; essential ingredients; how to buy feeds; standards adopted; definition and description of products; classification of feeding stuffs; chemical analyses of samples taken by our inspectors; and registration list for 1907.

The Feeding Stuffs Law a Necessity.

The quality of feeding stuffs has been under governmental control in the European countries for a good many years. Not until recently has such a control been adopted by some of the states in this country. The fact that some sixteen or eighteen states have enacted laws governing the sale of feeding stuffs is sufficient evidence to warrant such a control.

The trade in Kentucky of concentrated commercial feeding stuffs, such as bran, shorts, shipstuff, inferior grades of flour, corn meal, cotton seed meal, oil meal, gluten feed, dried distillery slops and various mixtures of ground grains, involves an enormous sum of money each year—estimated at over two million dollars. An examination showed that these feeds were being sold often bearing misleading names, and their prices were no indication as to their real value as feeds. Often feeds were found bearing the same name and widely apart in their feeding value—due mainly to the

quality of the ingredients from which the feeds were made, or methods employed in making the feed, or to adulteration. Many of the feeds were adulterated with substances of inferior value—bran, shipstuff, and mill products generally, being adulterated with corn cob meal, rice hulls, corn bran, peanut hulls, and even saw dust; cotton seed meal being adulterated with cotton seed hulls fully one-half, and many mixed feeds being almost entirely composed of oat hulls and the by-products of factories making oat meal and offered as superior feed for cattle, horses, etc.

Rice hulls, corn cob meal, and peanut hull meal were manufactured and shipped into Kentucky in car-load lots for mixing purposes. These adulterants were sold to the mixers of concentrated feeding stuffs, or millers, at $7.00 to $10.00 per ton, with the claim that they could be mixed to fully 20 per cent without being detected. To such an extent had this adulteration been carried on that the millers of the state either had to mix their feeding stuffs in order to compete, or ship their products to states having feeding stuffs control laws, where only pure feeding stuffs could be sold.

The fraud practiced in the trade of commercial feeding stuffs is as great as that in commercial fertilizers, foods for human consumption, or any other trade in commercial products. Kentucky has passed many laws protecting the people against frauds of different character, but there is none of greater importance to the public in general than the feeding stuffs control law. In passing this law, not only were the consumer and farmer considered, but the general public as well, as these feeds are largely used in feeding domestic animals and particularly cows which furnish milk to children and invalids throughout the state whose only nourishment comes from this source. Such feeds are often adulterated with substances that have little or no feeding value and in many cases these adulterants are very injurious to the health of the cows and thus the milk supply of the state becomes impure, dangerous, and unfit for use.

As most of the leading states, including our neighbors, have feeding stuffs control laws, it was realized by the feeders and dealers of the state that Kentucky was being made the "dumping ground" for inferior and adulterated feeding stuffs that could not be marketed elsewhere. In order to prevent the adulteration of

feeds and require the manufacturers to guarantee and to keep their products up to a certain standard in the essential elements, the South-Eastern Millers Association and the State Millers Association took the matter up and secured through the Kentucky Legislature of 1906 an act known as the Kentucky Concentrated Commercial Feeding Stuffs Law, which is given in full below for the benefit of those interested.

THE KENTUCKY CONCENTRATED COMMERCIAL FEEDING STUFFS LAW.

CHAPTER 48.

AN ACT to regulate the sale of concentrated commercial feeding stuffs, defining same and fixing penalties for violations thereof.

Be it enacted by the General Assembly of the Commonwealth of Kentucky:

Section 1. Every bag, barrel or other package of concentrated commercial feeding stuff, manufactured, sold, offered or exposed for sale in, or imported into, this State, shall have securely attached a tag or label, and plainly printed thereon the number of net pounds of concentrated commercial feeding stuff in the package, the name, brand or trade-mark under which the concentrated commercial feeding stuff is sold; the name and address of the manufacturer and the guaranteed analysis, stating the percentage of fat, and the percentage of protein, allowing one per centum of nitrogen to equal 6.25 per centum of protein, these constituents to be determined by the methods adopted by the Association of Official Chemists of the United States; and the ingredients from which it is compounded, also the stamp showing the payment of the inspection fee provided for in this act: Provided, That all concentrated commercial feeding stuffs shall be in standard weight bags or packages of no other than fifty, one hundred, one hundred and fifty, or two hundred pounds each, or less than fifty pounds, or sold in bulk. All concentrated commercial feeding stuffs shipped in bulk to consumers shall be subject to the penalties provided for in this act upon the attempt to evade the guaranteed analysis and the payment of the inspection fee provided for in this act. Provided, further, That nothing in this act shall be construed to restrict or prohibit sales of concentrated commercial feeding stuff material in bulk to each other by importers, manufacturers, or manipulators who mix concentrated commercial feeding stuffs for sale, or as preventing the free, unrestricted shipment of these articles in bulk to manufacturers or manipulators who mix concentrated commercial feeding stuffs for sale.

Sec. 2. The term "concentrated commercial feeding stuffs," as used in this act, shall include, linseed meals, corn and corn-cob meals, cocoanut meals, gluten feeds, gluten meals, germ feeds, corn feeds, starch feeds, sugar feeds, dried brewers' grains, malt sprouts, dried distillers' grains, dried beet refuse, hominy feeds, cerealine feeds, rice meals, rice bran, rice polish, peanut meals, oat feeds, corn and oat feeds, corn bran, wheat bran, wheat middings, wheat shorts, and other mill products, ground beef or fish scraps, mixed feeds, clover meal, alfalfa meal and feeds, peavine meal, cotton-seed meal, velvet bean meal, feeds and meals mixed or unmixed, made from seeds or grains, and all materials of similar nature used for food for domestic animals, condimental feeds, poultry feeds, stock feeds, patented proprietary or trade and market stock and poultry feeds.

Sec. 3. Each and every manufacturer, importer, jobber, agent or seller, before selling, offering or exposing for sale in this State any concentrated commercial feeding stuffs as defined in Section 2 of this act, shall, for each and every feeding stuff bearing a distinguishing name or trade-mark, file with the Director of the Kentucky Agricultural Experiment Station a copy of the statement named in Section 1 of this act: Provided, That whenever a manufacturer, importer or jobber of any concentrated commercial feeding stuff shall have filed the statement named in Section 3 of this act and paid the inspection tax, no agent or seller for said manufacturer, importer or jobber shall be required to file such a statement or pay such a tax for said brand.

Sec. 4. In each year every manufacturer, importer, agent or seller of any concentrated commercial feeding stuff shall pay to the Director of said Experiment Station an inspection fee of twenty cents per ton for each ton of such concentrated commercial feeding stuff sold, offered or exposed for sale in this State: Provided, That when the manufacturer or importer shall have paid the inspection fee for any brand, any person acting as agent or seller for said manufacturer or importer, shall not be required to pay the inspection fee for said brand. It shall be the duty of every person before selling, exposing or offering for sale any concentrated commercial feeding stuff in this State, to attach or cause to be attached to each bag, barrel or package thereof, one of the tags and stamps hereinbefore described.

Sec. 5. Upon receipt of the inspection fee, it shall be the duty of the Director of said Experiment Station to furnish the manufacturers, dealers or importers of concentrated commercial feeding stuffs with stamps or labels in lots to the value of five dollars or any multiple thereof to be attached to each package of concentrated commercial feeding stuff sold or used in this State. Such stamps or labels shall be printed in such form as may be prescribed by the Director of said Experiment Station.

Sec. 6. Each manufacturer or dealer of concentrated commercial feeding stuffs shall forward the money for stamps to the Director of said Experiment Station, who shall pay all such fees received by him into the treasury of the Kentucky Agricultural Experiment Station, the Board of Control of which shall expend the same in meeting all necessary expenses in carrying out the provisions of this act, including the employment of inspectors, chemists, expenses in securing samples, expert witnesses' expenses attending grand juries and courts, printing bulletins, and legitimate expenses of said Experiment Station.

Sec. 7. Any person purchasing any concentrated commercial feeding stuff in this State for his own use may submit fair samples of the said feeding stuff to the Director of the Experiment Station for analysis, but in order to protect the manufacturer or vendor from the submission of spurious samples for analysis, the person selecting the sample shall do so in the presence of two or more disinterested persons (from not less than 10 per cent. of the lot purchased) which sample shall be taken from one or more packages and shall be put into a bottle or can or other package and sealed in the presence of said witnesses, and this sample placed in the hands of a disinterested person, who shall forward the same at the expense of the purchaser to the Director of the Experiment Station, and upon the receipt by him of such sample package, the Director shall make or cause to be made an analysis of the same, and he shall return to such purchaser a certificate of analysis, and the said certificate, when verified by the affidavit of the analyst, shall be competent evidence in any court of law or equity in this State.

Sec. 8. The Director of said Experiment Station is hereby authorized, in person or by deputy, to take samples for analysis not exceeding two pounds in weight from any lot, parcel or package of any concentrated commercial feeding stuff which may be in the possession of any manufacturer, importer, agent, dealer, or transportation company in this State. The said Director shall have one or more samples of such feeding stuff collected as herein provided, analyzed annually and the results published, together with such additional information as he may determine.

Sec. 9. Any manufacturer, importer, jobber, agent or dealer who shall sell, offer or expose for sale in this State any concentrated commercial feeding stuff, as defined in this act, without having complied with the provisions of this act, or who shall sell, offer or expose for sale any concentrated commercial feeding stuff which contains a smaller percentage of protein or fat than the minimum guarantee, or a larger percentage of crude fiber than the maximum guarantee, or who shall adulterate any concentrated commercial feeding stuff with foreign mineral matters or other foreign substance, such as rice hulls, chaff, peanut shells, corn cob meal,

oat hulls, or other similar materials of less or of little or no feeding value, without plainly stating on the label hereinbefore described, the kind and amount of such mixture, or who shall adulterate with any substance injurious to health of domestic animals, shall be guilty of a violation of this act and fined not less than $10 nor more than $100.

Sec. 10. The label attached according to this act to any lot, parcel or package of concentrated commercial feeding stuff offered or exposed for sale in this State, shall be accepted as the guarantee of the manufacturer, importer, jobber, dealer or agent that the said concentrated commercial feeding stuff contains the kinds and amounts of essential ingredients printed on the label or tag, and any person fraudulently attaching or permitting to be attached to any package of concentrated commercial feeding stuff a fraudulent or counterfeit label, or a genuine label used the second time, or label representing it to contain a larger percentage of protein or fat than is actually found by analysis to be contained in said concentrated commercial feeding stuff, shall be guilty of violating this act and may be fined as provided in Section 9, and shall also be liable for reasonable damages sustained by the purchaser of such concentrated commercial feeding stuff; Provided, however, That a small deficiency in protein or fat shall not be considered evidence of fraudulent intent.

Sec. 11. Any manufacturer, seller, dealer, agent, clerk or other person who shall impede, obstruct, hinder or otherwise prevent or attempt to prevent any duly authorized inspector or other person in the performance of his duty in collecting samples or otherwise on duty in connection with this act, shall be guilty of violating this act and shall, upon conviction, be fined not less than $10 nor more than $50.

Sec. 12. It shall be the duty of every prosecuting attorney, county attorney, and city attorney to whom the Director of said Experiment Station shall report any violation of this act, to cause proceedings to be commenced against the party so violating the act, and the same prosecuted in manner required by law.

Sec. 13. The Director of said Experiment Station is empowered to adopt standards for concentrated commercial feeding stuffs and to make and enforce such rules and regulations as he may deem necessary to carry into effect the true intent and meaning of this act.

Sec. 14. The Director of said Experiment Station shall have power to refuse the registration of any feeding stuff under name which would be misleading as to the materials of which it is made, or when the percentage of crude fiber is above or the percentage of fat and protein below the standard adopted for concentrated commercial feeding stuffs by said Director.

Sec. 15. No civil action shall be maintained in any court in this State on account of any sale or other contract made in violation of this act.

Sec. 16. All laws and parts of laws in conflict with this act are hereby repealed.

Approved March 17, 1906.

Objects of the Law

1. To require all feeding stuffs to be tagged, giving the name of the feed, the name and address of the manufacturer or dealer, and the manufacturer's or dealer's guarantee, stating the percentages of protein and fat, and the names of the ingredients from which the feed is made.

2. To protect the consumer against inferior and adulterated feeds.

3. To protect the manufacturer and dealer against dishonest competition.

4. To promote a more rational use of feeding stuffs.

The Essential Ingredients

The protein and fat are the valuable essential constituents of concentrated feeding stuffs. Protein is the nitrogenous substance of all feeding material. It is the most valuable constituent and is the one which produces muscle, sinew, nerve, hair, feathers and milk. And as to the money value, it is those substances in the market containing a large per cent of protein that cost the most.

Fat is the heat and energy producer and has a value some two and one-half times as great as starch and sugar for this purpose. It has no power, however, to produce muscle, sinews, nerves, milk, etc. Protein may also serve as an energy producer and may be used to form fat, but the use for this purpose is not to be recommended as it is not profitable.

Fiber is the cell wall or structural material—the woody portion—of the plant. It is almost valueless in feeding stuffs. It may be looked upon as a filler. It is inert, or nearly so. Usually a feeding stuff having a high percentage of fiber is an indication that it is a low grade feed. The percentage of digestibility of protein is less in materials, high in fiber, but low in protein, such as

corn bran, corn cob meal, straw, oat hulls, etc., than in high grade feed.

How to Buy Feeds

The building up material, or the matter of food in feeding stuffs is all important to the consumer in purchasing feeds. When a consumer buys one hundred pounds of feeding stuff, say shipstuff, which should contain 16 per cent. protein and 4.50 per cent. fat, he buys 16 pounds of actual building up material and 4½ pounds of heat and energy producing substance. If he buys a low grade feed, he gets a correspondingly less amount of food, and likewise, if he buys a higher grade of feed, he gets more food material. A feeding stuff containing a large percentage of fat and little protein would not be of much value as a food. Furthermore, too much fat is not to be recommended on account of the feeding stuff getting rancid if left long after grinding.

All feeds should be bought under a guarantee. The official tag issued by the Experiment Station, and which is required by the law to be attached to all feed, gives the guarantee of the dealer or manufacturer. No purchaser should accept any feed unless it has one of these tags attached. If the feed is not as represented by the official tag attached, then the dealer or manufacturer is responsible and liable under the law for damages.

With all classes of feeds, high percentages of protein and fat indicate high feeding value. On the other hand, a high percentage of fiber usually indicates a low grade feed. Of two feeds containing an equal amount of protein, the one containing the smaller amount of fiber is to be preferred. The amount of protein should determine the price of the feed, other things being equal, and the intelligent feeder is now buying feeds in reference to the amount of digestible protein they contain. At present, however, the prices paid for feeding stuffs bear very little relation to their feeding value. Often the same price is paid for feeds whether they contain 40, 38, 20, 15, or 8 per cent. of protein; but this is a great mistake on the part of the purchaser, as it is the protein in a feeding stuff that is wanted, and the price should be largely determined by the amount of digestible protein it contains.

System of Tagging.

To help the consumer to readily ascertain by the tags the kind and character of feed he is getting, the Station issues three kinds of tags to be put on commercial feeding stuffs. First, a manila tag printed in black ink attached to a feeding stuff indicates at once that the feed is a straight feed, that is, a feed made of one grain only, such as wheat, or corn, or cotton seed, etc. Second, a manila tag printed in red ink indicates the feed is made of the products of two or more grains, such as corn and wheat, or corn, wheat and oats, or cotton seed meal, bran and oats, etc. Third, a yellow tag attached to a feeding stuff indicates that it contains an adulterant, or a substance or substances of little feeding value, or a substance not classed as a feeding stuff, such as cotton seed hulls, oat hulls, peanut hulls, corn cob meal, grit, oyster and clam shells, etc. To illustrate: A feed sold heretofore as cotton seed meal and containing only 22 per cent. protein will have a yellow tag attached, and it cannot be sold as cotton seed meal, because it is a mixture of cotton seed meal and cotton seed hulls. So, likewise, bran, shipstuff, etc., containing corn, cob meal, ground peanut hulls, cannot be sold as bran or shipstuff, and will have a yellow tag attached, indicating that it is not pure.

For condimental or medicated stock feeds, the same form of tag is used for the standard weight of bags and packages, namely: 50, 100, 150, and 200 pounds, as the other feeding stuffs. For packages for less than 50 pounds, tags will be issued with the additional words, "For not over 50 pounds." Such tags are to be attached to bags and packages containing 50 pounds or less. Stickers "For not over 25 pounds" may be used on packages of 25 pounds or less.

Standards Adopted

As the law requires that every bag or package must have a Kentucky official tag attached giving the guarantee of the manufacturer or dealer, and empowers the Director to adopt standards for the different feeding stuffs, the following percentages have been adopted as the minimum of protein and fat and the maximum of fiber in the several feeds mentioned:

	Protein Per cent.	Fat Per cent.	Fiber Per cent.
Shipstuff	15.50	4.20	7.00
Bran	15.00	4.00	8.00
Middlings	15.75	4.25	6.50
Shorts	15.75	4.25	6.50
Corn Bran	9.00	6.50	12.00
Corn Meal	8.50	4.25	2.00
Cracked Corn (or Corn Chop)	8.75	4.00	2.50
Cotton Seed Meal (choice)	42.00	8.50	8.00
Cotton Seed Meal (prime)	38.00	8.50	9.00
Linseed Oil Meal (old process)	32.00	7.50	9.00
Linseed Oil Meal (new process)	33.00	3.00	9.50
Ear Corn Crushed	7.50	4.00	6.60

The following quotation from the Biennial Report of the Connecticut Station for 1907-8, Part 1, page 16, is of interest in this connection:

"The following rules, adopted by the Interstate Cotton Seed Crushers Association in May, 1907, are of importance.

Standard Classification

"Section 1. Choice Cotton Seed Meal must be finely ground, perfectly sound and sweet in odor, yellow, free from excess of lint and hulls, and by analysis must contain at least 8 per cent. of ammonia. (6.59 per cent. nitrogen.)

"Sec. 2. Prime Cotton Seed Meal must be finely ground, of sweet odor, reasonably bright in color, yellow, not brown or reddish, and by analysis must contain at least 7½ per cent. ammonia. (6.2 per cent. nitrogen.)

"Sec. 3. Good Cotton Seed Meal must be finely ground, of sweet odor, reasonably bright in color, and by analysis must contain at least 7 per cent. of ammonia. (5.77 per cent. nitrogen.) etc."

In the above, the percentage of nitrogen 6.59 per cent. is equivalent to 41.19 per cent. protein; 6.2 per cent. nitrogen is equivalent to 38.75 per cent. protein; and 5.77 per cent. nitrogen is equivalent to 36.07 per cent. protein.

Adulterants.

The following table will give an idea of the feeding value of some of the substances commonly used as adulterants:

	Protein Per cent.	Fat Per cent.	Fiber Per cent.
Oat Hulls	3.03	1.06	29.07
Peanut Hulls	4.50	0.81	67.31
Ground Corn Cob	2.50	0.50	30.10
Rice Hulls	3.60	0.70	35.70
Cotton Seed Hulls	4.00	2.00	44.40
Grit, Oyster and Clam Shells	No nutritive value.		

Corn Cockle, on account of its poisonous effect on animals when eaten by them, will be considered an adulterant when found in feeding stuffs. Many instances are on record where animals have died from saponin poison in eating materials containing cockle seeds. Tailings or screenings usually contain a large per cent. of the seed and when fed to stock and poultry in this condition are often injurious to health and sometimes prove fatal.

Method of Inspection.

When the law first went into effect, copies of the law and circular letters were sent to the various manufacturers and dealers and the trade in the State, giving the provisions of the law and its requirements. Inspectors were sent out from the Station and visited as many of the manufacturers and dealers as possible, explaining in detail the provisions of the law and its requirements, and the system adopted in carrying out its provisions.

Since the manufacturers and dealers have become familiarized with the requirements of the law, inspectors are sent over the State to see that these requirements are complied with. All feeds are inspected:

1. To see whether they are properly tagged with the Kentucky official tag.
2. To see if the bags are of the standard weight.
3. To take samples and send them to the Station for chemical and microscopical examinations to ascertain if they are up to the guarantee.

A chemical examination is made to see if the feed is up to guarantee in the essential elements; and a microscopical examination to see if it is adulterated and what the adulterant is. As soon as the examinations are completed, the results are reported to the dealers or manufacturers. If the feeds are found to be adul-

terated or below the guarantee of the manufacturer or dealer, the matter is reported to the prosecuting attorney and court proceedings entered at once.

Results Obtained.

1. Since the operation of the law the sale of adulterated feeds in the State has greatly decreased.

2. It has driven from the market those feeds largely made up of corn cob meal, peanut hull meal, cotton seed hull meal, and oat hulls.

3. It has materially increased the demand for high class feed by the protection it gives to the consumer under the guarantee required of the manufacturer and dealer.

4. It has been a source of education to the consumer and manufacturer and dealer and the trade is more intelligently handled in the State.

The Effects of the Law on Trade.

1. It has stimulated a desire on the part of the consumer to use only high grade feeds.

2. To meet the demand for high grade feed, the dealers are placing on the market only feeds of this character, and are endeavoring to keep them up to the standard.

3. By protecting the dealer and consumer alike it has brought about a more rational use of feeding stuffs.

Guaranteed Analysis of Feeding Stuffs.

The guaranteed analysis of the feeding stuffs as required by the law should give the minimum percentage amounts of protein and fat and the maximum percentage of fiber.

The percentage amount is the amount in 100. If the protein in a feed is 16.5 every 100 pounds of feed contains 16.5 pounds of protein. Since a ton is twenty hundred pounds, a ton of the feed would contain twenty times 16.5, which is 320 pounds of protein in a ton. Likewise the amount of fat and fiber may be determined.

Composition of Feeds.

Feeds are examined chemically and microscopically.

By chemical analysis feeds are separated into the following substances: Water, protein, fat, nitrogen-free extract, fiber, and ash.

By microscopical examination feeds are examined for adulterants and what the adulterants are.

Water in feeds is the natural moisture common to all grain and feed stuffs and varies from a few to as much as fifteen or more per cent. according to whether it is stored in a damp or dry place, the kind of feed stuff and its age or state of greenness, etc.

Protein is the nitrogenous constituent of feed, and is a name that includes such bodies as the gluten of wheat, the albumen or white of egg, lean part of beef, the fibrin of blood, and varies from a few to as many as forty-five per cent., or even more, in different kinds of feeding stuffs.

Fat is the oily constituent of feeds and varies greatly in percentage in the different classes of feeds.

Nitrogen-free extract, in the usual table of analysis, includes sugar and starch. In grains the per cent. runs from 50 to 75, while in the hulls, chaff and other waste parts of grain the amount is considerably less. The word carbohydrates is sometimes used instead of nitrogen-free extract.

Fiber, or crude fiber, as it is called in the analysis of feeds, is the structural material or woody part of grains, hay and other feeding stuffs and is lowest in amount in the hulled corn, and the highest in the husk of grain such as cotton seed hulls, oat hulls, peanut hulls, chaff, corn cob, etc.

Ash is the mineral constituent of feeds and consists principally of phosphate of lime and potash.

Function of Nutrients.

Protein, fat, nitrogen-free extract, and ash or mineral matter of feeds are called nutrients on account of their function in building up the growth or repairing the natural waste in animal bodies. Each of these nutrients performs a certain function in the building up and maintaining the animal body and may be described as follows:

Water is not a nutrient in the sense of the term used here, though no animal body can be maintained without it. The amount of moisture found in feeding stuffs has but little to do with the food value of a feed, because the animal obtains an abundant supply from other sources. However, an excessive amount lowers the keeping quality of a feed and also its money and food value, because every per cent. of water means a per cent. less of solid food.

Protein is the nitrogenous substance of feeds and is by far the most valuable constituent because the various bodies belonging to this class are the only ones that can supply the nitrogenous nutrients that are essential in building up the tissues of the body. For instance, such substances as albumen, lean meat, gluten flour, fibrin of blood, casein or curd of milk, etc.

These protein constituents of feeds produce flesh, muscle, ligaments, glandular secretions, tissues, milk, blood, tendons, hair, hoofs, horn, hide, and all portions of the animal machine which have strength, including the bones which contain about 25 or 30 per cent. of a nitrogenous substance. No other constituent of food can supply the function of protein. While fats and the nitrogen-free extract, which consists chiefly of carbohydrates, can take the place of each other, and protein can perform the work of both of them in furnishing energy to the body, neither fats nor carbohydrates can perform the office of protein, because protein contains nitrogen from 15 to 17 per cent., while all the other constituents of food contain practically none.

Protein may also serve as an energy producer and may be used to form fat, but the use for such purpose is not to be recommended, as it is too costly for this use, and therefore unprofitable. It is readily seen, therefore, that a food that can supply the largest amount of this important constituent would be the most valuable, digestibility being considered, from a dietetic standpoint.

Fiber is the woody portion, or structural material, of plants. It is practically valueless in feeding stuffs. It may be used as roughness, and its only value in feeds would be for that purpose. It is inert, or nearly so. Usually a feeding stuff having a high percentage of fiber is an indication of a low grade of feed.

Carbohydrates, the chief constituent of the nitrogen-free extract, and fats perform the same functions in the body—those of

the production of heat to keep the body warm and energy to give movement. They are the "heat and force producers," being consumed in the body as fuel, giving out heat, muscular and intellectual energy. Fats have about two and one-fourth times the value of carbohydrates as heat producers. Besides serving as "heat and force producers," carbohydrates are converted into fats in the animal body and stored as such in the fatty tissues.

Ash, or the mineral constituent, consists principally of the phosphates of potash and lime. These are needed in producing the bony structures and the various tissues and secretions of the body.

Classification of Feeding Stuffs.

A general classification of feeding stuffs may be made as follows:

1. High in protein (40 per cent and over): cotton seed meal; ground meats; dried blood, etc.
2. Rich in protein (25 to 40 per cent.): linseed meal, gluten meal; buckwheat middlings; soja beans; brewer's dried grains; distiller's dried grains from corn, etc.
3. Fair in protein (15 to 25 per cent.): wheat shorts; bran; middlings; oat shorts; rye shorts; gluten feed; distiller's dried grains from rye, etc.
4. Low in protein (12 per cent. and below): corn bran; corn meal; grains; hays, etc.

Definition and Description of Products.

The term "concentrated commercial feeding stuff" is usually applied to a class of substances which in a majority of cases are by-products of milling and certain manufacturing industries. Many of these articles, bran, shorts, middlings, cotton seed meal, oil meal, etc., and mixtures of these products, have been the daily food of domestic animals for many years. These products are mainly as follows:

FROM WHEAT.

Bran—This consists of the outer portion of the wheat grain and is a valuable feed because of its protein and fat content.

Shorts and Middlings—In the feeding stuff trade these two products are usually considered the same. They are composed of the coatings of the wheat grain just beneath the bran coating and are made up of the smaller fragments with portions of the more starchy parts of the grain. These products are rich in protein and fat and make an excellent feed.

Wheat Germ—This consists of the embryo of the wheat grain. It is rich in oil and protein.

Shipstuff—The term "shipstuff" is usually applied to a mixture of bran and middlings or shorts, or bran, middlings and shorts. This makes an ideal feed.

"Red Dog"—This is a term applied to low grade flour.

FROM CORN.

Corn Bran—This is the outer coat of the corn grain. It is high in fiber and low in feeding value.

Gluten Meal—This by-product of corn is produced in the manufacture of starch It is the more nitrogenous portion of the corn grain which lies just beneath the bran coating. It is what is left after the bran, germ and starch are taken from the grain in the manufacture of starch.

Hominy Meal—Consists of part of the starch, the germ and the bran coating of the grain.

Hominy Hearts are by-products in the manufacture of hominy, etc., and consist of the germ or heart of the grain.

Germ Meal—This by-product is also produced in the manufacture of starch from corn. It is the nitrogenous and fatty substance left after extracting the oil from the germ of the corn. It is very digestible and makes an excellent feed.

Feed Meal is the whole grain of corn ground fine.

Corn Chop is the crushed grain of corn.

Corn Cob—This consists largely of woody fiber and consequently has low feeding value. When corn has not fully ripened, more nutrient remains in the cob and it contains less woody fiber.

Corn and Cob Meal—This consists of ear corn crushed or ground without separating the cob.

FROM OATS.

Oats are usually fed whole or crushed. The by-product from the manufacture of oat meal is the husk or hull and is largely composed of woody fiber, and has little or no feeding value.

FROM BARLEY.

Malt Sprouts—Malt is produced by soaking barley and allowing it to germinate until shoots attain a certain size. The malt is then kiln dried and the shoots broken off. These dried shoots are called malt sprouts and are rich in protein.

Brewer's Dried Grains consist of the residue left after the "mashing" the malt whereby the greater portion of the carbohydrates are converted into sugar and removed, leaving protein. When dried they make a valuable feed.

Distiller's Dried Grains are a by-product in the manufacture of whiskey and alcohol—the slop remaining after the distillation is strained through filter presses, and the solid matter is then kiln dried, producing a valuable feed, since it contains a greater part of the protein of the original grain.

FROM COTTON SEED.

Cotton Seed Meal—This is a by-product of the cotton seed oil industry and is the portion left after the oil has been extracted. It is rich in protein and fat.

Cotton Seed Hulls—This is the outer portion of the cotton seed. They have little or no feeding value and are largely made up of woody fiber.

FROM FLAX SEED.

Linseed Meal is a by-product of the linseed oil industry, being the part that is left after extracting the oil from the ground flax seed. There are two kinds of linseed meal on the market, known as "old process" and "new process" meal. On account of the perfect extraction of the oil by the "new process" the "old process" meal is the richer of the two in fat.

Free Analyses to Consumers.

The law provides in Section 7 that any one who buys a concentrated feeding stuff for his own use may send a sample to the Experiment Station for free analysis. These samples should be carefully taken in the manner prescribed in the law and should be accompanied by a certificate of the following form:

CERTIFICATE FOR FREE ANALYSIS.

.....190..

M. A. Scovell, Director, Lexington, Ky.:

This is to certify that I am not a dealer in, or agent for the sale of any concentrated commercial feeding stuffs, and that the feeding stuff, a sample of which I have sent by express to you for free analysis, was purchased by me .....190.. from an agent or dealer in Kentucky for my own use and not for sale.

I further certify that the sample was taken at the time of purchase from at least 10 per cent. of the sacks or other packages comprising the whole lot purchased, and that it was taken as provided in Section 7 (Concentrated Commercial Feeding Stuffs law) in the following described manner, to-wit:.....

.....

.....

.....

.....

Upon receipt of the analysis from you, I agree to furnish you with a tag taken from one of the sacks sampled, the name and address of the firm or agent of whom the feeding stuff was purchased, and the amount purchased.

(Signature).....

(P. O. Address).....

Signature of Witnesses:

.....

.....

Blank certificates may be obtained by application to the Director of the Experiment Station.

2. *Analyses of Inspectors' Samples—*

In the following tables are printed the analyses of all samples collected by our inspectors up to the date of publication of this bulletin, from concentrated feeds on the market. The numbers in the first column are the registration numbers. Those followed by a star (*) come under last year's registration list and should be compared with the guarantees for 1906. We have attempted to bring together all feeds of the same name, beginning with bran, middlings, shorts, and shipstuffs; then corn products; mill run and mixed feeds; and finally miscellaneous feeds, or those having trade names. In the column headed "Remarks" the expression "Ingredients as guaranteed" does not refer to the percentages of protein and fat, but denotes that we find the same ingredients present in the sample examined that were guaranteed by the manufacturer or dealer and printed on the official tag.

In 1906, a small proportion of corn product, not to exceed five per cent., was permitted to be run into wheat products. In accordance with this ruling, the samples of wheat products collected in 1906 which were found to contain less than five per cent. of corn product were not pronounced adulterated. Our examinations showed, however, that the privilege was being abused to such an extent that it became necessary to change this ruling, and we now consider the presence of corn product in appreciable quantity as an adulteration, unless stated in the guarantee and printed on the tag. Several cases of this kind of adulteration will be found in the tables; but we are now able to state that most of these have been corrected by the manufacturers in 1907. On this account the proportion of adulterated feeds shown in this table is larger than now exists on the market in the State.

We do not include in this table several hundred analyses of samples sent in by the manufacturers and dealers for registration purposes.

The chemical analyses reported in this bulletin were made by Messrs. B. R. Hart and H. D. Spears, and also most of the microscopical examinations. The rest of the microscopical examinations, including the most difficult ones, were made by Dr. H. Garman and Miss Mary L. Didlake, of the Division of Entomology and Botany.

Table of Analyses of Samples Collected in 1906-7.

Registration No.	BRAND	MANUFACTURER.
269*	Wheat Bran	Ashland Milling Co., Ashland, Ky.
155	Ballard's Bran	Ballard & Ballard Co., Louisville, Ky.
322*	Bran	Bate & Henderson, Vanceburg, Ky.
3	Bran	Beshers & Jackson, Columbus, Ky.
3	Bran	Beshers & Jackson, Columbus, Ky.
110	Bran	O. S. Bryant, Scottsville, Ky.
528	Bran	F. E. Case, Hickman, Ky.
165	Bran	College Mill Co., Franklin, Ky.
475	Bran	Dahnke-Walker Milling Co., Union City, Tenn.
475	Bran	Dahnke-Walker Milling Co., Union City, Tenn.
420	Bran	Dukedom Roller Mills Co., Dukedom, Tenn.
366	Wheat Bran	T. E. Ford, Paducah, Ky.
366	Wheat Bran	T. E. Ford, Paducah, Ky.
366	Wheat Bran	T. E. Ford, Paducah, Ky.
366	Wheat Bran	T. E. Ford, Paducah, Ky.
547	Wheat Bran	French Milling Co., Fulton, Ky.
478*	Bran	Gentry & Kenney, Danville, Ky.
82	Wheat Bran	Greenup Milling Co., Greenup, Ky.
495*	Bran	H. P. Hawkins & Son, Paducah, Ky.
495*	Bran	H. P. Hawkins & Son, Paducah, Ky.
495*	Bran	H. P. Hawkins & Son, Paducah, Ky.
495*	Bran	H. P. Hawkins & Son, Paducah, Ky.
42*	Bran	Hiner & Gardner, Vanceburg, Ky.

Table of Analyses of Samples Collected in 1906-7.

OBTAINED FROM	ANALYSES.				REMARKS
	Protein		Fat		
	Guaranteed.	Found	Guaranteed.	Found	
Manufacturer's Warehouse	15.81	12.24	2.95	4.00	Adulterated with 40 per cent. corn bran
C. H. Dugan, Elizabethtown, Ky.....	15.25	14.78	4.60	4.08	Ingredients as guaranteed
Manufacturer's Warehouse	15.43	16.31	4.00	4.00	Ingredients as guaranteed
Hickman Grocery Co., Hickman, Ky...	14.06	16.31	4.07	4.69	Ingredients as guar.
Hickman Joint Stock Co., Hickman,Ky.	14.06	15.50	4.07	4.26	Adul. with corn bran
L. Plumlee & Sons, Scottsville, Ky....	15.08	14.25	4.34	3.95	Adul. with corn bran
Manufacturer's Warehouse	14.94	15.25	4.27	4.10	Adult'ed with small per cent. corn bran
R. E. Wilson & Co., Scottsvills, Ky....	15.56	14.10	4.68	4.97	Ingredients as guar.
A. S. Barklett & Co., Hickman, Ky....	16.00	15.35	4.06	5.06	Ingredients as guar.
Ellison Bros., Hickman, Ky.....	16.00	14.88	4.06	4.48	Adul. with corn bran
Shacklett-Thomas Hdw. Co., Fulton,Ky	14.12	13.91	3.73	5.22	Adul. with corn bran
H. Crick, Paducah, Ky.....	16.93	14.52	4.55	4.57	Adult'ed with straw and hulls
Herman Dixon, Paducah, Ky.....	16.93	14.22	4.55	4.70	Adul. with corn bran
J. E. Payne, Paducah, Ky.....	16.93	14.41	4.55	4.65	Adul. with corn bran and hulls
T. J. Wood, Lone Oak, Ky.....	16.93	15.16	4.55	4.64	Adul. with corn bran
Shacklett-Thomas Hdw. Co., Fulton,Ky	13.91	15.37	4.23	4.92	Adult'ed with small per cent. corn bran
Manufacturer's Warehouse	14.56	16.45	4.90	3.78	Ingredients as guar.
Manufacturer's Warehouse	15.00	16.00	4.50	4.10	Ingredients as guar.
J. W. Bell's Dairy Barn, Paducah, Ky.	14.50	15.03	3.70	4.76	Ingredients as guar.
Mrs. A. Sanderson, Lone Oak, Ky.....	14.50	14.69	3.70	5.09	Adul. with corn bran and chaff
C. W. Ingram, Paducah, Ky.....	14.50	14.88	3.70	4.83	Adul. with corn bran
J. F. Brandon & Son, Benton, Ky....	14.50	15.39	3.70	4.80	Adul. with corn bran
Manufacturer's Warehouse	15.00	15.43	4.50	3.70	Ingredients as guar.

Table of Analyses of Samples Collected in 1906-7.

Registration No.	BRAND	MANUFACTURER.
239	Bran	R. U. Kevil & Sons, Mayfield, Ky.
41*	Bran	R. U. Kevil & Sons, Princeton, Ky.
—	Bran	Lexington Roller Mills, Lexington, Ky.
13*	Bran	R. C. Mansfield & Son, Winchester, Ky.
400	Bran	Moscow Roller Mills, Moscow, Ky.
261*	Bran	Orndorff & Russell, Adairville, Ky.
351	Wheat Bran	R. C. Poage Milling Co., Ashland, Ky.
351	Wheat Bran	R. C. Poage Milling Co., Ashland, Ky.
424	White Swan Bran	T. A. Sandefur, Henderson, Ky.
439*	Bran	E. F. Spears & Sons, Paris, Ky.
145*	Bran	Springfield Roller Mills, Springfield, Ky.
152	Bran	Washburn-Crosby Milling Co., Louisville, Ky.
199*	Bran	J. W. Webb & Sons, Vanceburg, Ky.
199*	Bran	J. W. Webb & Sons, Vanceburg, Ky.
16	Bran	Phil. J. Weisenberger, Midway, Ky.
16	Bran	Phil. J. Weisenberger, Midway, Ky.
16	Bran	Phil. J. Weisenberger, Midway, Ky.
—	Bran	Winchester Roller Mills, Winchester, Ky.
427	Winter Wheat Middlings	Akin-Erskine Milling Co., Evansville, Ind.
268*	Middlings	Ashland Milling Co., Ashland, Ky.
84*	Middlings	Greenup Milling Co., Greenup, Ky.
15*	Middlings	R. C. Mansfield & Son, Winchester, Ky.
166	Middlings	R. C. Poage Milling Co., Ashland, Ky.

Table of Analyses of Samples Collected in 1906-7.

OBTAINED FROM	ANALYSES.				REMARKS
	Protein		Fat		
	Guaranteed.	Found	Guaranteed.	Found	
Mayfield Grocery Co., Mayfield, Ky....	15.00	14.47	4.95	5.37	Adul. with corn products
A. Cash & Co., Princeton, Ky.....	15.00	16.31	4.95	4.62	Ingredients as guaranteed
Manufacturer's Warehouse	.....	15.31	.....	3.88	Wheat product
Manufacturer's Warehouse	15.00	17.00	4.50	4.33	Ingredients as guar.
Ellison Bros., Hickman, Ky.....	15.30	14.47	4.06	3.98	Ingredients as guar.
Young & Orndorff, Adairville, Ky.....	15.31	14.41	4.67	5.33	Ingredients as guar.
Young & Orndorff, Adairville, Ky.....	15.37	15.56	3.31	3.55	Ingredients as guar.
Tom Williams, Pikeville, Ky.....	15.37	12.76	3.31	3.21	Adul. with corn bran
C. L. McDonald, Henderson, Ky.....	15.00	14.22	4.50	5.01	Adult'ed with large per cent. corn bran
Manufacturer's Warehouse	14.68	17.18	4.70	4.30	Ingredients as guar.
Manufacturer's Warehouse	15.00	14.50	4.50	4.46	Adul. with corn bran
W. H. Luesing	16.00	15.25	4.00	4.45	Ingredients as guar.
Manufacturer's Warehouse	15.00	14.68	4.50	3.80	Ingredients as guar.
Manufacturer's Warehouse	15.00	15.70	4.50	4.69	Ingredients as guar.
Roszell Bros., Lexington, Ky.....	14.43	14.71	4.31	5.16	Adul. with corn bran
Roszell Bros., Lexington, Ky.....	14.43	14.84	4.31	5.48	Adul. with corn bran
John Luigart, Lexington, Ky.....	14.43	15.12	4.31	5.08	Ingredients as guar.
Manufacturer's Warehouse	.....	15.00	.....	4.03	Wheat product
Central Coal & Iron Co., Cent. City, Ky.	16.36	16.31	4.50	5.23	Ingredients as guar.
Manufacturer's Warehouse	16.81	16.31	4.07	4.95	Adul. with corn bran
Manufacturer's Warehouse	16.50	17.87	4.75	4.79	Ingredients as guar.
Manufacturer's Warehouse	16.50	17.25	4.75	4.88	Ingredients as guar.
Manufacturer's Warehouse	16.75	16.25	4.41	3.50	Ingredients as guar.

Table of Analyses of Samples Collected in 1906-7.

Registration No.	BRAND	MANUFACTURER.
146*	Middlings	Springfield Roller Mills, Springfield, Ky.
200*	Middlings	J. W. Webb & Sons, Vanceburg, Ky.
156	Ballard's Shorts	Ballard & Ballard Co., Louisville, Ky.
138	Shorts	Bowling Green Milling Co., Bowl'g Green, Ky.
138	Shorts	Bowling Green Milling Co., Bowl'g Green, Ky.
442	Shorts	Edinger & Co., Louisville, Ky.
4	"We-Kno" Shorts	Oscar Farmer & Sons, Louisville, Ky.
—	Shorts	Lexington, Roller Mills, Lexington, Ky.
—	"Double S." Shorts	A. Schneider's Sons, Louisville, Ky.
153	Shorts	Washburn-Crosby Co., Louisville, Ky.
153	Shorts	Washburn-Crosby Co., Louisville, Ky.
153	Shorts	Washburn-Crosby Co., Louisville, Ky.
153	Shorts	Washburn-Crosby Co., Louisville, Ky.
15	Shipstuff	Acme Mills & Elevator Co., Hopkinsville, Ky.
157	Ballard's Shipstuff	Ballard & Ballard Co., Louisville, Ky.
157	Ballard's Shipstuff	Ballard & Ballard Co., Louisville, Ky.
84	Shipstuff	Bergenroth Bros., Troy, Ind.
401	Shipstuff	Carlisle Milling Co., Carlisle, Ky.
401	Shipstuff	Carlisle Milling Co., Carlisle, Ky.
136*	Shipstuff	Crescent Milling Co., Cynthiana, Ky.
454	Shipstuff	Crescent Milling Co., Hopkinsville, Ky.
17*	Shipstuff	Danville Roller Mills Co., Danville, Ky.
445	Shipstuff	Edinger & Co., Louisville, Ky.

Table of Analyses of Samples Collected in 1906-7.

OBTAINED FROM	ANALYSES. Protein Guaranteed.	Protein Found	Fat Guaranteed.	Fat Found	REMARKS
Manufacturer's Warehouse	16.50	14.31	4.75	3.48	Ingredients as guaranteed
Manufacturer's Warehouse	16.50	15.93	4.75	3.50	Ingredients as guar.
Schwartz Bros., Louisville, Ky.....	15.25	15.84	4.60	4.30	Ingredients as guar.
Geo. T. Massey, Bowling Green, Ky..	17.31	16.38	4.47	5.90	Ingredients as guar.
B. S. Sweeza, Glasgow, Ky.....	17.31	16.90	4.47	6.61	Ingredients as guar.
B. J. Brumlee, Louisville, Ky.....	16.00	16.16	5.00	4.34	Ingredients as guar.
Frank Birchler, Louisville, Ky.....	15.34	15.09	4.00	4.29	Ingredients as guar.
Manufacturer's Warehouse	.....	16.37	.....	4.60	Wheat product
Manufacturer's Warehouse	.....	14.91	.....	3.34	Adul. with corn bran
C. J. Clausen, Louisville, Ky.....	18.00	17.06	4.50	4.63	Ingredients as guar.
C. J. Clausen, Louisville, Ky.....	18.00	16.59	4.50	4.56	Ingredients as guar.
Riley & Miller, Louisville, Ky.....	18.00	17.44	4.50	4.77	Ingredients as guar.
Ritter & Herring, Louisville, Ky.....	18.00	16.12	4.50	4.23	Ingredients as guar.
J. H. West, Hopkinsville, Ky.....	15.37	15.09	4.49	4.75	Ingredients as guar.
Schwartz Bros., Louisville, Ky.....	16.50	16.06	4.80	4.08	Ingredients as guar.
Reidling Bros., Louisville, Ky.....	16.50	16.21	4.80	4.08	Ingredients as guar.
Amos Yaeger, Louisville, Ky.....	15.68	15.47	3.95	4.42	Ingredients as guar.
Manufacturer's Warehouse	16.00	17.00	4.50	4.40	Ingredients as guar.
Ratcliffe & Co., Carlisle, Ky.....	16.00	16.81	4.50	4.38	Ingredients as guar.
Ratcliffe & Co., Carlisle, Ky.....	15.06	16.68	4.68	4.40	Ingredients as guar.
Overby & McKeel, Murray, Ky.....	16.00	16.30	4.50	4.94	Ingredients as guar.
Manufacturer's Warehouse	16.00	12.02	4.50	0.93	Adul. with corn products
Bonnycastle & Wilder, Louisville, Ky.	16.00	17.12	4.00	4.60	Ingredients as guar.

Table of Analyses of Samples Collected in 1906-7.

Registration No.	BRAND	MANUFACTURER.
—	Shipstuff	T. E. Ford, Paducah, Ky.
490	Shipstuff	J. F. Frost & Son, Wingo, Ky.
490	Shipstuff	J. F. Frost & Son, Wingo, Ky.
285*	Shipstuff	Greenville Milling Co., Greenville, Ky.
285*	Shipstuff	Greenville Milling Co., Greenville, Ky.
336	Shipstuff	D. V. Kennedy, Stanford, Ky.
64	Thoroughbred Shipstuff	Lexington Roller Mills, Lexington, Ky.
258*	Shipstuff	Livermore Milling Co., Livermore, Ky.
278*	Shipstuff	McAlister & Hayden, Stanley, Ky.
126*	Shipstuff	Model Milling Co., Smith's Grove, Ky.
279	Shipstuff	Monarch Milling Co., Mt, Sterling, Ky.
34*	Shipstuff	Murray Mill & Light Co., Murray, Ky.
125	Shipstuff	Nolin Milling Co., Nolin, Ky.
554	Bostain's Shipstuff	Sharpsburg Roller Mills, Sharpsburg, Ky.
554	Bostain's Shipstuff	Sharpsburg Roller Mills, Sharpsburg, Ky.
—	Shipstuff	E. F. Spears & Sons, Paris, Ky.
203*	Wheat Bran and Shipstuff	The Star Mills, Owensboro, Ky.
292	Shipstuff	Temple Bros. & Co., Paducah, Ky.
337	Shipstuff	W. Trow & Co., Madison, Ind.
17	Shipstuff	Phil. J. Weisenberger, Midway, Ky.
17	Shipstuff	Phil. J. Weisenberger, Midway, Ky.
82	Shipstuff	Winchester Roller Mills, Winchester, Ky.
82	Shipstuff	Winchester Roller Mills, Winchester, Ky.

Table of Analyses of Samples Collected in 1906-7.

OBTAINED FROM	ANALYSES. Protein Guaranteed.	Protein Found	Fat Guaranteed.	Fat Found	REMARKS
C. M. Black, Paducah, Ky.	.....	14.34	.....	4.96	Adul. with corn bran and hulls
J. D. Robertson, Mayfield, Ky.	14.81	14.63	4.00	4.88	Adul. with corn bran gr'd corn & hulls
A. J. Wheeler, Mayfield, Ky.	14.81	14.53	4.00	4.67	Adul. with corn bran and crushed corn
H. E. Eaves, Greenville, Ky.	15.68	15.56	4.13	5.94	Adul. with corn bran and chaff
Wickliffe Bros., Greenville, Ky.	15.68	14.72	4.13	5.03	Adult'ed with large per cent. corn bran
Manufacturer's Warehouse	16.12	15.37	3.29	4.01	Ingredients as guaranteed
Louis des Cognets & Co., Lexington, Ky	15.59	14.54	4.77	4.39	Ingredients as guar.
J. R. Carr, Central City, Ky.	15.25	14.69	3.00	3.66	Ingredients as guar.
Rapier Grain & Feed Co., Owensboro, Ky	15.06	14.28	4.20	4.93	Adul. with corn bran
Park City Seed Store, Bowl'g Green, Ky.	16.00	14.00	4.50	4.65	Ingredients as guar.
Manufacturer's Warehouse	16.56	16.37	4.00	4.13	Ingredients as guar.
Manufacturer's Warehouse	16.00	14.85	4.50	4.78	Adul. with corn bran
C. H. Dugan, Elizabethtown, Ky.	15.00	14.65	4.50	5.03	Ingredients as guar.
I. F. Tabb, Mt. Sterling, Ky.	16.00	16.31	4.50	4.11	Ingredients as guar.
Ratcliffe & Co., Carlisle, Ky.	16.00	16.43	4.50	4.10	Ingredients as guar.
Manufacturer's Warehouse	.....	16.93	.....	3.45	Wheat product
E. G. Field, Owensboro, Ky.	15.68	14.22	4.08	4.30	Ingredients as guar.
Mrs. Alma Griffith, Paducah, Ky.	14.81	14.53	4.28	5.07	Ingredients as guar.
Clore & Hunt, Beards, Ky.	15.37	15.02	5.93	4.78	Ingredients as guar.
Roszell Bros., Lexington, Ky.	14.19	14.80	4.44	5.42	Adul. with corn bran
Roszell Bros., Lexington, Ky.	14.19	15.18	4.44	5.58	Adul. with corn bran
F. P. Blair, Morehead, Ky.	15.50	15.50	3.73	4.23	Ingredients as guar.
Manufacturer's Warehouse	15.50	15.63	3.73	4.73	Ingredients as guar.

Table of Analyses of Samples Collected in 1906-7.

Registration No.	BRAND	MANUFACTURER.
130	Shipstuff	Wolcott Bros., South Carrollton, Ky.
465*	Shipstuff	R. H. Wolf, Georgetown, Ky.
—	Corn Bran	T. E. Ford, Paducah, Ky.
—	Corn Bran	T. E. Ford, Paducah, Ky.
—	Corn Bran	T. E. Ford, Paducah, Ky.
279*	Corn Bran	McAlister & Hayden, Stanley, Ky.
97*	Corn Bran	Patton Milling Co., Catlettsburg, Ky.
267*	Corn Chop	Ashland Milling Co., Ashland, Ky.
22	Corn Chop	Ashland Milling Co., Ashland, Ky.
22	Corn Chop	Ashland Milling Co., Ashland, Ky.
321*	Cracked Corn	Bate & Henderson, Vanceburg, Ky.
476	Corn Chop	Big Sandy Milling Co., Louisa, Ky.
240	Corn Chop	C. W. Bransford, Owensboro, Ky.
343	Corn Chop	Chas. Broeker & Co., Owensboro, Ky.
343	Corn Chop	Chas. Broeker & Co., Owensboro, Ky.
490*	Corn Chop	D. J. Burchett, Jr., Louisa, Ky.
194	Callahan's Cracked Corn	Callahan & Sons, Louisville, Ky.
360	Corn Chop	Dukedom Roller Mills, Dukedom, Tenn.
453	Favorite Corn Chop	Factory Addition Mills, Owensboro, Ky.
434	Corn Chop	Hiner & Gardner, Vanceburg, Ky.
264	Crushed Corn	Louisville Cereal Mill Co., Louisville, Ky.
264	Crushed Corn	Louisville Cereal Mill Co., Louisville, Ky.
264	Crushed Corn	Louisville Cereal Mill Co., Louisville, Ky.

Table of Analyses of Samples Collected in 1906-7.

OBTAINED FROM	ANALYSES. Protein Guaranteed.	Protein Found	Fat Guaranteed.	Fat Found	REMARKS
J. R. Carr, Central City, Ky.	16.00	15.19	4.50	4.86	Adul. with corn bran
Jos. Burke, Georgetown, Ky.	16.00	15.57	4.70	4.71	Adul. with corn bran
H. Crick, Paducah, Ky.	.....	11.72	.....	7.12	Corn product
L. T. Gilbert, Paducah, Ky.	.....	10.86	.....	6.07	Contained gr'd corn
C. W. Ingram, Paducah, Ky.	.....	11.19	.....	6.69	Contained gr'd corn
Eureka Flour & Feed Store. Owensboro, Ky.	8.56	9.03	8.11	6.48	Ingredients as guaranteed
Kelly Likens, Ashland, Ky.	9.00	7.09	5.00	4.70	Ingredients as guar.
Manufacturer's Warehouse	8.50	8.31	3.52	3.85	Adul. with corn cob
John Bradley, Ashland, Ky.	8.50	8.26	3.52	4.20	Ingredients as guar.
In transit	8.50	8.75	3.52	3.89	Ingredients as guar.
Manufacturer's Warehouse	8.12	8.62	3.65	3.61	Ingredients as guar.
Sam Hatcher, Allen, Ky.	8.90	8.47	3.98	4.22	Ingredients as guar.
J. Geo. Zinsz, Owensboro, Ky.	8.00	8.78	4.00	3.86	Ingredients as guar.
W. E. Brock, Owensboro, Ky.	8.37	9.59	4.15	5.36	Ingredients as guar.
Ratikin & Johnson, Owensboro, Ky.	9.40	7.41	4.80	2.97	Ingredients as guar.
Manufacturer's Warehouse	8.93	8.66	4.13	4.30	Adul. with corn bran
B. J. Brumleve, Louisville, Ky.	8.62	8.69	4.00	4.50	Ingredients as guar.
H. F. Taylor, Fulton, Ky.	8.18	8.64	3.43	5.48	Ingredients as guar.
Skillman & Co., Owensboro, Ky.	8.55	8.12	4.01	4.13	Ingredients as guar.
Manufacturer's Warehouse	8.86	9.06	3.43	4.68	Ingredients as guar.
W. H. Luesing, Louisville, Ky.	8.52	9.00	4.05	4.23	Ingredients as guar.
Bonnycastle & Wilder, Louisville, Ky.	8.52	9.56	4.05	7.39	Ingredients as guar.
C. Merhoff's Sons, Louisville, Ky.	8.52	11.53	4.05	7.03	Cont'ned wheat bran

Table of Analyses of Samples Collected in 1906-7.

Registration No.	BRAND	MANUFACTURER.
280	Cracked Corn	Monarch Milling Co., Mt. Sterling, Ky.
46*	Cracked Corn	Monarch Milling Co., Mt. Sterling, Ky.
148	Corn Chop	Patton Milling Co., Catlettsburg, Ky.
168	Corn Chop	R. C. Poage Milling Co., Ashland, Ky.
174	Crushed Corn	F. Raidt Milling Co., Louisville, Ky.
394	Corn Chop	G. W. Robinson, Waitman, Ky.
—	Corn Chop	Stafford Milling Co., Martin, Tenn.
217	"Anchor" Cracked Corn	Standard Cereal Co., Chillicothe, Ohio.
223*	Corn Chop	Star Mills, Owensboro, Ky.
61	Sterling Chop	I. F. Tabb, Mt. Sterling, Ky.
176*	Sterling Chop	I. F. Tabb, Mt. Sterling, Ky.
261*	Corn Chop	J. W. Webb & Sons, Vanceburg, Ky.
311	Corn Chop	J. W. Zaring Grain & Mill Co., Richmond, Ky.
265	Hominy Hearts	Louisville Cereal Mill Co., Louisville, Ky.
265	Hominy Hearts	Louisville Cereal Mill Co., Louisville, Ky.
177	Feed Meal	C. H. Aubrey, Stithton, Ky.
483*	Dorsel's Corn Meal	The Dorsel Co., Newport, Ky.
195	Feed Meal	Callahan & Sons, Louisville, Ky.
172	Feed Meal	F. Raidt Milling Co., Louisville, Ky.
173	Hominy Meal	F. Raidt Milling Co., Louisville, Ky.
343	Hominy Feed	Chas. Broeker & Co., Owensboro, Ky.
—	Cotton Seed Meal	Frank Birchler (dealer), Louisville, Ky.
—	Cotton Seed Meal	C. S. Brent, Lexington, Ky.

Table of Analyses of Samples Collected in 1906-7.

OBTAINED FROM	ANALYSES. Protein Guaranteed.	Protein Found	Fat Guaranteed.	Fat Found	REMARKS
J. F. Tabor, Olive Hill, Ky.	9.40	8.72	4.80	3.12	Ingredients as guaranteed
Manufacturer's Warehouse	9.40	7.93	4.80	3.83	Ingredients as guar.
In transit	9.40	8.70	4.80	3.73	Ingredients as guar.
In transit	8.31	8.38	3.85	3.94	Ingredients as guar.
Jno. Webber, Louisville, Ky.	8.68	8.66	3.85	3.17	Ingredients as guar.
Eureka Flour & Feed Store Owensboro, Ky.	8.87	9.06	4.28	4.69	Ingredients as guar.
Rucker Bros., Fulton, Ky.	.....	8.16	.....	4.00	Corn product
A. M. Glenn, Ashland, Ky.	8.37	8.97	4.33	4.20	Ingredients as guar.
F. E. Johnson, Owensboro, Ky.	8.62	7.93	3.64	4.51	Ingredients as guar.
Manufacturer's Warehouse	9.40	8.38	4.80	2.20	Ingredients as guar.
Manufacturer's Warehouse	9.40	8.25	4.80	4.00	Ingredients as guar.
Manufacturer's Warehouse	9.18	8.56	3.77	4.03	Ingredients as guar.
Manufacturer's Warehouse	8.75	8.87	4.18	3.98	Ingredients as guar.
W. H. Luesing, Louisville, Ky.	9.81	9.95	8.39	9.47	Ingredients as guar.
Bonnycastle & Wilder, Louisville, Ky.	9.81	10.37	8.39	9.92	Adul. with corn bran
T. C. Caummisau, Louisville, Ky.	8.50	8.78	4.20	2.94	Ingredients as guar.
Z. Meek & Co., Catlettsburg, Ky.	8.93	8.31	4.28	2.95	Contains corn bran
B. J. Brumleve, Louisville, Ky.	8.62	8.25	5.27	3.46	Ingredients as guar.
Geo. W. Reidling, Louisville, Ky.	8.31	8.37	5.25	4.98	Ingredients as guar.
Chris. Miller & Sons, Louisville, Ky.	9.06	10.63	7.87	9.65	Ingredients as guar.
Cain & Co., Central City, Ky.	10.56	10.25	10.33	8.01	Ingredients as guar.
Dealer's Warehouse	.....	37.50	.....	9.28	Adult'ed with cotton seed hulls
Dealer's Warehouse	.....	22.37	.....	1.68	Adul. with 50 per ct. cotton seed hulls

Table of Analyses of Samples Collected in 1906-7.

Registration No.	BRAND	MANUFACTURER.
23	"Owl Brand" (Cotton Seed Meal)	F. W. Brode & Co., Memphis, Tenn.
6	"We Kno" Cotton Seed Meal	Oscar Farmer & Sons, Louisville, Ky.
311	Cotton Seed Meal	Richmond & Bond Co., Hickman, Ky.
311	Cotton Seed Meal	Richmond & Bond Co., Hickman, Ky.
311	Cotton Seed Meal	Richmond & Bond Co., Hickman, Ky.
67	Star Brand (Cotton Seed Meal)	J. Lindsay Wells Co., Memphis, Tenn.
446	Linseed Oil Meal	Edinger & Co., Louisville, Ky.
5	"We Kno" Oil Meal	Oscar Farmer & Sons, Louisville, Ky.
5	"We Kno" Oil Meal	Oscar Farmer & Sons, Louisville, Ky.
5	"We Kno" Oil Meal	Oscar Farmer & Sons, Louisville, Ky.
509*	Oil Meal	Henry Fruechtenicht, Louisville, Ky.
509*	Oil Meal	Henry Fruechtenicht, Louisville, Ky.
—	Oil Meal	A. Schneider's Sons, Louisville, Ky.
270*	Mill Run	Ashland Milling Co., Ashland, Ky.
20	Mill Run	Ashland Milling Co., Ashland, Ky.
20	Mill Run	Ashland Milling Co., Ashland, Ky.
20	Mill Run	Ashland Milling Co., Ashland, Ky.
20	Mill Run	Ashland Milling Co., Ashland, Ky.
128	Mill Run	Big Sandy Milling Co., Louisa, Ky.
104	Hope Mills Mill Feed	J. Andrew Cain, Versailles, Ky.
396	Mill Feed	Cecilian Milling Co., Cecilian, Ky.
497	Mill Feed	Hustonville Roller Mills, Hustonville, Ky.
149	Mill Run	Patton Milling Co., Catlettsburg, Ky.

Table of Analyses of Samples Collected in 1906-7.

OBTAINED FROM	ANALYSES. Protein Guaranteed.	Protein Found	Fat Guaranteed.	Fat Found	REMARKS
Oscar Farmer & Sons, Louisville, Ky..	38.00	36.06	9.00	7.83	Adult'ed with cotton seed hulls
Manufacturer's Warehouse	38.63	39.62	9.28	9.83	Ingredients as guaranteed
Ellison Bros., Hickman, Ky.	35.90	37.30	6.00	11.91	Ingredients as guar.
Ledford & Randle, Hickman, Ky.....	35.90	42.05	6.00	8.78	Ingredients as guar.
Ledford & Randle, Hickman, Ky.....	35.90	42.09	6.00	8.13	Ingredients as guar.
Eureka Flour & Feed Store..... Owensboro, Ky.	41.00	35.48	9.00	10.36	Ingredients as guar.
Bonnycastle & Wilder, Louisville, Ky.	34.00	35.10	6.02	7.80	Ingredients as guar.
Manufacturer's Warehouse	32.81	33.75	7.83	7.38	Ingredients as guar.
Manufacturer's Warehouse	32.81	33.75	7.83	6.48	Ingredients as guar.
Manufacturer's Warehouse	32.81	34.50	7.83	8.11	Ingredients as guar.
Manufacturer's Warehouse	31.56	31.12	9.13	8.33	Ingredients as guar.
Manufacturer's Warehouse	31.56	32.31	9.13	9.26	Ingredients as guar.
Manufacturer's Warehouse	.....	29.66	.....	7.59	Flax seed product
Manufacturer's Warehouse	13.81	14.25	3.79	3.83	Ingredients as guar.
A. M. Glenn, Ashland, Ky.....	13.81	13.75	3.79	4.50	Ingredients as guar.
O. F. Fultz, Olive Hill, Ky.....	13.81	12.94	3.79	4.53	Ingredients as guar.
John Jeems, Louisa, Ky.	13.81	13.97	3.79	4.54	Ingredients as guar.
F. M. Bayes, Paintsville, Ky.....	13.81	13.72	3.79	4.48	Ingredients as guar.
A. C. Webb & Sons, Allen, Ky.....	16.50	12.64	4.30	5.12	Ingredients as guar.
J. W. Newman, Versailles, Ky.....	15.56	14.94	3.68	4.23	Ingredients as guar.
W. E. Miller & Co., Central City, Ky...	14.37	14.34	4.15	4.37	Ingredients as guar.
O. J. Thurmond & Sons, Danville, Ky..	15.89	14.59	4.87	4.03	Ingredients as guar.
John Brown, Paintsville, Ky.....	16.30	14.94	6.01	4.34	Ingredients as guar. (Wheat product)

Table of Analyses of Samples Collected in 1906-7.

Registration No.	BRAND	MANUFACTURER.
95*	Mill Run	Patton Milling Co., Catlettsburg, Ky.
149	Mill Run	Patton Milling Co., Catlettsburg, Ky.
149	Mill Run	Patton Milling Co., Catlettsburg, Ky.
366*	Mill Feed	E. F. Spears & Sons, Paris, Ky.
88	Mill Feed	E. F. Spears & Sons, Paris, Ky.
351	Mixed Mill Feed	J. H. Baughman & Co., Stanford, Ky.
351	Mixed Mill Feed	J. H. Baughman & Co., Stanford, Ky.
254	Mixed Feed	M. B. Beville & Co., Louisville, Ky.
140	Mixed Feed	Bowling Green Milling Co., Bowl'g Green, Ky.
239	Mixed Feed	C. W. Bransford, Owensboro, Ky.
239	Mixed Feed	C. W. Bransford, Owensboro, Ky.
173*	Mixed Feed	Chas. Broeker & Co., Owensboro, Ky.
342	Mixed Feed	Chas. Broeker & Co., Owensboro, Ky.
342	Mixed Feed	Chas. Broeker & Co., Owensboro, Ky.
484	Mixed Feed	Jas. Cate & Son Co., Hopkinsville, Ky.
356*	Mixed Feed	Crown Jewel Milling Co., Cynthiana, Ky.
300	Mixed Feed	Crown Roller Mills, Morganfield, Ky.
521	Mixed Feed	Dukedom Roller Mills, Dukedom, Tenn.
308	Mixed Feed	Eagle Mills, Franklin, Ky.
200	Mixed Feed	T. M. Ellis & Co., Russellville, Ky.
241	Mixed Feed	Farless & White, Henderson, Ky.
419	Mixed Feed	John W. Fry, Melber, Ky.
267	Mixed Feed	J. W. Gilbert's Sons, Owensboro, Ky.

Table of Analyses of Samples Collected in 1906-7.

OBTAINED FROM	ANALYSES.				REMARKS
	Protein		Fat		
	Guaranteed.	Found	Guaranteed.	Found	
N. D. Taylor, Olive Hill, Ky.	16.30	15.69	6.01	4.45	Ingredients as guar. (Wheat product)
H. H. Fitzpatrick & Co. Prestonsburg, Ky.	16.30	14.78	6.01	5.21	Adult'ed with small per cent. corn bran
Z. Meek & Co., Catlettsburg, Ky.	16.30	15.00	6.01	5.69	Adult'ed with small per cent. corn bran
Manufacturer's Warehouse	15.12	16.93	3.95	4.83	Ingredients as guaranteed
Manufacturer's Warehouse	15.12	15.06	3.95	3.73	Ingredients as guar.
Manufacturer's Warehouse	14.43	15.47	4.73	4.81	Ingredients as guar.
Manufacturer's Warehouse	14.43	14.87	4.73	4.92	Ingredients as guar.
M. B. Beville & Co., Louisville, Ky.	15.06	15.81	4.10	4.05	Ingredients as guar. (Wheat product)
Geo. T. Massey, Bowling Green, Ky.	11.06	10.16	3.38	3.61	Ingredients as guar. (con. corn cob meal)
Venable Seed Co., Owensboro, Ky.	15.23	15.19	4.11	4.60	Ingredients as guar.
J. Geo. Zinsz, Owensboro, Ky.	15.23	14.65	4.11	4.78	Adult'ed with wheat chaff and straw
F. E. Johnson, Owensboro, Ky.	14.87	14.70	4.25	5.47	Ingredients as guar.
Cain & Co., Central City, Ky.	14.56	15.59	6.18	4.92	Ingredients as guar.
Skillman & Co., Owensboro, Ky.	14.56	12.65	6.18	6.20	Ingredients as guar.
Forbes Manufacturing Co. Hopkinsville, Ky.	12.87	12.28	4.62	5.33	Ingredients as guar.
Manufacturer's Warehouse	16.06	15.75	4.52	4.08	Ingredients as guar.
Manzy & Waller, Morganfield, Ky.	12.87	12.59	4.97	4.97	Ingredients as guar.
Boaz Bros., Fulton, Ky.	14.12	15.00	5.73	5.01	Ingredients as guar.
Park City Feed Store, Bowl'g Green, Ky.	15.18	14.63	5.10	5.56	Ingredients as guar.
Russellville Feed and Seed Co. Russellville, Ky.	15.00	15.16	4.60	4.41	Ingredients as guar.
A. T. Callender, Henderson, Ky.	15.18	15.28	4.30	5.06	Ingredients as guar.
T. J. Wood, Lone Oak, Ky.	15.00	14.44	3.63	4.61	Ingredients as guar.
J. T. Hubbard, Owensboro, Ky.	12.18	14.87	4.08	5.00	Ingredients as guar.

Table of Analyses of Samples Collected in 1906-7.

Registration No.	BRAND	MANUFACTURER.
268	Mixed Feed	Guthrie Milling Co., Guthrie, Ky.
339	Mixed Feed	R. U. Kevil & Sons, Princeton, Ky.
286	Mixed Feed	Massey Milling Co., Drake, Ky.
286	Mixed Feed	Massey Milling Co., Drake, Ky.
143	Mixed Feed	W. E. Merkley Mill Co., Lebanon, Ky.
563	Mixed Feed	Miller Milling Co., Panther, Ky.
563	Mixed Feed	Miller Milling Co., Panther, Ky.
389	White Rose Mixed Feed	Morganfield Roller Mills, Morganfield, Ky.
167	Mixed Feed	R. C. Poage Milling Co., Ashland, Ky.
167	Mixed Feed	R. C. Poage Milling Co., Ashland, Ky.
167	Mixed Feed	R. C. Poage Milling Co., Ashland, Ky.
348	Quante's Mixed Feed	A. Quante, Metropolis, Ill.
105	Mixed Feed	Somerset Mill Co., Somerset, Ky.
393	Mixed Feed	Southern Star Roller Mills, Perryville, Ky.
393	Mixed Feed	Southern Star Roller Mills, Perryville, Ky.
393	Mixed Feed	Southern Star Roller Mills, Perryville, Ky.
393	Mixed Feed	Southern Star Roller Mills, Perryville, Ky.
171	Mixed Feed	E. F. Spears & Sons, Paris, Ky.
151	Mixed Feed	Washburn-Crosby Milling Co., Louisville, Ky.
151	Mixed Feed	Washburn-Crosby Milling Co., Louisville, Ky.
151	Mixed Feed	Washburn-Crosby Milling Co., Louisville, Ky.
151	Mixed Feed	Washburn-Crosby Milling Co., Louisville, Ky.
289*	Victor Corn and Oat Feed	American Cereal Co., Chicago, Ill.

Table of Analyses of Samples Collected in 1906-7.

OBTAINED FROM	ANALYSES.				REMARKS
	Protein		Fat		
	Guaranteed.	Found	Guaranteed.	Found	
I. D. Ruffner, Guthrie, Ky.	13.81	15.13	4.08	5.16	Ingredients as guaranteed
Central Coal & Iron Co., Cent. City, Ky.	15.00	14.18	4.00	4.99	Ingredients as guar.
I. J. Holman, Bowling Green, Ky.	13.68	14.00	5.02	4.09	Ingredients as guar.
Hill & McElroy	13.68	14.31	5.02	4.58	Ingredients as guar.
In transit	14.06	12.42	4.32	4.50	Ingredients as guar.
Eureka Flour & Feed Store, Owensboro, Ky.	14.63	14.90	3.55	5.70	Ingredients as guar.
Eureka Flour & Feed Store, Owensboro, Ky.	14.63	14.00	3.55	3.97	Ingredients as guar.
Young, Conway & Co., Morganfield, Ky.	12.50	15.12	4.50	4.94	Ingredients as guar.
J. M. Caudill & Co., Morehead, Ky.	16.25	14.56	4.40	4.23	Ingredients as guar.
A. M. Glenn, Ashland, Ky.	16.25	13.81	4.40	5.04	Ingredients as guar.
Powers Supply Co., Prestonsburg, Ky.	16.25	13.68	4.40	4.45	Ingredients as guar.
T. E. Ford, Paducah, Ky.	15.19	15.00	4.23	4.80	Ingredients as guar.
M. F. Crawford, Somerset, Ky.	15.00	14.68	4.00	4.21	Ingredients as guar.
O. J. Thurmond, Danville, Ky.	15.50	15.15	3.78	4.74	Ingredients as guar.
F. R. Tribble, Danville, Ky.	15.50	15.37	3.78	4.51	Wheat product
Kentucky Supply Co., Danville, Ky.	15.50	16.75	3.78	4.55	Wheat product
Kentucky Supply Co., Danville, Ky.	15.50	15.90	3.78	4.55	Ingredients as guar.
Yerkes & Kenney, Paris, Ky.	16.00	14.61	4.00	6.07	Ingredients as guar.
Geo. W. Reidling, Louisville, Ky.	17.04	16.06	4.00	4.46	Ingredients as guar. (Wheat product)
Chris. Miller & Sons, Louisville, Ky.	17.04	16.50	4.00	4.22	Ingredients as guar. (Wheat product)
W. H. Luesing, Louisville, Ky.	17.04	16.19	4.00	4.63	Ingredients as guar. (Wheat product)
Ritter & Herring, Louisville, Ky.	17.04	15.06	4.00	4.00	Ingredients as guar. (Wheat product)
Ollie Overstreet, Louisville, Ky.	7.50	7.25	3.00	3.07	Adul. with 30 per ct. oat hulls

Table of Analyses of Samples Collected in 1906-7.

Registration No.	BRAND	MANUFACTURER.
289*	Victor Corn and Oat Feed.....	American Cereal Co., Chicago, Ill.....
98	Sucrene Dairy Feed	American Milling Co., Philadelphia, Pa.....
98	Sucrene Dairy Feed	American Milling Co., Philadelphia, Pa.....
98	Sucrene Dairy Feed	American Milling Co., Philadelphia, Pa.....
98	Sucrene Dairy Feed	American Milling Co., Philadelphia, Pa.....
98	Sucrene Dairy Feed	American Milling Co., Philadelphia, Pa.....
97	Sucrene Horse Feed	American Milling Co., Philadelphia, Pa.....
21	Daisy Food	Ashland Milling Co., Ashland, Ky.....
259	Barlow Feed	Barlow Roller Mills, Barlow, Ky.....
450	Eclipse Feed	Binns Milling Co., Pee Dee, Ky.....
106	Blue Grass Cow Feed.....	Blue Grass Commission Co., Lexington, Ky.
107	Monarch Horse Feed	Blue Grass Commission Co., Lexington, Ky.
107	Monarch Horse Feed	Blue Grass Commission Co., Lexington, Ky.
395*	Bowman's Crushed Grain Feed.	A. H. Bowman & Co., Louisville, Ky.....
223	Brano	L. Brewer, Mayfield, Ky. .....
394*	Chickering Chop Feed	L. Brewer, Mayfield, Ky. .....
104	Hope Mills Mill Feed	J. Andrew Cain, Versailles, Ky.....
192	Shanghai Chicken Feed	Callahan & Sons, Louisville, Ky.....
191	Callahan's Columbia Cru'd Feed	Callahan & Sons, Louisville, Ky.....
191	Callahan's Columbia Cru'd Feed	Callahan & Sons, Louisville, Ky.....
191	Callahan's Columbia Cru'd Feed	Callahan & Sons, Louisville, Ky.....
333	Corno Chick Feed	Corno Mills Co., E. St. Louis, Ill.....
131	Star and Crescent	Crescent Milling Co., Hopkinsville, Ky.....

Table of Analyses of Samples Collected in 1906-7.

OBTAINED FROM	ANALYSES.				REMARKS
	Protein		Fat		
	Guaranteed.	Found	Guaranteed.	Found	
Ritter & Herring, Louisville, Ky.....	7.50	8.25	3.00	3.46	Adult'ed with large per cent oat hulls
J. W. Gardner, Elizabethtown, Ky.....	16.50	17.18	3.50	5.42	Ingredients as guaranteed
F. E. Johnson, Owensboro, Ky.....	16.50	18.81	3.50	4.96	Ingredients as guar.
W. C. Dodson, Paris, Ky.	16.50	17.16	3.50	5.91	Contained large per cent of chaff
Shacklett-Thomas Hardware Co..... Fulton, Ky.	16.50	17.08	3.50	5.14	Contained large per cent of chaff
Park City Feed Store, Bowl'g Green,Ky	16.50	16.09	3.50	5.24	Contained large per cent of chaff
W. C. Dodson, Paris, Ky.	13.50	12.56	3.50	5.02	Contained large per cent of chaff
A. M. Glenn, Ashland, Ky.....	15.93	14.00	4.40	5.54	Ingredients as guar.
Geo. B. Wilds, Wickliffe, Ky.....	15.37	15.54	4.93	4.86	Ingredients as guar.
Planters Hdw. Co., Hopkinsville, Ky.	13.80	15.72	4.60	5.60	Ingredients as guar.
Manufacturer's Warehouse	15.62	15.25	5.20	5.40	Ingredients as guar.
Buford A. Graves, Lexington, Ky.....	10.87	10.45	3.77	3.77	Ingredients as guar.
Manufacturer's Warehouse	10.87	10.43	3.77	4.15	Ingredients as guar.
Manufacturer's Warehouse	9.93	11.31	5.00	3.17	Ingredients as guar.
Manufacturer's Warehouse	13.50	15.43	3.90	4.82	Ingredients as guar.
H. Fruechtenicht, Louisville, Ky.....	12.25	13.09	3.63	3.81	Ingredients as guar.
Manufacturer's Warehouse	15.56	15.06	3.68	4.24	Ingredients as guar.
Schrieber Bros., Louisville, Ky.....	9.19	9.25	3.52	3.35	Ingredients as guar.
Herbold & Hess, Louisville, Ky.....	13.75	10.15	4.40	3.68	Adul. with oat hulls
Riley Miller, Louisville, Ky.....	13.75	10.09	4.40	3.48	Adul. with oat hulls
Chowning Coal, Grain and Feed Co... Georgetown, Ky.	13.75	7.59	4.40	3.09	Contained large amt. of chaff
Young, Conway & Co., Morganfield, Ky.	10.00	9.16	3.50	2.94	Ingredients as guar.
T. E. Hearin, Madisonville, Ky.....	14.63	15.78	4.68	6.16	Ingredients as guar.

Table of Analyses of Samples Collected in 1906-7.

Registration No.	BRAND	MANUFACTURER.
224	Chick Food	Cyphers Incubator Co., Buffalo, N. Y.
228	Scratching Food	Cyphers Incubator Co., Buffalo, N. Y.
147	Anderson & Spillman's Feed	Danville Roller Mills, Danville, Ky.
384	Crushed Feed	C. P. Dodd & Co., Louisville, Ky.
384	Crushed Feed	C. P. Dodd & Co., Louisville, Ky.
381	Chicken Feed	C. P. Dodd & Co., Louisville, Ky.
9	"We Kno" Chicken Feed	Oscar Farmer & Sons, Louisville, Ky.
371*	Buffalo Gluten Feed	Glucose Sugar Refinery Co., Chicago, Ill.
488	Good Luck Mill Feed	Good Luck Mills, St. Louis, Mo.
419*	Excelsior Chop Feed	Great Western Cereal Co., Chicago, Ill.
419*	Excelsior Chop Feed	Great Western Cereal Co., Chicago, Ill.
419*	Excelsior Chop Feed	Great Western Cereal Co., Chicago, Ill.
419*	Excelsior Chop Feed	Great Western Cereal Co., Chicago, Ill.
377	Excelsior Chop Feed	Great Western Cereal Co., Chicago, Ill.
298	Feed Stuff	Harlan-Lowe Milling Co., Bardwell, Ky.
298	Feed Stuff	Harlan-Lowe Milling Co., Bardwell, Ky.
—	Dairy Feed	W. H. Henderson, Lexington, Ky.
—	Dairy Feed	W. H. Henderson, Lexington, Ky.
39	Premier Mixed Feed	Kentucky Supply Co., Danville, Ky.
39	Premier Mixed Feed	Kentucky Supply Co., Danville, Ky.
87	Peerless	M. F. Lawson, Mayfield, Ky.
136	Eureka	Leitchfield Milling Co., Leitchfield, Ky.
263	"None Such"	Louisville Cereal Mill Co., Louisville, Ky.

Table of Analyses of Samples Collected in 1906-7.

OBTAINED FROM	ANALYSES. Protein		Fat		REMARKS
	Guaranteed.	Found	Guaranteed.	Found	
Smith, Watkins & Co., Lexington, Ky.	10.54	12.28	3.40	3.53	Ingredients as guaranteed
Smith, Watkins & Co., Lexington, Ky.	11.05	11.05	3.00	3.44	Ingredients as guar.
Manufacturer's Warehouse	12.06	12.84	5.10	4.05	Ingredients as guar.
Wm. Morton & Son, Louisville, Ky....	12.06	10.81	4.83	2.93	Ingredients as guar.
Manufacturer's Warehouse	12.06	10.66	4.83	3.44	Ingredients as guar.
Manufacturer's Warehouse	9.62	9.72	3.38	3.45	Ingredients as guar.
Manufacturer's Warehouse	10.06	10.00	3.05	3.43	Ingredients as guar.
Eureka Flour and Feed Store.....	25.00	23.96	2.50	2.31	Ingredients as guar.
Rucker Bros., Fulton, Ky.....	9.00	9.58	3.00	2.92	Ingredients as guar.
H. Fruechtenicht, Louisville, Ky.....	9.00	8.43	4.20	5.63	Ingredients as guar. (largely oat hulls)
Amos Yaeger, Louisville, Ky.....	9.00	8.31	4.20	5.50	Ingredients as guar. (largely oat hulls)
Oscar Farmer & Sons, Louisville, Ky.	9.00	8.31	4.20	5.51	Ingredients as guar. (largely oat hulls)
Reidling Bros., Louisville, Ky.....	9.00	8.50	4.20	5.83	Ingredients as guar. (largely oat hulls)
T. E. Ford, Paducah, Ky.....	8.00	7.31	3.50	3.70	Ingredients as guar. (largely oat hulls)
Ballard Mercantile Co., Wickliffe, Ky..	14.62	14.26	5.18	4.79	Ingredients as guar.
D. R. Cotner & Son, Bardwell, Ky.....	14.62	14.63	5.18	4.53	Ingredients as guar.
Manufacturer's Warehouse	.....	12.15	.....	3.79	Adul. with corn cob meal
Manufacturer's Warehouse	.....	15.37	.....	2.73	Adul. with corn cob meal
Manufacturer's Warehouse	10.19	10.72	4.54	3.13	Ingredients as guar. (con. corn cob meal)
Manufacturer's Warehouse .....,	10.19	12.15	4.54	2.81	Ingredients as guar. (con. corn cob meal)
A. J. Wheeler, Mayfield, Ky.....	15.18	16.12	4.08	4.46	Ingredients as guar.
A. J. Wheeler, Mayfield, Ky.....	13.50	14.65	6.70	7.38	Ingredients as guar.
A. J. Wheeler, Mayfield, Ky.....	11.62	11.63	7.80	9.36	Ingredients as guar.

Table of Analyses of Samples Collected in 1906-7.

Registration No.	BRAND	MANUFACTURER.
373	Bob White Feed	Madisonville Milling Co., Madisonville, Ky.
389	White Rose Mixed Feed	Morganfield Roller Mills, Morganfield, Ky.
347	Purina Mill Feed	Purina Mills, St. Louis, Mo.
347	Purina Mill Feed	Purina Mills, St. Louis, Mo.
347	Purina Mill Feed	Purina Mills, St. Louis, Mo.
347	Purina Mill Feed	Purina Mills, St. Louis, Mo.
347	Purina Mill Feed	Purina Mills, St. Louis, Mo.
347	Purina Mill Feed	Purina Mills, St. Louis, Mo.
247	Victor Feed	Quaker Oats Co., Chicago, Ill.
328	Kentucky	Rineyville Roller Mills, Rineyville, Ky.
507*	Ground Feed	Roszell Bros., Lexington, Ky.
444*	Double "S" Crushed Feed	A. Schneider's Sons, Louisville, Ky.
444*	Double "S" Crushed Feed	A. Schneider's Sons, Louisville, Ky.
444*	Double "S" Crushed Feed	A. Schneider's Sons, Louisville, Ky.
445*	Double "S" Chop Feed	A. Schneider's Sons, Louisville, Ky.
445*	Double "S" Chop Feed	A. Schneider's Sons, Louisville, Ky.
445*	Double "S" Chop Feed	A. Schneider's Sons, Louisville, Ky.
459	XXX Mixed Feed	W. H. Small & Co., Evansville, Ind.
460	Eclipse Poultry and Chick Feed	W. H. Small & Co., Evansville, Ind.
163	Smith's I. X. L. Feed	H. C. Smith & Sons, Harrodsburg, Ky.
350	Steinmesch Chicken Feed	Steinmesch Feed & Poultry Supply Co. St. Louis, Mo.
62	Sterling Poultry Feed	I. F. Tabb, Mt. Sterling, Ky.

Table of Analyses of Samples Collected in 1906-7.

OBTAINED FROM	ANALYSES. Protein Guaranteed.	Protein Found	Fat Guaranteed.	Fat Found	REMARKS
T. E. Hearin, Madisonville, Ky.....	12.93	13.62	3.77	5.92	Ingredients as guaranteed
Newman & Richards, Morganfield, Ky.	12.50	13.78	4.50	6.57	Ingredients as guar.
Williams Bros., Clinton, Ky.....	11.00	12.37	3.60	3.01	Ingredients as guar.
J. M. York, Catlettsburg, Ky.....	11.00	9.97	3.60	3.00	Ingredients as guar.
Ellison Bros., Hickman, Ky.....	11.00	10.99	3.60	3.90	Ingredients as guar.
Ellison Bros., Hickman, Ky.....	11.00	10.42	3.60	3.62	Ingredients as guar.
J. H. Dean, Versailles, Ky.....	11.00	11.56	3.60	4.41	Ingredients as guar.
J. H. Dean, Versailles, Ky.....	11.00	10.59	3.60	3.51	Ingredients as guar.
Flournoy Bros., Paducah, Ky.....	7.50	7.19	3.00	3.41	Ingredients as guar. (largely oat hulls)
J. W. Gardner, Elizabethtown, Ky.....	14.63	15.19	5.16	4.87	Ingredients as guar.
Manufacturer's Warehouse	9.50	9.77	4.17	4.58	Ingredients as guar.
J. H. Davis, Louisville, Ky.....	10.50	9.56	4.50	5.60	Composed largely of oat hulls
Manufacturer's Branch Warehouse ...	10.50	10.06	4.50	5.09	Adul. with oat hulls
J. H. Davis, Louisville, Ky.....	10.50	9.47	4.50	5.12	Adul. with oat hulls
J. H. Davis, Louisville, Ky.....	10.81	11.31	4.15	4.25	Ingredients as guar.
J. H. Davis, Louisville, Ky.....	10.81	10.59	4.15	3.54	Ingredients as guar.
J. H. Davis, Louisville, Ky.....	10.81	10.44	4.15	3.32	Ingredients as guar.
F. M. Allen, Centertown, Ky.....	13.81	12.00	3.15	3.56	Adul. with corn cob meal
Forbes Manufacturing Co. ..... Hopkinsville, Ky.	10.63	8.31	3.24	2.26	Ingredients as guar.
Kentucky Supply Co., Danville, Ky....	15.68	16.86	4.52	4.30	Ingredients as guar.
C. L. MacDonald, Henderson, Ky.....	12.60	11.18	9.00	4.43	Ingredients as guar.
Manufacturer's Warehouse	11.18	9.75	2.58	2.70	Ingredients as guar.

Table of Analyses of Samples Collected in 1906-7.

Registration No.	BRAND	MANUFACTURER.
100	Belle Brans	Thomson & Hankins, Madisonville, Ky.
71	Blue Grass Mixed Feed	A. Waller & Co., Henderson, Ky.
71	Blue Grass Mixed Feed	A. Waller & Co., Henderson, Ky.
455*	Weber's Cele'd Pure Chop Feed	J. E. Weber, Louisville, Ky.
98	Sucrene Dairy Feed	American Milling Co., Philadelphia, Pa.
377	Excelsior Chop Feed	Great Western Cereal Co., Chicago, Ill.
298	Feed Stuff	Harlan-Lowe Milling Co., Bardwell, Ky.
298	Feed Stuff	Harlan-Lowe Milling Co., Bardwell, Ky.
330	Feed Stuff	R. U. Kevil & Sons, Mayfield, Ky.
320	Mill Feed	Ledbetter Milling Co., Elizabethtown, Ill.
62	Feeder's Favorite Mixed Feed	Marion Milling Co., Marion, Ky.
62*	Feeder's Favorite Mixed Feed	Marion Milling Co., Marion, Ky.
389	White Rose Mixed Feed	Morganfield Roller Mills, Morganfield, Ky.
389	White Rose Mixed Feed	Morganfield Roller Mills, Morganfield, Ky.
424	White Swan Mixed Feed	T. A. Sandefur, Henderson, Ky.
460	Eclipse Poultry & Chick Food	W. H. Small & Co., Evansville, Ind.
295	Jersey Cream	Stafford Milling Co., Martin, Tenn.
247	Victor Feed	The Quaker Oats Co., Chicago, Ill.
348	Quante's Mixed Feed	A. Quante, Metropolis, Ill.
348	Quante's Mixed Feed	A. Quante, Metropolis, Ill.
348	Quante's Mixed Feed	A. Quante, Metropolis, Ill.
348	Quante's Mixed Feed	A. Quante, Metropolis, Ill.

Table of Analyses of Samples Collected in 1906-7.

OBTAINED FROM	ANALYSES. Protein Guaranteed.	Protein Found	Fat Guaranteed.	Fat Found	REMARKS
T. E. Hearin, Madisonville, Ky.....	14.75	15.81	4.29	6.52	Ingredients as guaranteed
E. M. Gish, Central City, Ky.....	9.81	9.31	1.65	2.63	Ingredients as guar. (con. corn cob meal)
Herbold & Hess, Louisville, Ky.....	9.81	10.50	1.65	2.94	Ingredients as guar. (con. corn cob meal)
Manufacturer's Warehouse	12.93	11.47	3.93	3.31	Ingredients as guar.
F. E. Johnson, Owensboro, Ky.....	16.50	16.68	3.00	4.90	Adul. with oat hulls
Bonds & Powell, Paducah, Ky.....	8.00	8.12	3.50	3.60	Ingredients as guar. (largely oat hulls)
Ballard Mercantile Co., Wickliffe, Ky.	14.62	15.97	5.18	4.59	Ingredients as guar.
Manufacturer's Warehouse	14.62	15.00	5.18	4.92	Ingredients as guar.
A. J. Wheeler, Mayfield, Ky.....	15.00	14.93	4.95	5.30	Ingredients as guar.
T. E. Ford, Paducah, Ky.....	15.70	14.87	4.50	4.60	Ingredients as guar.
Taylor & Daugherty, Marion, Ky.....	14.40	15.18	4.60	5.18	Ingredients as guar.
J. M. McChesney, Marion, Ky.....	14.40	15.00	4.60	5.51	Ingredients as guar.
Newman & Richards, Morganfield, Ky.	12.50	12.93	4.50	5.45	Ingredients as guar.
Walker Brothers, Morganfield, Ky.....	12.50	13.00	4.50	5.94	Ingredients as guar.
C. L. McDonald, Henderson, Ky.....	15.53	15.68	4.92	4.51	Ingredients as guar.
Ratican & Turner, Owensboro, Ky....	10.63	7.72	3.24	2.35	Ingredients not as guaranteed
Shacklett-Thomas Hardware Co..... Fulton, Ky.	13.18	13.42	10.05	10.88	Ingredients as guar. (largely cotton fiber and corn cob meal)
Flournoy Bros., Paducah, Ky.....	7.50	8.03	3.00	3.37	Ingredients as guar. (largely oat hulls)
H. P. Hawkins & Son, Paducah, Ky...	15.19	16.53	4.23	4.63	Ingredients as guar. (wheat product)
Barry & Hennisberger, Paducah, Ky...	15.19	15.68	4.23	4.90	Ingredients as guar. (wheat product)
Bonds & Powell, Paducah, Ky.....	15.19	16.12	4.23	5.48	Ingredients as guar. (wheat product)
Wm. Moore, Paducah, Ky.....	15.19	16.43	4.23	4.84	Ingredients as guar. (wheat product)

3. *Registrations for 1907 to December 1.*

Acme Mills & Elevator Co., Hopkinsville, Ky., 14—Acme Feed; 15—Shipstuff.

Acme Milling Co., Indianapolis, Ind., 319—Acme Feed.

Akin-Erskine Milling Co., Evansville, Ind., 427—Winter Wheat Middlings.

Allen & Wheeler Co., Troy, Ohio, 35—Trojan Middlings.

American Milling Co., Philadelphia, Pa., 97—Sucrene Horse Feed; 98—Sucrene Dairy Feed; 99—Sucrene Poultry Feed.

Anderson & Spilman, Danville, Ky., 147—Anderson & Spilman's Feed.

Ashland Feed & Produce Co., Ashland, Ky., 189—Pure Corn Chop; 190—Crushed Ear Corn.

Ashland Milling Co., Ashland, Ky., 18—Middlings; 19—Bran; 20—Mill Run; 21—Daisy Food; 22—Corn Chop; 486—Crushed Ear Corn.

Ashbrook Distillery Co., Cynthiana, Ky., 199—Distiller's Dried Grain.

C. H. Aubrey, Stithton, Ky., 176—Mill Feed; 177—Feed Meal.

Auburn Mills, Auburn, Ky., 282—Coke's Mixture.

Austrew & Jackson, Baskett, Ky., 620—Crushed Ear Corn; 621—Feed Meal.

Ballard & Ballard Co., Louisille, Ky., 155—Ballard's Bran; 156—Ballard's Shorts; 157—Ballard's Shipstuff.

Bandana Roller Mills, Bandana, Ky., 630—Ideal Wheat Feed.

Chas. E. Bates, Bagdad, Ky., 571—Empress Feed Stuff.

Barlow Roller Mills, Barlow, Ky., 259—Barlow Feed.

J. H. Baughman & Co., Stanford, Ky., 329—Mixed Mill Feed; 351—Mixed Mill Feed; 605—Cracked Corn.

Beaver Dam Milling Co., Beaver Dam, Ky., 201—Perfection.

M. B. Beville & Co., Louisville, Ky., 253—Beville's National Crushed Feed; 254—Mixed Feed; 255—Feed Meal; 256—Cracked Corn.

Berea Roller Mills, Berea, Ky., 455—Mill Feed.

Bergenroth Bros., Troy, Ind., 84—Shipstuff; 85—Middlings; 86—Bran.

Beshers & Jackson, Clinton, Ky., 3—Bran; 413—Bran.

Big Sandy Milling Co., Louisa, Ky., 127—Shipstuff; 129—Middlings; 476—Corn Chop.

Binn's Milling Co., Pee Dee, Ky., 450—Eclipse Feed.

Frank Birchler, Louisville, Ky., 359—Corn Bran; 565—Mixed Feed.

Blue Grass Commission Co., Lexington, Ky., 594—"Royal" Horse Feed; 106—Blue Grass "Cow Feed"; 107—"Monarch" Horse Feed; 108—Shipstuff; 109—Pure Bran.

Boston Mills Co., Boston, Ky., 614—Mixed Feed.

Bowling Green Milling Co., Bowling Green, Ky., 138—Shorts; 139—Bran; 140—Mixed Feed.

A. H. Bowman & Co., Louisville, Ky., 178—Chickering Chop Feed; 179—Bowman's Crushed Grain Feed; 180—Mixed Chicken Feed; 181—Shorts; 182—Cracked Corn; 183—Feed Meal.

Bradley Brothers, Paducah, Ky., 543—Corn Bran; 544—Corn Chops.

C. W. Bransford, Owensboro, Ky., 238—Shipstuff; 239—Mixed Feed; 240—Corn Chop.

C. S. Brent, Lexington, Ky., 435—Mill Feed; 158—Brent's Feed Meal; 159—Linseed Meal; 160—Brent's Premium Chicken Feed.

L. Brewer, Mayfield, Ky., 222—Brewer's Ships; 223—Bran; 553—Feed Meal.

H. E. Bridges & Co., Memphis, Tenn., 511—Cotton Seed Meal.

Chas. Broeker & Co., Owensboro, Ky., 342—Mixed Feed; 343—Corn Chop; 344—Hominy Feed.

Brookport Milling Co., Brookport, Ill., 470—Mixed Feed.

F. W. Brode & Co., Memphis, Tenn., 23—"Owl Brand."

O. L. Bryant, Scottsville, Ky., 110—Bran; 111—Mixed Feed.

W. S. Bumpus, Pembroke, Ky., 72—Wheat and Corn Bran.

D. J. Burchett, Louisa, Ky., 525—Corn Chop and Corn Bran.

Burkholder Bros., Crofton, Ky., 370—Rich Feed; 414—Pure Ear Crush.

A. R. Burks Mill Co., Loretta, Ky., 133—Corn Chop.

Burnam & Rucker, Paint Lick, Ky., 371—Mixed Feed.

Byars & Jenkins, Adairville, Ky., 150—Mixed Feed; 606—Corn and Cob Product.

Cadick Milling Co., Grandview, Ind., 433—Shipstuff; 248—Bran and Shipstuff; 432—Bran.

Callahan & Son, Louisville, Ky., 191—Callahan's Columbia Crushed Feed; 192—Shanghai Chicken Feed; 193—Callahan's Bran and Shorts; 194—Callahan's Cracked Corn; 195—Callahan's Feed Meal.

J. Andrew Cain, Versailles, Ky., 102—Woodford Stock Food; 103—Shipstuff; 104—Hope Mill's Mill Feed; 557—Hope Mill's Cracked Corn.

Cannelton Flour Mills, Cannelton, Ind., 362—Shipstuff; 363—Mixed Feed; 364—Bran.

Capital Roller Mill Co., Brookville, Ky., 407—Shipstuff.
Carlisle Milling Co., Carlisle, Ky., 401—Shipstuff.
Carrollton Roller Mills, Carrollton, Ky., 91—Cameron's Feed Stuff.
Cartwright & Co., Island, Ky., 487—Ideal Feed.
R. A. Carr, Maysville, Ky., 242—Bran; 243—Middlings.
F. E. Case, Hickman, Ky., 528—Wheat Bran.
Jas. Cate & Son Co., Hopkinsville, Ky., 210—Bran; 211—Mixed Feed; 484—Mixed Feed; 524—Corn Chop.
Cecilian Milling Co., Cecilian, Ky., 396—Mill Feed.
Center Roller Mills, Center, Ky., 572—Shipstuff.
Cincinnati Grain Co., Cincinnati, Ohio, 231—Bran; 232—Middlings; 233—Mixed Feed.
Clark & Clark, Franklin, Ky., 485—Bran and Shipstuff.
Clarkson Milling Co., Clarkson, Ky., 603—Bran; 604—Shorts.
Climax Milling Co., Mt. Sterling, Ky., 146—Shipstuff; 632—Corn Chops.
Climax Milling Co., Hopkinsville, Ky., 449—Mixed Feed; 558—Climax Feed; 559—Wheat Bran; 560—Middlings! 561—Invincible Feed.
Climax Roller Mills, Shelbyville, Ky., 390—Bran; 391—Shipstuff; 392—Shorts; 489—Blue Grass Butter Fat Dairy Feed.
College Mill Co., Franklin, Ky., 165—Bran.
R. L. Collins & Sons, Crittenden, Ky., 441—Shipstuff.
J. L. Collins, New Market, Ky., 586—Bran; 587—Shipstuff.
The Corno Mills Co,. East St. Louis, Ill., 331—Corno Horse & Mule Feed; 332—Cremo Dairy Feed; 333—Corno Chick Feed; 334—Corno Hen Feed.
Corydon Milling Co., Corydon, Ky., 218—Famous Feed; 219—Famous Bran; 220—Famous Corn Chop.
J. J. Cozatt, Parksville, Ky., 530—Cracked Corn; 283—Pure Bran; 284—Shipstuff; 285—Mixed Feed.
Crescent Mills, Shreve, Ky., 70—Blue Ribbon Feed.
Crescent Milling Co., Hopkinsville, Ky., 131—Star and Crescent; 454—Shipstuff.
Crescent Milling Co., Cynthiana, Ky., 522—Crescent Feed.
Crider Roller Mills, Crider, Ky., 617—Mixed Feed.
The Crosier Stock & Poultry Powder Co., New Albany, Ind., 523—Crosier Stock Food.
Crown Roller Mills, Morganfield, Ky., 299—Bran; 300—Mixed Feed; 519—Pure Corn Chop.
Robert Crump Co., Bowling Green, Ky., 352—Mixed Feed.
Culbertson Brothers, Ghent, Ky., 249—Mixed Feed.
W. C. Curry Co., Louisville, Ky., 615—Choice Cotton Seed Meal; 616—Prime Cotton Seed Meal; 622 Feed Cotton Seed Meal.

Cyphers Incubator Co., Buffalo, N. Y., 224—Chick Food; 225—Developing Food; 226—Forcing Food; 227—Laying Food; 228—Scratching Food.

Dahnke-Walker Milling Co., Union City, Tenn., 475—Wheat Bran.

C. D. Damon, Elkton, Ky., 154—Damon's Feed.

Darling & Co., Chicago, Ill., and Long Island City, New York, 303—Beef Scraps; 304—Beef Meal; 335—Darling's Granulated Bone; 480—Chick Feed.

Daugherty & Hurst, Nepton, Ky., 69—Mill Feed.

Dawson Milling Co., Dawson Springs, Ky., 388—Mixed Feed; 555—Corn Chop.

Dean Mill Co., Ava, Ky., 313—Wheat Bran.

J. H. Deweese & Co., Morgantown, Ky., 187—Shipstuff.

The Diadem Roller Mills, Stephensport, Ky., 477—Shipstuff; 478—Mixed Feed; 479—Bran.

Dixon Milling Co., Dixon, Ky., 367—Mixed Feed.

C. P. Dodd & Co., Louisville, Ky., 381—Chicken Feed; 382—Feed Meal; 383—Cracked Corn; 384—Crushed Feed.

The Dorsel Co., Newport, Ky., 590—Dorsel's Wheat Middlings; 589—Dorsel's Flour Middlings; 591—Dorsel's Wheat Bran; 592—Dorsel's Corn Meal.

Dublin Milling Co., Dublin, Ky., 629—Pure Wheat Bran.

E. G. Duckwall & Co., Louisville, Ky., 57—E. G. D. & Co.'s Feed Meal; 58—E. G. D. & Co.'s Shorts; 59—E. G. D. & Co.'s Chicken Feed; 60—E. G. D. & Co.'s Cotton Seed Meal and Hulls; 397—E. G. D. & Co.'s Corn Bran.

Dukedom Roller Mills, Dukedom, Tenn., 360—Corn Chop; 420—Bran; 521—Mixed Feed.

J. W. Duncan & Co., Owensboro, Ky., 570—Wheat Bran and Shipstuff.

William Dupee, London, Ky., 633—Mixed Feed; 634—Crushed Feed.

Eagle Roller Mills, Lawrenceburg, Ky., 56—Shipstuff.

Eagle Mills, Franklin, Ky., 308—Mixed Feed; 309—Bran.

The Early & Daniel Co., Covington, Ky., 120—Bran; 121—Yellow Meal; 123—Hominy Meal; 124—Oriental Feed; 122—Middlings.

Eberts & Bro., Jeffersonville, Ind., 325—Bran; 326—Mixed Feed; 327—Shipstuff; 474—"Mixed Feed"; 580—Cracked Corn; 581—Cracked Corn and Wheat.

Edinger & Co., Louisville, Ky., 145—Cracked Corn; 144—Mixed Chicken Feed; 442—Shorts; 443—Feed Meal; 444—Bran; 445—Shipstuff; 446—Linseed Oil Meal.

Elizabethtown Milling Co., Elizabethtown, Ky., 65—Mill Feed.

T. M. Ellis & Co., Russellville, Ky., 200—Mixed Feed.

Elliston Mill Co., Waco, Ky., 244—Mixed Feed.

Eminence Milling Co., Eminence, Ky., 13—Leader Mixed Feed.
Equity Roller Mills, Livermore, Ky., 527—Shipstuff.
T. M. Estes Mill Co., Lebanon, Ky., 540—Middlings; 541—Shipstuff; 542—Bran.
Factory Addition Mills, Owensboro, Ky., 453—Favorite Corn Chop.
Farless & White, Henderson, Ky., 241—Mixed Feed; 415—Pure Corn Chop.
Farris & Farris, Cave City, Ky., 403—Shipstuff.
Oscar Farmer & Sons, Louisville, Ky., 4—"We Kno" Shorts; 5—"We Kno" Oil Meal; 6—"We Kno" Cotton Seed Meal; 7—"We Kno" Hominy Meal; 8—"We Kno" Cracked Corn; 9—"We Kno" Chicken Feed; 517—"We Kno" Feed Meal.
J. H. Fedders & Sons, Covington, Ky., 520—Bran.
Flemingsburg Roller Mills, Flemingsburg, Ky., 237—Shipstuff.
T. E. Ford, Paducah, Ky., 366—Wheat Bran.
French Milling Co., Fulton, Ky., 547—Wheat Bran; 548—Shipstuff.
J. F. Frost & Sons, Wingo, Ky., 490—Shipstuff.
Henry Fruechtenicht, Louisville, Ky., 141—Bran; 142—Shipstuff; 431—Wheat Shorts.
John W. Fry, Melber ,Ky., 419—Mixed Feed.
R. L. Galloway, Falmouth, Ky., 266—Mixed Feed.
The Gem Roller Mills, Natlee, Ky., 2—Mixed Feed.
J. W. Gilbert's Sons, Owensboro, Ky., 267—Mixed Feed.
Gilliam & Tully, Burgin, Ky., 492—Mixed Feed.
Glasgow Milling Co., Glasgow, Ky., 90—Crushed Corn and Cob.
A. M. Glenn, Ashland, Ky., 235—Mill Run.
Golconda Roller Mills, Golconda, Ill., 469—Bran.
The Goldcamp Mill Co., Ironton, Ohio, 531—Cracked Corn.
Good Luck Mills, St. Louis, Mo., 488—Good Luck Mill Feed (Chick and Scratch Size).
Goodpaster & Scott, Sherburn, Ky., 293—Shipstuff; 610—Shipstuff.
Grange City Mills, Grange City, Ky., 533—Shipstuff.
Great Western Cereal Co., Chicago, Ill., 229—Excelsior Chop Feed; 376—Boss Chop Feed; 377—Excelsior Chop Feed.
Willis Green, Falls of Rough, Ky., 500—Mixed Feed.
Greenville Milling Co., Greenville, Ky., 596—Mixed Feed.
L. Green & Sons, Falls of Rough, Ky., 12—Mixed Feed.
Grimes Milling Co., Leavenworth, Ind., 628—Grimes Milling Co.'s Mixed Feed.
Guthrie Milling Co., Guthrie, Ky., 268—Mixed Feed; 269—Nelson's Special Feed.
Gwinn Brothers, Huntington, W. Va., 549—Mixed Feed; 550—Wheat Bran; 551—Middlings; 552—Corn Chop.
Hanson Roller Mills, Hanson, Ky., 421—H. R. M. Feed.
Harlan-Lowe Milling Co., Bardwell, Ky., 298—Feed Stuff.
Harvey & Turner, Marrowbone, Ky., 536—Bran.

H. P. Hawkins & Son, Paducah, Ky., 532—Corn Chop.
Hays Milling Co., Smith's Grove, Ky., 611—Mixed Feed.
L. H. Helfer & Son, Lowes, Ky., 258—Banner Feed; 288—Helfer's Feed.
J. R. Helfer, Wickliffe, Ky., 595—Wickliffe's Feed.
Henshaw Mill & Grain Co., Henshaw, Ky., 306—Bran; 307—Mixed Feed.
Hiner & Gardner, Vanceburg, Ky., 434—Corn Chop.
Hodgenville Roller Mills, Hodgenville, Ky., 245—"Lincoln."
Hogan & Smith, Shelby City, Ky., 236—Mixed Feed.
T. J. Hook, Hardinsburg, Ky., 510—Mixed Feed.
Hope Milling Co., White Plains, Ky., 368—Jersey Mixed Feed; 369—Kentucky Corn Chop.
W. L. Horrell & Son, Utica, Ky., 398—Mixed Feed.
Horse Cave Mills, Horse Cave, Ky., 316—Mixed Feed.
Banks Hudson, Lancaster, Ky., 209—Mixed Feed.
Hunter & Irvine, Washington, Ky., 234—Shipstuff.
Hustonville Roller Mills Co., Hustonville, Ky., 497—Mill Feed.
Igleheart Brothers, Evansville, Ind., 534—Wheat Bran; 535—Wheat Middlings.
Illinois Feed Mills, St. Louis, Mo., 451—Feed-Well Poultry Feeds.
Irvington, Milling Co., Irvington, Ky., 230—Shipstuff; 294—Crushed Ear Corn; 546—Mixed Feed.
J. W. Jarboe & Co., Springfield, Ky., 578—Corn Chop.
The J. E. M. Milling Co., Frankfort, Ky., 81—Kyome.
J. M. Johnson, Benton, Ky., 198—Johnson's Special Feed.
W. B. Johnson & Co., Memphis, Tenn., 374—Cotton Seed Meal; 375—Cotton Seed Meal.
Justice & Parrish, Providence, Ky., 301—Mixed Feed; 302—Corn Chop.
Geo. Keller, Newport, Ky., 112—Bran; 113—Rye Feed; 114—Middlings; 115—Corn Meal.
W. C. Kendall, Berry, Ky., 436—Wheat Bran; 437—Wheat Middlings.
D. V. Kennedy & Co., Stanford, Ky., 336—Shipstuff.
Kentucky Supply Co., Danville, Ky., 39—Premier Mixed Feed.
R. U. Kevil & Sons, Princeton, Ky., 330—Feed Stuff; 339—Mixed Feed; 466—Corn Chops.
Wright M. Kirby, Woodburn, Ky., 471—Mixed Feed.
T. W. Knox, Boyd, Ky., 447—Shipstuff.
Kuttawa Milling Co., Kuttawa, Ky., 518—Mixed Feed.
LaCenter Implement Co., LaCenter, Ky., 602—Ideal Stock Food.
J. W. Lancaster, Williamstown, Ky., 41—Bonum; 188—Equity; 257—Emergency.
Lane Lumber & Milling Co., Rio, Ky., 24—Shipstuff.
Lawrenceburg Roller Mills Co., Lawrenceburg, Ind., 54—Snowflake

Mixed Feed; 317—Snowflake Bran; 318—Snowflake Middlings.

M. F. Lawson, Mayfield, Ky., 87—Peerless.

Ledbetter Milling Co., Elizabethtown, Ill., 320—Mill Feed; 529—Mill Feed.

Leitchfield Milling Co., Leitchfield, Ky., 134—Bran; 135—Shipstuff; 136—Eureka.

Lewisport Mill Co., Lewisport, Ky., 203—Shipstuff; 204—Mixed Feed; 205—Bran.

Lewisburg Milling Co., Lewisburg, Ky., 310—Bran.

Lexington Roller Mills, Lexington, Ky., 64—Thoroughbred Shipstuff.

J. Lindsay Wells Co., Memphis, Tenn., 66—Sunny South Brand; 67—Star Brand.

Little River Mills, Hopkinsville, Ky., 584—Mixed Feed.

Logan & Logan Co., Shelbyville, Ky., 275—Bran; 276—Shipstuff; 277—Middlings; 278—Butter Fat Dairy Feed.

Louisville Cereal Mill Co., Louisville, Ky., 263—Nonesuch; 264—Crushed Corn; 265—Hominy Hearts.

J. S. Lycan & Son, Lafayette, Ky., 270—Mixed Bran; 448—Bran; 583—Shorts.

Lynn Grove Milling Co., Lynn Grove, Ky., 412—Bran.

Madisonville Milling Co., Madisonville, Ky., 372—Quail Chops; 373—Bob White Feed.

Mann & Adams, Harrodsburg, Ky., 502—Mixed Feed; 503—Shipstuff.

R. C. Mansfield & Son, Winchester, Ky., 215—Mixed Feed; 498—Chop Corn.

C. F. Mantz, Campbellsville, Ky., 422—Bran; 423—Middlings.

Massey Milling Co., Drake, Ky., 286—Mixed Feed; 385—Middlings; 386—Shorts; 387—Bran.

J. E. Matlock, Drake, Ky., 577—Shipstuff.

McAfee & Cunningham, Vanarsdell, Ky., 465—Shipstuff.

J. A. McAlister, Stanley, Ky., 588—Mixed Feed.

McKinney Roller Mills, McKinney, Ky., 341—Shipstuff.

Frank X. Merkley, Campbellsville, Ky., 212—Corn Chop.

W. E. Merkley Mill Co., Lebanon, Ky., 143—Mixed Feed; 608—Merkley's Feed.

Middlesboro Supply Co., Middlesboro, Ky., 252—Magic City Mill Mixed Feed.

Miller Milling Co., Panther, Ky., 563—Mixed Feed.

Millerstown Milling Co., Millerstown, Ky., 164—Bran.

Mobley & Samuels, Samuels, Ky., 461—Germ Bran; 462—Shorts; 463—Bran.

Model Roller Mills Co., Smith's Grove, Ky., 314—Mixed Feed; 315—Shorts; 491—Mixed Bran.

Model Roller Mills, Trenton, Ky., 408—Trenton Mill Stock Food; 409—Trenton Mill Shipstuff.

Model Roller Mills Co., Oakland Ky., 507—Mixed Feed; 508—Shorts.

Monarch Milling Co., Mt. Sterling, Ky., 279—Shipstuff; 280—Cracked Corn.

Morganfield Roller Mills, Morganfield, Ky., 389—White Rose Mixed Feed; 402—Chop Corn.

Morganfield Ice & Milling Co., Morganfield, Ky., 467—Crushed Corn and Cob; 468—Pure Corn Chop.

Moscow Roller Mills, Moscow, Ky., 400—Wheat Bran.

Mountain City Mill Co., Chattanooga, Tenn., 600 Feed Meal.

Munfordville Milling Co., Munfordville, Ky., 25—Mixed Feed.

W. R. Myers, Columbia, Ky., 272—Bran and Shipstuff.

W. N. Neville, Arlington, Ky., 68—Mixed Feed.

New Haven Mill Co., New Haven, Ky., 452—Mixed Feed.

Newport Mill Co., Loudon, Tenn., 624—Pure Wheat Shorts; 625—Mixed Feed; 626—Bran and Shorts; 627—Pure Wheat Bran.

Nolin Milling Co., Nolin, Ky., 125—Shipstuff; 126—Mixed Feed.

Nordmeyer & Berding, Covington, Ky., 50—Feed Corn Meal; 51—Middlings; 52—Bran; 53—Mixed Feed.

C. E. Nunn, Blackford, Ky., 512—Mixed Feed.

Oakville Milling Co., Oakville, Ky., 365—Mixed Feed.

E. F. Ogden, Slaughtersville, Ky., 340—Chop Corn.

Ohio Valley Mills, Louisville, Ky., 290—Shorts; 291—Hominy Feed; 612—Shipstuff.

Ohio Valley Mill & Supply Co., Ashland, Ky., 380—Corn Chop; 405—Mill Feed; 249—Trojan Middlings; 406—C. & O. Feed; 537—Corn and Cob Crush; 619—"Purity Middlings."

W. K. Oldham & Son, Stamping Ground, Ky., 609—Mixed Feed.

Olive Hill Mill & Seed Co., Olive Hill, Ky., 10—Corn Chop; 11—Corn Cob Meal and Corn Chop.

Joseph G. Orth & Co., Newport, Ky., 28—Corn Meal; 29—Wheat Bran; 30—Germ Feed; 31—Oil Meal (old process); 32—Mixed Feed; 33—Shorts; 34—Rye Feed.

Palmer, Sinkhorn & Herrin, Stamping Ground, Ky., 296—Wheat Bran; 297—Middlings; 312—Mixed Feed; 496—Corn Bran.

C. A. Pardee, Colesburg, Ky., 251—Bran.

Paris Milling Co., Paris, Ky., 260—Mixed Feed.

Paris, Milling Co. Paris,, Tenn., 573—Mixed Feed.

The Patton Milling Co., Catlettsburg, Ky., 148—Corn Chop; 149—Mill Run.

Payne Mill & Elevator Co., Gallatin, Tenn., 538—Payne's Bran; 539—Payne's Mixed Feed.

Peoples Roller Mills, Georgetown, Ky., 567—Mixed Feed; 568—Bran.

E. R. Perkins, Edmonton, Ky., 473—Wheat Bran.
Peters & Bradley Mill Co., Knoxville, Tenn., 137—Mixed Feed.
Philpott & Lile, Rocky Hill Station, Ky., 601—Shipstuff.
Phoenix Flour Mill, Evansville, Ind., 504—Phoenix Mixed Feed; 505—Phoenix Bran; 506—Phoenix Shorts.
R. C. Poage Milling Co., Ashland, Ky., 166—Middlings; 167—Mixed Feed; 168—Corn Chop.
Poole Milling Association, Poole, Ky., 569—Mixed Feed.
Portsmouth Cereal Co., Portsmouth, Ohio, 346—Scioto Hominy Feed.
Potts & Duerson, White's Station, Ky., 1—Mixed Feed.
Purina Mills, St. Louis, Mo., 347—Purina Mill Feed.
The Quaker Oats Co., Chicago, Ill., 246—Schumacher Stock Feed; 247—Victor Feed.
A. Quante, Metropolis, Ill., 348—Quante's Mixed Feed.
D. S. Ragon Stock Food Co., Evansville, Ind., 482—Farmer's Stock Food; 483—Farmer's Poultry Food.
F. Raidt Milling Co., Louisville, Ky., 172—Feed Meal; 173—Hominy Meal; 174—Crushed Corn; 175—Crushed Corn and Wheat.
Ralston Purina Co., St. Louis, Mo., 271—Purina Feed.
J. B. Ramsey, Sebree, Ky., 404—Cream Patent Feed.
L. A. Rankin & Co., Rankin, Ky., 464—Rankin Feed.
Ray Brothers, Sedalia, Ky., 495—Shipstuff.
Red Cross Milling Co., Clay, Ky., 305—Peerless Feed.
A. J. Rice, McBrayer, Ky., 430—Mill Feed.
Richmond & Bond Co., Hickman, Ky., 311—Cotton Seed Meal.
Riddle & Beaty, Walnut Grove, Ky., 196—Mill Feed; 197—Shipstuff.
Riedling & Bro., Louisville, Ky., 597—Cracked Corn; 598—Feed Meal; 599—Shorts.
Rineyville Roller Mills, Rineyville, Ky., 328—Kentucky.
Riverside Mill, Stanford, Ky., 274—Corn Bran.
G. W. Robinson, Waitman, Ky., 394—Corn Chop.
Rockport Milling Co., Rockport, Ind., 361—Mixed Feed.
A. M. Rouse & Son., Walton, Ky., 509—Shipstuff.
Rucker Bros., Fulton, Ky., 499—Wheat Bran.
Rucker, Benton & Co., Waco, Ky., 89—Mixed Feed.
Russell Creek Roller Mill, Columbia, Ky., 399—Bran.
Sacramento Milling Co., Sacramento, Ky., 635—Shipstuff.
Sadieville Milling Co., Sadieville, Ky., 438—Mixed Feed.
Salem Milling Co., Salem, Ky., 576—Mixed Feed.
T. A. Sandefur, Henderson, Ky., 424—White Swan Bran; 425—Leader Middlings; 426—Ohio River Chopped Corn; 579—White Swan Mixed Feed.
Sardis Milling Co., Sardis, Ky., 575—Shipstuff.

A. Schneider's Sons, Louisville, Ky., 353—Double "S" Chick Feed; 354—Double "S" Cracked Corn; 355—Double "S" Hominy Meal; 356—Double "S" Feed Meal; 357—Double "S" Shorts; 358—Double "S" Corn Bran; 439—Double "S" Improved Crushed Feed.

Scott Brothers & Co., Cave-in-Rock, Ill., 49—Mixed Feed.

W. D. Sharp & Son, Nicholasville, Ky., 213—Shipstuff; 214—Ajax Feed.

Sharpsburg Roller Mills, Sharpsburg, Ky., 289—Bostain's Feed; 554—Bostain's Shipstuff.

. R. Shaw & Co., Jett, Ky., 27—Corn Bran.

Shrewsbury & Byers, Caneyville, Ky., 169—Mill Feed.

W. H. Small & Co., Evansville, Ind., 458—XX Mixed Feed; 459—XXX Mixed Feed; 460—Eclipse Poultry and Chick Food; 545—Corn Chop.

Smithfield Milling Co., Smithfield, Ky., 261—Shipstuff.

H. C. Smith & Sons, Harrodsburg, Ky., 161—Smith's Pure Crushed Corn; 162—Smith's Puritan Feed; 163—Smith's I. X. L. Feed.

J. Allen Smith & Co., Knoxville, Tenn., 287—Cow Feed.

Smithfield Milling Co., Smithfield, Ky., 262—Mixed Feed.

Dr. Snyder Stock Food Co., New Harmony, Ind., 472—Dr. J. H. 'nyder's Stock Food.

Somerset Mill Co., Somerset, Ky., 105—Mixed Feed.

Southern Star Roller Mills, Perryville, Ky., 393—Mixed Feed.

E. F. Spears & Sons, Paris, Ky., 88—Mill Feed; 170—Mill Feed; 171—Mixed Feed.

Stafford Milling Co., Martin, Tenn., 295—Jersey Cream.

Standard Cereal Co., Chillicothe, Ohio, 216—"Anchor" Middlings; 217—"Anchor" Cracked Corn.

Standard Hay & Grain Co., Cincinnati, Ohio, 73—Bran; 74—Middlings; 75—Mixed Feed; 76—Corn Meal; 77—Chop Feed C. & O.

Star Milling Co., Nicholasville, Ky., 349—Tip Top Feed.

J. S. Stevens & Co., Ashland, Ky., 513—Steven's Bran; 514—Steven's Middlings.

Standard Roller Mill Co., Cerulean, Ky., 202—Jersey Feed.

Steinmesch Feed & Poultry Supply Co., St. Louis, Mo., 350—Steinmesch Chicken Feed.

Sturgis Milling Co., Sturgis, Ky., 184—Shipstuff; 185—Mixed Feed; 186—Pure Corn Chop.

W. J. Sutton, Newport, Ky., 36—Middlings; 37—Mixed Feed; 38—Bran.

I. F. Tabb, Mt. Sterling, Ky., 61—Sterling Chop; 62—Sterling Poultry Feed; 63—C. & O.

Tell City Flouring Mills, Tell City, Ind., 456—Middlings; 457—Shipstuff.

Temple Brothers & Co., Paducah, Ky., 292—Shipstuff; 593—Shipstuff.
Tennessee Cotton Oil Co., Memphis, Tenn., 440—Cotton Seed Meal.
B. Terhune's Sons, Bradfordville, Ky., 116—Middlings; 117—Shipstuff; 118—Bran; 119—Corn Bran.
R. F. Thomas, Livermore, Ky., 631—Mixed Feed.
Thomson & Hankins, Madisonville, Ky., 100—Belle Bran; 101—Pearl Feed Meal.
Geo. T. Thompson, Warsaw, Ky., 564—Mill Feed.
R. W. Thompson, Water Valley, Ky., 481—Wheat Bran.
Trimble Milling Co., Milton, Ky., 493—Wheat Bran; 494—Shipstuff.
W. Trow & Co., Madison, Ind., 337—Shipstuff; 338—Bran; 395—Mixed Feed.
W. H. Traylor, Gilbert's Creek, Ky., 378—Shipstuff; 379—Mixed Feed.
Uniontown Roller Mill Co., Uniontown, Ky., 26—Mixed Feed.
The VanLeunen Co., Covington, Ky., 92—Royal Chop; 93—Bran; 94—Middlings; 95—Mixed Feed; 96—Corn Meal.
Vaughan & Herrin, Liberty, Ky., 556—Shipstuff.
Vine Grove Roller Mills, Vine Grove, Ky., 428—Middlings; 429—Concentrated Feed Stuff.
Alex. Walker, Lancaster, Ky., 221—Mixed Feed.
A. Waller & Co., Henderson, Ky., 71—Blue Grass Mixed Feed.
Washburn-Crosby Milling Co., Louisville, Ky., 151—Mixed Feed; 152—Bran; 153—Shorts.
J. W. Webb & Son, Vanceburg, Ky., 416—Corn Chop; 417—Wheat Bran; 418—Wheat Middlings.
Phil J. Weisenberger, Midway, Ky., 16—Cream Feed; 17—Shipstuff; 623—Middlings.
Welden & McCormack, Curdsville, Ky., 410—Corn Bran; 411—Corn Chop.
Western Grain Product Co., Milwaukee, Wis., 321—Hammond Dairy Feed.
Wheeler & Davis, Jeffersontown, Ky., 566—Wheeler & Davis Shorts.
Wheeler & Wheeler, Wheeler's Mill, Ky., 607—Wheat Bran.
A. P. White & Co., Cadiz, Ky., 618—National.
E. I. Williams & Co., Sanders, Ky., 79—Mill Feed; 80—Mixed Feed.
Willis Brothers, Rumsey, Ky., 40—Daisy Feed.
Willis & Lafont, Metropolis, Ill., 562—Mixed Feed.
C. A. Wilson & Co., Fredonia, Ky., 516—Mixed Feed.
Wilson & McFarland, Fulton, Ky., 501—Pure Corn Chop.
Winchester Roller Mills, Winchester, Ky., 55—Corn Chop; 81—Shipstuff; 83—Mixed Feed.
Wolcott Brothers, South Carrollton, Ky., 130—Shipstuff; 582—Wolcott's Feed.

J. T. Woolf & Co., Tolu, Ky., 78—Mixed Feed.

R. H. Wolfe, Georgetown, Ky., 526—Model Feed.

Amos Yaeger, Louisville, Ky., 43—Pure Shorts; 44—Mixed Horse Feed; 45—Mixed Chicken Feed; 46—Feed Meal; 47—Hominy Meal; 48—Crushed Corn.

M. J. Yopp Seed Co., Paducah, Ky., 585—M. J. Y pp Seed Co.'s Hen Feed.

J. W. Zaring Grain & Mill Co., Richmond, Ky., 206—Zaring; 207—Bonanza; 208—Crushed Corn.

Ziliak & Schafer Milling Co., Evansville, Ind., 42—Acme Horse and Mule Feed; 322—Bran; 323—Shipstuff; 324—Middlings; 574—Mixed Feed.

KENTUCKY

Agricultural Experiment Station

OF THE

State College of Kentucky.

BULLETIN NO. 132.

COMMERCIAL FERTILIZERS

LEXINGTON, KENTUCKY
DECEMBER 31, 1907

109

KENTUCKY

Agricultural Experiment Station

OF THE

State College of Kentucky.

BULLETIN NO. 132.

COMMERCIAL FERTILIZERS

LEXINGTON, KENTUCKY
DECEMBER 31, 1907

Kentucky Agricultural Experiment Station.

BOARD OF CONTROL.

GEO. B. KINKEAD, Chairman, Lexington, Ky.
D. F. FRAZEE, Lexington, Ky.
C. B. NICHOLS, Lexington, Ky.
C. M. CLAY, Paris, Ky.
J. K. PATTERSON, President of the College.
M. A. SCOVELL, Director, Secretary.

STATION OFFICERS.

M. A. SCOVELL, Director and Chemist.
A. M. PETER, Chemist, Head of Chemical Division.
H. E. CURTIS, Chemist, Head of Fertilizer Division.
H. GARMAN, Entomologist and Botanist, Head of Entomological and Botanical Division.
W. H. SCHERFFIUS, Agronomist, Head of Agricultural Division.
R. M. ALLEN, Head of Food Division.
J. D. TURNER, Head of Feed Division.
J. O. LaBACH, Chemist, Food Division.
MISS M. L. DIDLAKE, Assistant Entomologist and Botanist.
S. D. AVERITT, Assistant Chemist.
O. M. SHEDD, Assistant Chemist.
MISS LILLIE LISTON, Stenographer, Food Division.
E. C. VAUGHN, Assistant Entomologist and Botanist.
GEORGE ROBERTS, Assistant Chemist, Fertilizers.
E. S. GOOD, Animal Husbandman, Head of Animal Husbandry Division.
J. W. NUTTER, Assistant in Dairying.
MISS O. L. GINOCHIO, Stenographer.
H. D. SPEARS, Assistant Chemist, Feeds.
W. D. NICHOLS, Assistant Animal Husbandman.
J. W. McFARLIN, Assistant, Fertilizer and Feed Division.
MISS ANNA WALLIS, Stenographer.
E. F. WORTHINGTON, Superintendent Farm.

NOTICE.

The Bulletins of the Station will be mailed free to any citizen of Kentucky who sends his name and address to the Station for this purpose.

Correspondents will please notify the Director of changes in their postoffice address, or of any failure to receive the bulletins.

Address:
KENTUCKY AGRICULTURAL EXPERIMENT STATION,
Lexington, Ky.

BULLETIN NO. 132

ANALYSES OF COMMERCIAL FERTILIZERS

The matter of plant food is all important in purchasing fertilizers. When a farmer buys a ton of an average commercial fertilizer he buys in reality only about 300 pounds of actual plant food. If he buys a cheaper fertilizer he gets less than this amount. If he buys a high grade fertilizer he may receive as much as 600 pounds. It costs as much to mix a ton of fertilizer containing 300 pounds of plant food as it does one containing 600 pounds. The cost of sacking, hauling, and freighting is the same. Therefore, it is evident that the manufacturer can sell the plant food in a high grade fertilizer cheaper per pound than he can the plant food in a low grade fertilizer. In other words, the higher the grade the cheaper can the plant food be bought. Farmers are advised therefore to purchase only high grade fertilizers.

Attention is called to those brands which have less than two per cent. of ammonia or potash. Less than two per cent. of either of these ingredients is too small a quantity where such ingredients are needed, and where not needed it is useless to purchase them. It is an utter waste of money to purchase potash or ammonia in fertilizers containing less than one per cent. of these ingredients.

Number of brands. There were 382 different brands of commercial fertilizers registered during 1907. Of these different brands 230 were complete fertilizers, or fertilizers containing all three of the essential ingredients, namely: phosphoric acid, nitrogen, and potash; 46 were acid phosphates, or superphosphates; 2 contained a mixture of acid phosphates and nitrogen compounds only; 45 acid phosphate and potash salts only; and 59 were classed as bones or tankage.

Samples Collected and Analyzed. Three hundred and eight samples were collected by deputy inspectors, or were sent by farmers from various parts of the State; 386 samples were those sent in by firms as official samples; of these samples 636 were analyzed by the Station.

Results of the Analyses. The results of the analyses show that of the 636 samples analyzed, 118 representing 101 brands and 29 firms, fell so far below the guaranteed analyses in phosphoric acid, nitrogen or potash, or any two, or all three of these ingredients, that the deficiencies could not be accounted for by variations in sampling or analysis. It is probable that in most cases variations can be accounted for by hurried or careless mixing at the factories, or gross mistakes in shipping one brand for another, but in one or two instances, the results show a desire on the part of the manufacturer to guarantee a higher percentage of the essential ingredients than the goods contain.

Two very noticeable cases of careless mixing at the factory or mistakes in shipping one brand for another, to be found in the table, are the following: "Bear Tobacco Grower," manufactured by the Continental Fertilizer Co., and "Ground Bone," manufactured by the Jarecki Chemical Co.

The following table gives the names of all manufacturers legally selling fertilizers in the State during 1907, and the number of samples analyzed of each firm's fertilizers taken from various places in the State or furnished by the manufacturers.

The table also shows in how many of these samples there was a serious deficiency of either phosphoric acid, nitrogen or potash, and in how many the percentages of these constituents are such as to be considered acceptable, from the point of view of the buyer, either because they equal or exceed the percentage guaranteed by the manufacturer, or because a slight deficiency in one constituent is, in the Director's judgment, fully made up by an excess in one or both of the others. Under the heading "Relative Value per ton" is shown in how many instances the "estimated value per ton" calculated from our analysis, equals or exceeds the value calculated from the manufacturer's minimum guaranteed analysis, and in how many it is too low, reasonable allowance having been made for unavoidable variations. This table should be carefully studied. It concisely reviews each firm, showing how the samples of fertilizers taken from various places in the State compare with what was guaranteed. In order, however, to see the amount of variations from the guaranteed analysis, this table should be studied in connection with the table of results of analyses, which follows this introduction. This table can be easily referred to, as the names of the firms are arranged in alphabetical order.

NAME OF MANUFACTURER.	No. of Samples Analyzed.	Phosphoric Acid.		Nitrogen.		Potash.		Relative Value Per Ton	
		No. Acceptable.	No. Too Low.	No. Acceptable.	No. Too Low.	No. Acceptable.	No. Too Low.	No. Acceptable.	No. Too Low.
The American Agricultural Chemical Co	21	18	3	15	0	13	0	19	2
The Armour Fertilizer Works	31	31	0	26	0	21	1	31	0
Bowker Fertilizer Co	24	20	4	16	0	13	4	22	2
C. S. Brent	2	1	1	1	1	2	0	1	1
The Cincinnati Phosphate Co	13	11	2	9	0	7	2	12	1
Continental Fertilizer Co	27	21	6	22	2	18	3	23	4
The Currie Fertilizer Co	5	2	3	5	0	5	0	5	0
Duncan Bros. Co	20	12	8	19	1	16	2	15	5
Federal Chemical Co	29	28	1	23	0	21	1	28	1
Fox Chemical Co	30	29	1	22	0	20	3	29	1
Furman Farm Improvement Co	2	2	0	2	0	2	0	2	0

NAME OF MANUFACTURER	No. of Samples Analyzed.	Phosphoric Acid.		Nitrogen.		Potash.		Relative Value Per Ton	
		No. Acceptable.	No. Too Low.	No. Acceptable.	No. Too Low.	No. Acceptable.	No. Too Low.	No. Acceptable.	No. Too Low.
Globe Fertilizer Co	49	43	6	34	0	34	2	45	4
Indianapolis Rendering Co	1	1	0	1	0	1	0	1	0
The Jarecki Chemical Co	25	23	2	16	2	15	5	24	1
The Jones Fertilizing Co	22	19	3	17	0	14		20	2
Kaufman Fertilizer Co	10	9	1	6	1	7	0	10	0
Louisville Fertilizer Co	31	23	8	25	1	22	1	27	4
Michigan Carbon Works	25	22	3	21	0	18	0	25	0
Nelson Morris & Co	16	14	2	15	1	9	1	15	1
National Fertilizer Co	22	18	4	13	0	17	0	20	2
Mt. Pleasant Fertilizer Co	23	19	4	14	0	15	2	21	2
North-Western Fertilizing Co	38	36	2	29	1	26	1	38	0

Packer's Fertilizer Association	13	11	2	9	0	8	0	13	0
A. W. Pickerill	3	3	0	3	0	2	0	3	0
Pero & Stoecker	6	6	0	6	0	1	0	6	0
The Queen City Fertilizer Co	5	4	1	4	0	3	2	4	1
Read Phosphate Co	14	12	2	10	0	11	2	13	1
Smith Brothers	19	19	0	17	0	13	1	19	0
Standard Guano & Chemical Mfg. Co	1	1	0	1	0	0	0	1	0
Swift & Company	32	30	2	29	1	21	1	32	0
Tennessee Chemical Co	22	21	1	18	0	15	2	21	1
Tennessee Valley Fertilizer Co	5	1	4	1	2	5	0	5	0
Tuscarora Fertilizer Co	11	11	0	8	0	7	0	11	0
Virginia Carolina Chemical Co	11	9	2	8	0	10	0	10	1
Wood, Stubbs & Co	8	7	1	8	0	5	1	7	1

It is evident from the preceding table that while most of the fertilizers examined ran above the minimum guarantee, yet a thorough and careful inspection seems essential. It is hoped that farmers will generally take advantage of Section 8 of the fertilizer law, and when they purchase fertilizers, at least in quantity, that they will take a sample in accordance with Section 8, and send it to the Station for free analysis.

Essentials in Taking a Sample. 1. Take it at the time of purchase, and if possible in the presence of agent or seller. 2. Take a sample from not less than two bags, and from one additional bag for every ten purchased; mix these samples carefully and take at least a pint of this mixed sample, put it into a fruit jar, seal, box and express to M. A. Scovell, Director, Lexington, Ky. 3. Take the sample in the presence of at least one witness, and have the witness sign the required certificate. 4. The certificate for free analysis to be sent *by mail* and should be in accordance with the law as given in Section 8.

If the sample is taken in accordance with the above directions it may be sent by express and the charges will be paid by the Station.

Form of Certificate. A good form of certificate is the following and blank certificates will be sent free to any farmer requesting the same.

CERTIFICATE FOR FREE ANALYSIS.

.....190...

M. A. Scovell, Director, Lexington, Ky.:

This is to certify that I am not a dealer in, or agent for the sale of any fertilizer, and that the fertilizer, a sample of which I have sent by express to you for free analysis, was purchased by me.....190...., from an agent or dealer in Kentucky for my own use and not for sale.

I further certify that the sample was taken at the time of purchase from at least 10 per cent. of the sacks or other packages comprising the whole lot purchased, and that it was taken as provided in Section 8, of the fertilizer law, in the following described manner, towit: .....

.....

.....

.....

.....

Upon receipt of the analysis from you, I agree to furnish you with a tag taken from one of the sacks sampled, the name and address of the firm or agent of whom the fertilizer was purchased, and the amount purchased.

(Signature).....

(P. O. Address).....

Signature of Witnesses:

.....

.....

Should, however, any farmer desire to take a sample and not have a blank certificate at hand, he may write one in full like the form above given, or take the sample in presence of seller and witness and so mark it that he can identify it subsequently in a certificate, and send it at once to the Experiment Station with the request that the Station furnish form of certificate, such certificate to be filled out upon receipt covering the sample and properly signed by sender and witnesses and sent by return mail to the Station.

Section Providing for Free Analysis. The section of the Fertilizer Law, providing for the taking of samples for free analysis is as follows:

Sec. 8. Any person not a dealer in, or agent for the sale of any fertilizer who may purchase any commercial fertilizer in this State for his own use and not for sale, may take a sample of the same for analysis, which analysis shall be made by the said Experiment Station free of charge. Such sample for free analysis shall be taken by the purchaser in presence of the person, company or agent selling the fertilizer from at least ten (10) per cent. of the sacks or other packages comprising the whole lot purchased, and shall be thoroughly mixed and at least one pound of the material after mixing must be put into a jar or can, securely sealed and marked in such a way as to surely identify the sample and show by whom it was sent, without giving the name of the fertilizer or the person from whom it was purchased, and must be forwarded to the Director of the Kentucky Agricultural Experiment Station, Lexington, Ky. The purchaser shall also send with the sample a certificate signed by himself and witness, or by two witnesses, stating that the sender has purchased the fertilizer for his own use and not for sale, and that the sample was taken in the manner prescribed

in this section. Provided however, that if the person, company or agent shall refuse to witness the taking of the sample, then the sample may be taken at the time of the purchase in the manner already described in the presence of two witnesses who shall certify to the manner of taking the sample. The purchaser shall preserve the official label from one of the bags or other packages sampled to be sent to the Director after having received the report of analysis of the sample, and at the same time he shall furnish to the Director the name and address of the firm of whom the fertilizer was purchased and the amount purchased; and any person having sent a sample for free analysis, under the provisions of this section, who shall, after having received the report of analysis of the same, refuse to furnish the required information, shall thereafter forfeit the privilege of free analysis of fertilizers under this section. But if any sample shall have been submitted for free analysis without all the requirements of this section having been complied with, the Director shall inquire into the case and may accept the sample for free analysis if he believes that it is a fair sample of the fertilizer as it was delivered to the purchaser.

Values Used.—In calculating the relative value per ton, the following values have been used:

Soluble and reverted phosphoric acid in mixed fertilizers	6c per lb.
Soluble and reverted phosphoric acid in plain acid and unacidulated phosphates	5c per lb.
Insoluble phosphoric acid in mixed fertilizers	2c per lb.
Insoluble phosphoric acid in plain acid phosphates	Nothing.
Phosphoric acid in fine bone	4c per lb.
Phosphoric acid in medium bone	3c per lb.

Fine bone is all that passes through a sieve with meshes one-twenty-fifth inch square. Medium bone passes through a sieve with meshes one-sixth inch square, but does not include fine bone.

Nitrogen in all fertilizers	15c per lb.
Potash in all fertilizers, from sulphate	6c per lb.
Potash in all fertilizers, from muriate	5c per lb.

The term "Potash from muriate" does not indicate necessarily that the manufacturers used muriate of potash in furnishing the potash; they may have used sulphate of potash, or other salts of potash, but in all fertilizers where the term "Potash

from muriate" is used there is enough chlorine present to combine with the potash, either from salt in the tankage used, or the potash salts used, as muriate, kainit, carnallite, etc. As the objection to the use of muriate of potash arises from the chlorine present in this salt, it likewise follows that chlorine in a fertilizer is objectionable, whether put in with the potash or otherwise. The using of sulphate of potash where there is chlorine present in other ingredients of the fertilizer will not obviate the injurious effect of the chlorine, and therefore we take this method of showing chlorine present by designating the potash as "from muriate."

Explanation of the Table. In the table of analyses, following the name of each brand will be found the analysis of the sample furnished by the manufacturer at the time the fertilizer was entered for sale and which was accompanied by an affidavit giving the guaranteed analysis. This is the analysis that is marked "manufacturer" in the column headed "From Whom Obtained." If any other analyses of the same brand have been made, they will be found following this analysis. These samples have been collected by deputy inspectors or sent in by farmers. The manufacturer's guarantee is printed last in *italic* figures.

The figures in the table which are set in bold face type are those results which, in the judgment of the Director, were too low to be acceptable.

The names of the manufacturers are arranged in alphabetical order, and all the analyses of the same brand have been grouped together.

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	The American Agricultural Chemical Co., New York.	
20412	Special Potato and Onion Manure	Manufacturer
20413	Ground Bone	Manufacturer
20753		Jno. Harned, Big Clifty
20414	Special Bone Meal	Manufacturer
20415	Cleveland Dryer Works Horsehead Phosphate	Manufacturer
20516		O. A. Lutes & Co., Shepherdsville.
20754		Same
20416	Cleveland Dryer Works XXX Super Phosphate	Manufacturer
20417	Cleveland Dryer Works Phospho Bone	Manufacturer
20755		Wesley Rowlett, Bedford
20418	Cleveland Dryer Works Potato, Tobacco and General Crop Fertilizer	Manufacturer
20517		Wesley Rowlett
20419	Cleveland Dryer Works Ohio Seed Maker with Potash	Manufacturer
20756		Wesley Rowlett
20420	Bradley Fertilizer Works Soluble Dissolved Bone	Manufacturer

Table of Analyses.

Pounds in the Hundred.												
Phosphoric Acid.									Potash			
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.	Nitrogen.	Equivalent to Ammonia.	From Muriate.	From Sulphate.	Estimated Value per Ton.	Station Number.
				6.85	2.49	9.34	0.99	1.20	9.44		$21.63	20412
		4.00	*2.00*	*6.00*		*8.00*	*0.82*	*1.00*	*10.00*		*20.46*	
14.60	6.87					21.47	3.89	4.72			27.47	20413
11.07	9.81					20.88	2.28	2.77			21.59	20753
						20.00	*2.47*	*3.00*			*19.41*	
14.83	14.24					29.07	1.60	1.94			25.20	20414
						25.00	*1.23*	*1.50*			*18.69*	
				10.64	3.21	13.85					10.64	20415
				10.39	1.98	12.37					10.39	20516
				9.22	3.76	12.98					9.22	20754
		8.00	*2.00*	*10.00*		*12.00*					*10.00*	
				12.64	3.43	16.07					12.64	20416
		12.00	*2.00*	*14.00*		*16.00*					*14.00*	
				10.55	3.51	14.06	1.07	1.30	1.34		18.61	20417
				9.69	2.87	12.56	0.98	1.19	1.02		16.74	20755
		7.00	*3.00*	*10.00*		*12.00*	*0.82*	*1.00*	*1.00*		*16.26*	
				7.87	3.16	11.03	1.07	1.30	4.48		18.39	20418
				8.54	3.34	11.88	0.96	1.17	3.90		18.37	20517
		5.00	*3.00*	*8.00*		*10.00*	*0.82*	*1.00*	*4.00*		*16.86*	
				7.74	3.15	10.89	1.95	2.37	2.71		19.11	20419
				8.96	1.68	10.64	1.57	1.91	2.05		18.18	20756
		5.00	*3.00*	*8.00*		*10.00*	*1.65*	*2.00*	*2.00*		*17.35*	
				12.61	3.48	16.09					12.61	20420
		12.00	*2.00*	*14.00*		*16.00*					*14.00*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	The American Agricultural Chemical Co.	
20421	Bradley Fertilizer Works Alkaline Bone and Potash	Manufacturer
20422	Bradley Fertilizer Works Niagara Phosphate	Manufacturer
20423	Bradley Fertilizer Works Corn and Wheat Phosphate	Manufacturer
20424	Bradley Fertilizer Works Potato and Root Phosphate	Manufacturer
20425	Bradley Fertilizer Works Dissolved Bone with Potash	Manufacturer
20426	Bradley Fertilizer Works B. D. Sea Fowl Guano	Manufacturer
	The Armour Fertilizer Works, Chicago, Ill.	
20284	Grain Grower	Manufacturer
20518		Murphy & Acton, Kingsville
20675		Barren Co. Gro. and Hdw. Co., Glasgow
20285	Bone, Blood and Potash	Manufacturer
20286	White Burley and Black Tobacco	Manufacturer
20519		J. J. Ramsey & Bro., Shelbyville

Table of Analyses.

Pounds in the Hundred.												
Phosphoric Acid.									Potash			
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.	Nitrogen.	Equivalent to Ammonia.	From Muriat.	From Sulphate.	Estimated Value per Ton.	Station Number.
				8.99	3.21	12.20			2.57		$14.64	20421
		7.00	*3.00*	*10.00*		*12.00*			*2.00*		*14.80*	
				7.56	2.79	10.35	1.24	1.51	1.39		15.30	20422
		4.00	*3.00*	*7.00*		*8.00*	*0.82*	*1.00*	*1.00*		*12.26*	
				10.19	3.70	13.89	1.06	1.29	1.41		18.30	20423
		7.00	*3.00*	*10.00*		*12.00*	*0.82*	*1.00*	*1.00*		*16.26*	
				7.84	2.98	10.82	1.06	1.29	4.48		18.26	20424
		5.00	*3.00*	*8.00*		*10.00*	*0.82*	*1.00*	*4.00*		*16.86*	
				7.87	2.51	10.38	1.50	1.82	2.79		17.73	20425
		5.00	*3.00*	*8.00*		*10.00*	*1.03*	*1.25*	*2.00*		*15.49*	
				7.78	2.71	10.49	2.32	2.82	1.92		19.30	20426
		5.00	*3.00*	*8.00*		*10.00*	*2.06*	*2.50*	*1.50*		*18.08*	
				9.54	1.36	10.90	1.69	2.05	2.25		19.31	20284
				8.62	2.83	11.45	2.11	2.56	2.24		20.04	20518
				8.54	3.68	12.22	1.62	1.97	2.09		18.67	20675
		6.00	*2.00*	*8.00*		*10.00*	*1.65*	*2.00*	*2.00*		*17.35*	
				8.87	2.39	11.26	3.94	4.78		6.74	31.51	20285
		6.00	*2.00*	*8.00*		*10.00*	*4.12*	*5.00*		*7.00*	*31.16*	
				8.75	2.69	11.44	2.75	3.34		4.10	24.75	20286
				10.69	2.00	12.69	2.94	3.57	0.82	3.12	27.01	20519
		6.00	*2.00*	*8.00*		*10.00*	*2.88*	*3.50*		*4.00*	*23.84*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
20287 20520 20676	The Armour Fertilizer Works, Wheat, Corn and Oat Special..	Manufacturer ..... Overby & McKeel, Murray..... Barren Co. Gro. & Hdw. Co.....
20288	Ammoniated Bone with Potash.	Manufacturer .....
20289 20521 20757	Tobacco Grower	Manufacturer ..... Lovell & Grainger, Franklin..... Forbes Mfg. Co., Hopkinsville....
20290 20522	Dark Tobacco Special	Manufacturer ..... Murphy & Acton.....
20291	Armour's Champion	Manufacturer .....
20292	High Grade Potato	Manufacturer .....
20293	Record Brand	Manufacturer .....
20294	Phosphate and Potash	Manufacturer .....
20295	Soluble Phosphate and Potash.	Manufacturer .....
20296	Star Phosphate	Manufacturer .....
20297 20677	Cereal Phosphate	Manufacturer ..... R. A. Waggener, Columbia.....
20298 20523 20678	Raw Bone Meal	Manufacturer ..... Grayson Co. Supply Co. Leitchfield A. W. Pickerill, Hodgenville.....

Table of Analyses.

Pounds in the Hundred.												
Phosphoric Acid.									Potash		Estimated Value per Ton.	Station Number.
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.	Nitrogen.	Equivalent to Ammonia.	From Muriate.	From Sulphate.		
				7.08	0.97	8.05	0.81	0.98	1.17		$12.49	20287
				8.89	3.07	11.96	1.02	1.24	1.96		16.92	20520
				8.17	6.98	15.15	0.80	0.97	1.31		16.30	20676
		5.00	*2.00*	*7.00*		*9.00*	*0.82*	*1.00*	*1.00*		*12.66*	
				6.97	1.47	8.44	2.40	2.91	0.92	1.17	18.47	20288
		4.00	*2.00*	*6.00*		*8.00*	*2.47*	*3.00*		*2.00*	*17.81*	
				7.93	1.23	9.16	1.54	1.87		5.29	20.98	20289
				10.57	1.42	11.99	1.79	2.17	1.26	3.55	24.14	20521
				9.25	4.58	13.83	1.70	2.06		4.44	23.36	20757
		6.00	*2.00*	*8.00*		*10.00*	*1.65*	*2.00*		*5.00*	*21.35*	
				7.57	1.73	9.30	1.83	2.22		2.59	18.37	20290
				9.29	2.47	11.76	1.63	1.98	0.78	3.42	21.91	20522
		5.00	*2.00*	*7.00*		*9.00*	*1.65*	*2.00*		*4.00*	*18.95*	
				10.68	1.68	12.36	1.75	2.12	2.37		21.11	20291
		6.00	*4.00*	*10.00*		*12.00*	*1.65*	*2.00*	*2.00*		*19.75*	
				8.51	1.52	10.03	1.87	2.27	10.32		26.75	20292
		6.00	*2.00*	*8.00*		*10.00*	*1.65*	*2.00*	*10.00*		*25.35*	
				10.30	1.37	11.67	1.10	1.34	1.23		17.44	20293
		6.00	*4.00*	*10.00*		*12.00*	*0.82*	*1.00*	*1.00*		*16.26*	
				10.15	1.01	11.16			2.19		14.77	20294
		6.00	*4.00*	*10.00*		*12.00*			*2.00*		*14.80*	
				10.67	0.78	11.45			4.20		17.31	20295
		6.00	*4.00*	*10.00*		*12.00*			*4.00*		*16.80*	
				14.55	1.01	15.56					14.55	20296
		10.00	*4.00*	*14.00*		*16.00*					*14.00*	
				9.74	0.67	10.41					9.74	20297
				9.59	6.59	16.18					9.59	20677
		6.00	*4.00*	*10.00*		*12.00*					*10.00*	
19.71	6.57					26.28	3.90	4.73			31.41	20298
16.27	7.31					23.58	3.91	4.75			29.14	20523
11.78	12.76					24.54	3.99	4.84			29.05	20678
						22.00	*3.71*	*4.50*			*24.33*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	The Armour Fertilizer Works.	
20299	Bone Meal	Manufacturer
20679		Barren Co. Gro. & Hdw. Co.
20300	Steamed Bone Meal	Manufacturer
20301	Bone Meal with Potash	Manufacturer
20513	Wheat Special No. 2	Manufacturer
	Bowker Fertilizer Co., Boston—New York—Cincinnati.	
20427	Soluble Bone	Manufacturer
20524		Denney Bros., Science Hill
20680		Same
20428	Dissolved Bone and Potash	Manufacturer
20525		J. McKenzie, Mt. Vernon
20429	Potash Fertilizer	Manufacturer
20526		Richeson & Turner, Campbellsville.
20681		Solomon McKinley, Columbia
20430	Harvest Bone	Manufacturer
20431	Kentucky Special	Manufacturer
20527		J. T. Lawson, Greenup
20682		Richeson & Turner
20432	Fish Guano	Manufacturer
20528		Richeson & Turner

Table of Analyses.

Pounds in the Hundred.													
Phosphoric Acid.							Nitrogen.	Equivalent to Ammonia.	Potash		Estimated Value per Ton.	Station Number.
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.			From Muriate.	From Sulphate.		
23.28	3.48					26.76	3.03	3.68			$29 80	20299
22.86	1.98					24.84	2.72	3 30			27.64	20679
						24.00	*2.47*	*3.00*			*21.81*	
24.70	3.37					28.07	1.69	2.05			26 85	20300
						20.00	*1.65*	*2.00*			*16.95*	
21.81	3.44					25 25	2 76	3.35	3 35		31.14	20301
						23 00	*2 06*	*2.50*	*3.00*		*22.98*	
				10 60	1 51	12.11	0 88	1 07	2.41		18 37	20513
		6.00	*4.00*	*10 00*		*12 00*	*0 82*	*1.00*	*2.00*		*17 26*	
				12 89	3.36	16 25					12 89	20427
				14 13	3.65	17 78					14.13	20524
				13.76	3 89	17 65					13.76	20680
				14.00		*16 00*					*14.00*	
				8.71	3.44	12 15			2 59		14.42	20428
				9.54	3.02	12 56			1.71		14.37	20525
				10.00		*12 00*			*2.00*		*14.80*	
				9.58	2.46	12 04			5.78		18.26	20429
				9 64	3.01	12 65			5 08		17.85	20526
				10.24	3.10	13.34			4.25		17.78	20681
				10.00		*12.00*			*5.00*		*17.80*	
				7.86	2.39	10.25	1.18	1.43	1.92		15.85	20430
				8.00		*10.00*	*0.82*	*1.00*	*1.00*		*13.86*	
				6.96	2.62	9.58	1.62	1.97	5.12		19 38	20431
				8.16	2.33	10.49	1 39	1.69	4.15		19 04	20527
				6 64	3.86	10.50	1.32	1.60	3.14		16.61	20682
				8.00		*10.00*	*1.23*	*1.50*	*4.00*		*18.09*	
				7.67	2.23	9.90	1.24	1.51	3.77		17.58	20432
				8.82	2.66	11.48	0.88	1.07	2.75		17.03	20528
				8.00		*10.00*	*0.82*	*1.00*	*3.00*		*15.86*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	Bowker Fertilizer Co.	
20433	Tobacco Grower	Manufacturer
20529		Richeson & Turner
20683		Same
20434	10 per cent. Manure	Manufacturer
20435	High Grade Fertilizer	Manufacturer
20530		Owen Hulett, Williamstown
20436	Bone Meal	Manufacturer
20684		Richeson & Turner
20437	Raw Bone	Manufacturer
20685		Richeson & Turner
	C. S. Brent, Lexington, Ky.	
20500	Brent's Hemp and Tobacco Special	Manufacturer
20511	Brent's Grain Grower	Manufacturer
	The Cincinnati Phosphate Co., Cincinnati, O.	
20192	Capitol High Grade Guano	Manufacturer
20193	Capitol Grain and Grass Grower.	Manufacturer
20531		G. S. Hiatt, Mt. Vernon
20194	Capitol Dissolved Bone and Potash	Manufacturer
20195	Capitol Alkaline Bone	Manufacturer
20532		Sievers & Sievers, Somerset

Table of Analyses.

Pounds in the Hundred.												
Phosphoric Acid.									Potash			
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.	Nitrogen.	Equivalent to Ammonia.	From Muriate.	From Sulphate.	Estimated Value per Ton.	Station Number.
				7.38	2.87	10.25	1.93	2.34		5.54	$22.45	20433
				8.79	2.38	11.17	1.71	2.08		4.24	21.72	20529
				8.29	2.66	10.95	1.80	2.19	1.02	4.15	22.41	20683
				8.00		*10.00*	*1.65*	*2.00*		*5.00*	*21.35*	
				5.65	2.46	8.11	1.03	1.25	9.63		20.48	20434
				5.00		*7.00*	*0.82*	*1.00*	*10.00*		*19.26*	
				7.96	2.30	10.26	2.66	3.23		7.28	27.19	20435
				9.44	2.46	11.90	2.61	3.17		5.26	26.45	20530
				8.00		*10.00*	*2.47*	*3.00*		*6.00*	*25.01*	
13.28	16.22					29.50	1.60	1.94			25.15	20436
14.44	11.35					25.79	1.34	1.63			22.38	20684
						25.00	*1.23*	*1.50*			*18.69*	
12.66	9.16					21.82	3.58	4.35			26.37	20437
14.27	8.02					22.29	2.46	2.99			23.61	20685
						20.00	*2.47*	*3.00*			*19.41*	
				6.09	3.12	9.21	4.19	5.09		10.88	34.19	20500
				5.00			*4.00*	*4.86*		*10.00*	*30.00*	
				6.13	1.66	7.79	1.13	1.37	2.23		13.64	20511
				8.00		*10.00*	*1.65*	*2.00*	*2.00*		*17.35*	
				8.73	1.18	9.91	1.80	2.19		2.65	19.53	20192
				8.00		*9.00*	*1.23*	*1.50*	*2.50*		*16.19*	
				9.09	1.18	10.27	1.64	1.99		1.55	18.16	20193
				9.13	1.78	10.91	0.98	1.19	1.60		16.21	20531
				8.00		*9.00*	*1.03*	*1.25*	*2.00*		*15.09*	
				12.25	1.09	13.34				4.03	19.98	20194
				10.00		*11.00*			*4.00*		*16.40*	
				13.01	1.29	14.30				2.07	18.61	20195
				10.11	2.21	12.32			1.43		14.44	20532
				10.00		*11.00*			*2.00*		*14.40*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	The Cincinnati Phosphate Co.,	
20196	Capitol Wheat Grower	Manufacturer
20197	Capitol Tobacco, Potato and Beet Grower	Manufacturer
20198	Capitol Bonus A Humus Phosphate	Manufacturer
20533		Sievers & Sievers
20199	Capitol Ground Bone	Manufacturer
20200	Capitol Bone and Phosphate Mixture Wheat Special	Manufacturer
20201	Capitol Truck and Tobacco Fertilizer	Manufacturer
	Continental Fertilizer Co., Nashville, Tenn.	
20338	Bear High Grade Dissolved Bone	Manufacturer
20339	Bear Potash Mixture	Manufacturer
20340	Bear Special Corn Grower	Manufacturer
20534		J. M. Grey, Tolesboro
20341	Bear Special Tobacco Grower	Manufacturer
20535		Chas. Ratliff, Princeton
20690		Frank X. Merkley, Campbellsville

Table of Analyses.

Pounds in the Hundred.													
Phosphoric Acid.							Nitrogen.	Equivalent to Ammonia.	Potash		Estimated Value per Ton.		
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.			From Muriat.	From Sulphate.			
				15.11	1.65	16.76					$15.11		20196
				14.00		*15.00*					*14.00*		
				7.06	0.97	8.03	1.11	1.35	0.00	2.84	15.60		20197
				8.00		*9.00*	*0.82*	*1.00*	*2.00*	*2.00*	*16.86*		
				13.94	1.80	15.74	0.31	0.38			18.38		20198
				11.82	2.28	14.10	0.34	0.41			16.11		20533
				12.00		*13.00*	*0.41*	*0.50*			*16.03*		
19.24	5.12					24.36	2.43	2.95			25.75		20199
						20.00	*2.47*	*3.00*			*19.41*		
				9.79	6.15	15.94	1.87	2.27		1.28	21.36		20200
				11.00		*16.00*	*1.65*	*2.00*	*1.00*		*21.15*		
				8.33	3.35	11.68	1.99	2.42		5.82	24.29		20201
				6.00		*7.00*	*1.65*	*2.00*		*6.00*	*19.75*		
				15.52	1.10	16.62					15.52		20338
		8.00	*6.00*	*14.00*		*15.00*					*14.00*		
				14.11	0.46	14.57				1.87	19.35		20339
		6.00	*4.00*	*10.00*		*11.00*			*2.00*		*14.40*		
				9.12	0.67	9.79	1.07	1.30		1.14	15.79		20340
				5.97	2.20	8.17	0.89	1.08		1.14	12.08		20534
		4.00	*3.00*	*7.00*		*8.00*	*0.82*	*1.00*		*1.00*	*12.46*		
				9.31	1.23	10.57	0.90	1.09		1.47	16.16		20341
				6.17	2.98	9.15	1.38	1.68		1.90	15.01		20535
				6.77	*2.39*	9.16	0.81	0.98		1.38	13.17		20690
		5.00	*3.00*	*8.00*		*9.00*	*0.82*	*1.00*		*1.50*	*14.26*		

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	Continental Fertilizer Co.	
20342	Bear High Grade Tobacco and Potato Grower	Manufacturer
20536		Grayson Co. Supply Co., Leitchfield
20343	Bear Tobacco Grower	Manufacturer
20537		Lovell & Grainger, Franklin
20633		Ben F. Applegate, Tolesboro
20344	Bear Slaughter House Bone	Manufacturer
20538		Grayson Co. Supply Co., Leitchfield
20691		R. A. Waggener, Columbia
20345	Bear Beef, Blood and Bone	Manufacturer
20692		Frank X. Merkley
20409	Bear Phosphate	Manufacturer
20410	Bear Special Wheat Grower	Manufacturer
20693		R. A. Waggener
20411	Bear Potato Grower	Manufacturer
20484	Bear Bone Meal	Manufacturer
20694		Frank X. Merkley
20485	Bear Raw Bone	Manufacturer
20758		Ratliff & Co., La Grange
20542	Bear Grain Grower	Manufacturer
20759		Ratliff & Co.

Table of Analyses.

Pounds in the Hundred.													
Phosphoric Acid.							Nitrogen.	Equivalent to Ammonia.	Potash		Estimated Value per Ton.	Station Number.
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.			From Muriate.	From Sulphate.		
				6.33	2.19	8.52	2.13	2.59		5.10	$20.99	20342
				6.19	2.06	8.25	1.87	2.27		3.68	18.28	20536
		4.00	*3.00*	*7.00*		*8.00*	*1.65*	*2.00*		*4.00*	*18.55*	
				8.35	1.91	10.26	2.59	3.14		6.12	25.89	20343
				8.86	1.04	9.90	1.27	1.54	2.26		17.12	20537
				6.07	2.28	8.35	1.11	1.35		1.09	12.83	20633
		5.00	*3.00*	*8.00*		*9.00*	*2.47*	*3.00*		*6.00*	*24.61*	
				7.98	1.74	9.72	2.18	2.65		2.20	19.46	20344
				7.00	1.09	8.09	1.65	2.00		1.79	15.94	20538
				7.44	2.14	9.58	1.67	2.03		1.52	16.62	20691
		5.00	*3.00*	*8.00*		*9.00*	*1.65*	*2.00*		*2.00*	*17.35*	
				12.47	1.22	13.69	1.78	2.16		2.19	23.42	20345
				9.49	2.16	11.65	1.62	1.97		2.25	19.81	20692
		6.00	*4.00*	*10.00*		*11.00*	*1.65*	*2.00*		*2.00*	*19.75*	
				13.08	1.57	14.65					13.08	20409
		7.00	*5.00*	*12.00*		*13.00*					*12.00*	
				9.26	0.58	9.84	1.06	1.29		1.12	15.86	20410
				6.74	1.79	8.53	0.69	0.84		0.86	11.91	20693
		4.00	*3.00*	*7.00*		*8.00*	*0.82*	*1.00*		*1.00*	*12.46*	
				8.27	1.98	10.25	2.73	3.31		5.67	25.70	20411
		5.00	*3.00*	*8.00*		*9.00*	*2.47*	*3.00*		*6.00*	*24.61*	
26.84	2.02					28.86	2.15	2.61			29.13	20484
17.95	5.67					23.62	1.36	1.65			21.84	20694
						20.00	*0.82*	*1.00*			*14.46*	
18.97	6.00					24.97	2.71	3.29			26.91	20485
17.11	5.71					22.82	2.63	3.19			25.01	20758
						20.00	*2.47*	*3.00*			*19.41*	
				8.61	1.01	9.62	0.46	0.56		3.97	16.87	20542
				7.79	1.25	9.04	0.58	0.70		4.48	16.97	20759
		5.00	*3.00*	*8.00*		*9.00*	*0.41*	*0.50*		*4.00*	*16.03*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	The Currie Fertilizer Co., Louisville, Ky.	
20489	Currie's Corn and Wheat Special.	Manufacturer
20539		C. W. Quiggins, Elizabethtown
20490	Currie's Soluble Bone	Manufacturer
20491	Currie's Golden Leaf Tobacco and Potato Grower	Manufacturer
20653	Currie's Wheat Grower	Manufacturer
	Duncan Bros Co., La Grange, Ky.	
20474	Tiger Brand Tobacco and Potato Grower	Manufacturer
20544		Mfrs. Warehouse
20760		Mfrs. Warehouse
20475	Tiger Brand Grain Grower	Manufacturer
20545		Mfrs. Warehouse
20761		Mfrs. Warehouse
20476	Tiger Brand Bone and Phosphate	Manufacturer
20762		Mfrs. Warehouse
20477	Tiger Brand Corn and Wheat Grower	Manufacturer
20546		Mfrs. Warehouse
20763		Mfrs. Warehouse
20495	Tiger Brand Superphosphate	Manufacturer
20547		Mfrs. Warehouse

Table of Analyses.

Pounds in the Hundred.												
Phosphoric Acid.									Potash			
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.	Nitrogen.	Equivalent to Ammonia.	From Muriat.	From Sulphate.	Estimated Value per Ton.	Station Number.
				8 06	2.49	10.55	0.98	1.19	7.79		$21.40	20489
				10.67	1.18	11.85	1.06	1.29	1 34		17.79	20539
				10.00			*0.82*	*1.00*	*1.00*		*15.46*	
				7.29	2.66	9.95	1.55	1.88	4.58		19 04	20490
				10.00			*0.99*	*1.20*	*1.45*		*16.42*	
				7.63	1.91	9.54	1 53	1.86	2.00	1.03	17.75	20491
				8.00			*1.48*	*1.80*	*3.40*		*17.44*	
				7.35	2.65	10.00	1 56	1.89	4.44		19 00	20653
				10.00		*11.00*	*1.03*	*1.25*	*1.50*		*16.99*	
				7.75	0.64	8.39	2.18	2.65		7.38	24.96	20474
				9.78	1.25	11.03	2.37	2.88		5.50	25.95	20544
				9.10	2.25	11.35	1 90	2 31	4.44		21.96	20760
				9.00		*11.00*	*2.47*	*3.00*		*5.00*	*25.01*	
				13 01	1.01	14.02	0.84	1 02		2.98	22.11	20475
				13 86	1.04	14 90	0.48	0.58		2.39	21.36	20545
				13.80	1.04	14.84	0.54	0 66		0 96	19.75	20761
				13.00		*15.00*	*0 82*	*1.00*		*2.00*	*21.26*	
				8.82	10.98	19 80	1.44	1.75		1.36	20.92	20476
				8.44	10.26	18.70	1.46	1.77		1.50	20.41	20762
				10.00		*17.00*	*1.23*	*1.50*		*1.50*	*20.29*	
				11 17	3.16	14.33	1.37	1.66		2.34	21.58	20477
				11.93	1.96	13.89	1.31	1.59		2.12	21 57	20546
				10 61	3 36	13.97	1.52	1.85		1.76	20 74	20763
				12.00		*15.00*	*1.65*	*2.00*		*2.00*	*22.95*	
				7 20	8 38	15.58	1.54	1.87		2.28	19.35	20495
				9.36	6.32	15 68	1.48	1.80		2.36	21.03	20547
				8.00		*10.00*	*1.65*	*2.00*		*2.00*	*17.75*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	Duncan Bros. Co.	
20496	Tiger Brand Corn and Oat Special	Manufacturer
20548		Mfrs. Warehouse
20497	Tiger Brand Big 4 Corn and Wheat Grower	Manufacturer
20549		Mfrs. Warehouse
20764		Mfrs. Warehouse
20651	Tiger Brand Raw Bone	Manufacturer
20765		Mfrs. Warehouse
	Federal Chemical Co., Louisville, Ky.	
20161	Daybreak Special Tobacco Grower	Manufacturer
20550		B. C. Grigsby, Tolesboro
20162	Daybreak Standard Tobacco Grower	Manufacturer
20551		Plain & Vickers, Madisonville
20163	Daybreak Favorite	Manufacturer
20164	Daybreak Complete Fertilizer	Manufacturer
20165	Daybreak Standard	Manufacturer
20552		M. D. Jordan, Olive Hill
20166	Daybreak Grain Grower	Manufacturer

Table of Analyses.

Pounds in the Hundred.												
Phosphoric Acid.									Potash			
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.	Nitrogen.	Equivalent to Ammonia.	From Muriate.	From Sulphate.	Estimated Value per Ton.	Station Number.
				9.86	7.01	16.87	1.27	1.54		1.30	$20.00	20496
				8.14	11.05	19.19	1.13	1.37		0.99	18.77	20548
				8.00		*10.00*	*0.82*	*1.00*		*1.00*	*14.06*	
				9.04	6.26	15.30	2.15	2.61		1.91	22.09	20497
				9.64	4.62	14.26	1.96	2.38		2.70	22.54	20549
				7.90	7.43	15.33	2.41	2.93		1.83	21.88	20764
				6.00		*16.00*	*2.06*	*2.50*		*2.00*	*19.78*	
17.21	2.80					20.01	4.24	5.15			28.17	20651
15.48	3.40					18.88	4.21	5.11			27.05	20765
						22.00	*3.71*	*4.50*			*24.33*	
				8.96	0.69	9.65	1.76	2.14		6.10	23.63	20161
				7.84	2.28	10.12	1.06	1.29		6.81	21.67	20550
				8.00		*10.00*	*1.23*	*1.50*		*6.00*	*21.29*	
				8.79	0.55	9.34	1.39	1.69		4.86	20.77	20162
				8.34	0.33	8.67	1.00	1.21		4.61	18.67	20551
				8.00		*12.00*	*0.82*	*1.00*		*4.00*	*18.46*	
				12.20	0.67	12.87	1.38	1.68		3.55	23.31	20163
				11.00		*13.00*	*0.82*	*1.00*		*3.00*	*20.06*	
				11.16	0.58	11.74	2.23	2.71		2.86	23.74	20164
				10.00		*13.00*	*1.65*	*2.00*		*2.00*	*20.55*	
				8.76	0.50	9.26	2.16	2.62		2.96	20.74	20165
				8.19	1.02	9.21	1.83	2.22	0.98	1.21	18.16	20552
				8.00		*12.00*	*1.65*	*2.00*		*2.00*	*18.55*	
				9.84	0.54	10.38	1.01	1.23		2.36	17.89	20166
				9.00		*11.00*	*0.41*	*0.50*		*1.50*	*14.63*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	Federal Chemical Co.	
20167	Daybreak Wheat and Corn Special	Manufacturer
20553		M. T. Crawford, Somerset
20695		C. W. Quiggins, Elizabethtown
20696		C. W. Quiggins
20168	Daybreak Crop Grower	Manufacturer
20169	Daybreak Harvest Bone	Manufacturer
20170	Daybreak Bone and Potash	Manufacturer
20171	Daybreak Phosphate and Potash	Manufacturer
20172	Daybreak Potash Mixture	Manufacturer
20173	Daybreak Royal Phosphate	Manufacturer
20174	Daybreak Standard Phosphate	Manufacturer
20175	Daybreak Star Phosphate	Manufacturer
20176	Daybreak Raw Bone	Manufacturer
20697		C. W. Quiggins
20177	Daybreak Bone Meal	Manufacturer
20382	Daybreak Corn and Clover Grower	Manufacturer
20554		Wm. Leming, Hodgenville

Table of Analyses.

Pounds in the Hundred.												
Phosphoric Acid.							Nitrogen.	Equivalent to Ammonia.	Potash		Estimated Value per Ton.	Station Number.
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.			From Muriate.	From Sulphate.		
				11.59	0.56	12.15	0.84	1.02		1.50	$18.45	20167
				11.68	0.61	12.29	0.49	0.59		1.12	17.07	20553
				11.79	4.21	16.00	0.46	0.56		0.90	18 29	20695
				11.66	1.01	12.67	0.46	0.56		1.12	17.11	20696
				11.00		*13.00*	*0.41*	*0.50*		*1.00*	*16.43*	
				10 47	0 60	11.07	1.22	1.48		2.70	19.70	20168
				10.00		*13.00*	*0.82*	*1.00*		*2.00*	*18.06*	
				12.72	2.32	15.04	2.78	3.37			24.53	20169
				10.00		*15.00*	*2.47*	*3.00*			*21.41*	
				10.27	0.64	10.91			2.41		14.99	20170
				10.00		*12.00*			*2.00*		*14.80*	
				11.97	0.96	12.93			2.65		17.39	20171
				12.00		*14.00*			*2.00*		*17.20*	
				10.87	0.58	11.45			4.27		17.54	20172
				10.00		*12.00*			*4.00*		*16.80*	
				13.95	0.90	14.85					13.95	20173
				14.00		*16.00*					*14.00*	
				12.52	0.68	13.20					12.52	20174
				12.00		*14.00*					*12.00*	
				10.34	0.38	10.72					10.34	20175
				10.00		*12.00*					*10.00*	
10.36	13.18					23.54	3.93	4.77			27.99	20176
9.42	13.02					22.44	4.00	4.86			27.35	20697
						24.00	*3.71*	*4.50*			*25.53*	
19.90	8.94					28.84	2.32	2 82			28.24	20177
						25.00	*2.47*	*3.00*			*22.41*	
				9.83	0.52	10.35	1.41	1.71		1.85	18.46	20382
				10.67	0.54	11.21	0.87	1.06		0.71	16.48	20554
				9.00		*12.00*	*0.82*	*1.00*		*1.00*	*15.66*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	Federal Chemical Co.	
20492	Daybreak Potato and Tobacco Grower	Manufacturer
20512	Grigsby's Special Wheat Grower	Manufacturer
20766		Grigsby & Co., Bardstown
	Fox Chemical Co., Branch, Federal Chemical Co., Louisville Ky.	
20239	Fox Formula	Manufacturer
20698		T. W. Buchanan & Co., Campbellsville
20240	Fox Wheat and Corn Grower	Manufacturer
20241	Fox Early Bell	Manufacturer
20242	Fox Wheat and Grain Special	Manufacturer
20243	Fox Bone, Blood and Potash	Manufacturer
20555		H. Austin, Beaver Dam
20699		T. W. Buchanan & Co.
20244	Fox Grain Grower	Manufacturer
20245	Fox Grain Special	Manufacturer
20246	Fox Special Tobacco Grower	Manufacturer
20556		Cooper & Stubblefield, Rectorville.
20247	Fox Vegetable Grower	Manufacturer

Table of Analyses.

Pounds in the Hundred.													
Phosphoric Acid.							Nitrogen.	Equivalent to Ammonia.	Potash		Estimated Value per Ton.	Station Number.
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.			From Muriat.	From Sulphate.		
				8.94	0.60	9.54	2.52	3.06		7.67	$27.73	20492
				8.00		*12.00*	*2.06*	*2.50*		*7.50*	*26.38*	
				10.59	0.59	11.18	1.20	1.46		2.68	19.77	20512
				9.58	1.45	11.03	0.83	1.01	0.84	0.57	16.09	20766
				10.00		*13.00*	*0.82*	*1.00*		*2.00*	*18.06*	
				12.18	0.69	12.87	1.40	1.70		3.54	23.35	20239
				12.86	0.79	13.65	0.47	0.57	2.13		19.29	20698
				11.00		*13.00*	*0.82*	*1.00*		*3.00*	*20.06*	
				10.81	0.73	11.54	2.27	2.76		2.89	23.54	20240
				10.00		*12.00*	*1.65*	*2.00*		*2.00*	*20.15*	
				10.55	0.61	11.16	1.16	1.41		2.69	19.61	20241
				10.00		*12.00*	*0.82*	*1.00*		*2.00*	*17.66*	
				12.46	0.79	13.25	1.22	1.48		1.53	20.77	20242
				12.00		*14.00*	*0.82*	*1.00*		*1.00*	*18.86*	
				11.72	0.60	12.32	0.78	0.95		1.57	18.52	20243
				11.10	1.07	12.17	0.65	0.79		1.42	17.40	20555
				10.66	5.00	15.66	0.48	0.58		0.77	17.15	20699
				11.00		*13.00*	*0.41*	*0.50*		*1.00*	*16.43*	
				9.80	0.70	10.50	1.42	1.72		1.97	18.66	20244
				9.00		*11.00*	*0.82*	*1.00*		*1.00*	*15.26*	
				10.12	0.64	10.76	1.01	1.23		2.43	18.35	20245
				9.00		*11.00*	*0.41*	*0.50*		*1.50*	*14.63*	
				8.87	0.70	9.57	2.45	2.97		5.17	24.47	20246
				9.81	0.27	10.08	1.43	1.74		4.29	21.32	20556
				8.00		*10.00*	*1.65*	*2.00*		*5.00*	*21.35*	
				8.74	0.50	9.24	2.46	2.99		5.25	24.37	20247
				8.00		*10.00*	*1.65*	*2.00*		*5.00*	*21.35*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	Fox Chemical Co., Branch, Federal Chemical Co.	
20248	Fox Tobacco Grower	Manufacturer
20557		H. Austin
20700		T. W. Buchanan & Co
20249	Fox Wheat Grower	Manufacturer
20674		Chas. Roberts, Burnside
20250	Fox High Grade Tobacco Grower	Manufacturer
20251	Fox Bone Phosphate and Potash	Manufacturer
20252	Fox Bone Phosphate	Manufacturer
20253	Fox Alkaline Bone	Manufacturer
20254	Fox Bone and Potash	Manufacturer
20255	Fox High Grade Acid Phosphate	Manufacturer
20256	Fox Acid Phosphate	Manufacturer
20257	Fox Standard Acid Phosphate	Manufacturer
20258	Fox A. A. Acid Phosphate	Manufacturer
20259	Fox Raw Bone	Manufacturer
20380	Fox Ammoniated Bone	Manufacturer

Table of Analyses.

Pounds in the Hundred.													
Phosphoric Acid.							Nitrogen.	Equivalent to Ammonia.	Potash		Estimated Value per Ton.	Station Number.
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.			From Muriate.	From Sulphate.		
				8.60	0.59	9 19	2 18	2.65		3.01	$20.71	20248
				8 73	1.75	10.48	1.62	1.97	0.80	1.40	18.52	20557
				7 11	1.22	8.33	1 67	2.03	0.66	1.42	16 39	20700
				8 00		*12.00*	*1 65*	*2 00*		*2.00*	*18.55*	
				8.79	0.51	9 30	2 21	2 68		2 90	20.86	20249
				8 24	1.80	10 04	1 84	2 23	0 64	0 77	17.69	20674
				8 00		*12.00*	*1.65*	*2.00*		*2.00*	*18 55*	
				9 32	0.68	10 00	3 53	4.29		4 93	27.96	20250
				8.00		*10.00*	*3 29*	*4.00*		*4 00*	*25.07*	
				10.31	0.90	11 21			4 59		17.32	20251
				10.00		*12.00*			*4.00*		*16.80*	
				12.34	0.77	13 11			2.41		17.53	20252
				12.00		*14 00*			*2.00*		*17.20*	
				10.48	0.42	10 90			2.70		15.45	20253
				10.00		*12.00*			*2.00*		*14.80*	
				9.33	0.47	9 80			1.67		13.06	20254
				9.00		*11.00*			*1.00*		*12.60*	
				16.07	0.92	16 99					16.07	20255
				16.00		*18.00*					*16.00*	
				14.11	1.10	15 21					14.11	20256
				14.00		*16.00*					*14.00*	
				12.34	0 95	13 29					12.34	20257
				12.00		*14.00*					*12.00*	
				10.67	0.55	11.22					10 67	20258
				10.00		*12.00*					*10.00*	
						23 53	3.88	4.71			27.54	20259
8.94	14.59					*24.00*	*3.71*	*4.50*			*25.58*	
				13.21	1.96	15.17	2.75	3.34			24.88	20380
				10.00		*15.00*	*2.47*	*3.00*			*21.41*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	Fox Chemical Co., Branch, Federal Chemical Co.	
20381	Fox Ground Bone	Manufacturer
	Furman Farm Improvement Co., Atlanta, Ga.	
20510	Furman High Grade Fertilizer	Manufacturer
20558		F. E. Johnson, Owensboro
	Globe Fertilizer Co., Branch, Federal Chemical Co., Louisville, Ky.	
20214	Braden Formula	Manufacturer
20559		Anderson Foley, McKinney
20767		Planters Hardware Co., Hopkinsville
20215	Globe Wheat Grower	Manufacturer
20768		W. G. W. Empson, Adairville
20216	Progress Corn and Wheat Grower	Manufacturer
20560		Grayson Co. Supply Co., Leitchfield
20701		W. F. Jeffries & Son, Columbia
20217	Globe Wheat and Grain Special	Manufacturer
20218	Globe Bone and Potash	Manufacturer
20561		I. K. Miller & Sons, Campbellsville
20702		I. K. Miller & Sons, Campbellsville
20219	Globe Bone Dust	Manufacturer

Table of Analyses.

Pounds in the Hundred.												
Phosphoric Acid.									Potash			
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.	Nitrogen.	Equivalent to Ammonia.	From Muriate.	From Sulphate.	Estimated Value per Ton.	Station Number.
18.32	9.86					28.18	2.34	2.84			$27.60	20381
						25.00	*2.47*	*3.00*			*22.41*	
				10.16	1.33	11.49	1.93	2 34	2.63		21.14	20510
				10.47	1 41	11.88	1.93	2.34	1.86		20.77	20558
				10.00			*1.65*	*2.00*	*2.00*		*18.95*	
				12.10	0.74	12.84	1.37	1 66		3.73	23.41	20214
				11.20	0 19	11.39	0.81	0.98	2.65		18.60	20559
				11.99	1.07	13.06	0.93	1.13	2.68		20 29	20767
				11.00		*13.00*	*0.82*	*1.00*		*3.00*	*20.06*	
				10 98	0 60	11 58	2.19	2.66		2.86	23.42	20215
				11.98	0.97	12.95	1.66	2.02	1 28		21.03	20768
				10.00		*12.00*	*1.65*	*2.00*		*2.00*	*20.15*	
				10.42	0.65	11.07	1.26	1.53		2.61	19.67	20216
				10.33	1.94	12.27	0.58	0.70	0 74	0.85	16.68	20560
				11.18	5.17	16.35	0.80	0.97	1.98		19.87	20701
				10.00		*12.00*	*0.82*	*1.00*		*2.00*	*17.66*	
				12 11	0.75	12.86	1.16	1 41		1.56	20.18	20217
				12.00		*14.00*	*0.82*	*1 00*		*1.00*	*18.86*	
				11.53	0.58	12.11	0 80	0 97		1.53	18 31	20218
				10 61	0 55	11.16	0.40	0 49		1.30	15.71	20561
				10 21	9.21	19.42	0.57	0.69		1.07	18 92	20702
				11.00		*13.00*	*0.41*	*0.50*		*1.00*	*16.43*	
				9 88	0.43	10.31	1.37	1.66		1.90	18.42	20219
				9.00		*11.00*	*0.82*	*1.00*		*1.00*	*15.26*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	Globe Fertilizer Co., Branch, Federal Chemical Co.	
20220 20562	Globe Grain Grower	Manufacturer J. L. Durham, Greensburg
20221 20563	Globe Special Tobacco Grower	Manufacturer I. F. Tabb, Mt. Sterling
20222	Globe Golden Harvest Bone Meal	Manufacturer
20223 20564 20769	Kentucky Standard Tobacco Grower	Manufacturer Farmers Hdw. & Gro. Co., Glasgow Planters Hardware Co., Hopkinsville
20224 20565	Globe Soluble Vegetable Manure.	Manufacturer J. L. Durham
20225 20566	Big Four Tobacco Grower	Manufacturer I. K. Miller & Sons
20226 20567	Eagle Corn and Wheat Grower	Manufacturer J. T. Cherry, Brodhead
20227	Globe Potato Grower	Manufacturer
20228	Globe High Grade Tobacco Grower	Manufacturer
20229	Globe Bone Phosphate and Potash	Manufacturer

Table of Analyses.

Pounds in the Hundred.												
Phosphoric Acid.									Potash			
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.	Nitrogen.	Equivalent to Ammonia.	From Muriate.	From Sulphate.	Estimated Value per Ton.	Station Number.
				10.08	0.42	10.50	0.94	1.14		2.26	$17 80	20220
				9.15	2.26	11.41	0.63	0.76		1.42	15.47	20562
				9.00		*11.00*	*0 41*	*0.50*		*1.50*	*14.63*	
				8.89	0.41	9.30	3.02	3.67		10.89	32 96	20221
				7.74	2.75	10.49	2 24	2.72		9.98	29.09	20563
				8.00		*10.00*	*2.47*	*3.00*		*10.00*	*29.81*	
				13.28	1.91	15 19	2 80	3.40			25.10	20222
				10.00		*15.00*	*2.47*	*3.00*			*21.41*	
				8 84	0.38	9.22	2.40	2 91		5 16	24.15	20223
				8.14	1 10	9.24	2.03	2.46		4.57	21.78	20564
				9.09	1.77	10.86	1.99	2.42		4 48	22.97	20769
				8.00		*10.00*	*1.65*	*2 00*		*5.00*	*21.35*	
				8 60	0 41	9.01	2.42	2.94		5.28	24.08	20224
				7 20	2.11	9.31	2.06	2 50		4.97	21.62	20565
				8 00		*10.00*	*1.65*	*2 00*		*5.00*	*21.35*	
				9 14	0 29	9.43	2 21	2.68		2.93	21.24	20225
				9.74	1.79	11 53	1.48	1 80	0.74	0.99	18.78	20566
				8.00		*12.00*	*1.65*	*2 00*		*2.00*	*18 55*	
				8.89	0 27	9.16	2.18	2.65		2.90	20 80	20226
				9.35	1.37	10.72	1.68	2.04	1.70		18.51	20567
				8.00		*12.00*	*1.65*	*2 00*		*2.00*	*18.55*	
				9.46	0.38	9.84	3.45	4.19		4.84	27.66	20227
				8.00		*10.00*	*3.29*	*4.00*		*4.00*	*25.07*	
				9.71	0.35	10.06	3.50	4 25		4.85	28 11	20228
				8.00		*10.00*	*3.29*	*4 00*		*4.00*	*25.07*	
				10 73	0.67	11.40			4.47		17.62	20229
				10.00		*12.00*			*4.00*		*16.80*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	Globe Fertilizer Co., Branch, Federal Chemical Co.	
20230	Globe Potash Compound	Manufacturer
20231	Globe Potash Special	Manufacturer
20568		Farmers Hdw. & Gro. Co.
20703		W. F. Jeffries & Son
20232	Big Four Phosphate	Manufacturer
20233	Globe High Grade Acid Phosphate	Manufacturer
20234	Globe Acid Phosphate	Manufacturer
20569		C. M. Langdon, Science Hill
20704		C. M. Langdon, Science Hill
20235	Globe Standard Acid Phosphate	Manufacturer
20705		C. M. Langdon
20236	Globe A. A. Acid Phosphate	Manufacturer
20570		Carson & Co., Hartford
20706		W. F. Jeffries & Son
20237	Globe Raw Bone	Manufacturer
20571		E. T. Pense, Stanford
20238	Globe Universal Crop Grower	Manufacturer
20572		Winter & Everett, Maysville
20379	Acorn Bone Meal	Manufacturer

Table of Analyses.

Pounds in the Hundred.												
Phosphoric Acid.									Potash			
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.	Nitrogen.	Equivalent to Ammonia.	From Muriate.	From Sulphate.	Estimated Value per Ton.	Station Number.
				11.97	0.77	12.74			2.73		$17.40	20230
				12.00		*14.00*			*2.00*		*17.20*	
				10.30	0.43	10.73			2.53		15.06	20231
				9.04	0.31	9.35			2.49		13.46	20568
				10.54	8.76	19.30				2.39	19.02	20703
				10.00		*12.00*			*2.00*		*14.80*	
				9.51	0.43	9.94			1.70		13.28	20232
				8.00		*10.00*			*1.00*		*11.40*	
				16.07	1.02	17.09					16.07	20233
				16.00		*18.00*					*16.00*	
				13.90	0.91	14.81					13.90	20234
				14.20	0.61	14.81					14.20	20569
				12.87	0.77	13.64					12.87	20704
				14.00		*16.00*					*14.00*	
				12.42	0.69	13.11					12.42	20235
				11.74	0.69	12.43					11.74	20705
				12.00		*14.00*					*12.00*	
				10.52	0.47	10.99					10.52	20236
				9.84	0.36	10.20					9.84	20570
				10.38	11.30	21.68					10.38	20706
				10.00		*12.00*					*10.00*	
10.09	12.84					22.93	3.99	4.84			27.74	20237
8.20	13.96					22.16	4.05	4.92			27.09	20571
						24.00	*3.71*	*4.50*			*25.53*	
				9.12	0.47	9.59	1.35	1.64		4.75	20.88	20238
				7.18	0.29	7.47	0.76	0.92	3.22		14.24	20572
				8.00		*12.00*	*0.82*	*1.00*		*4.00*	*18.46*	
22.11	6.98					29.09	2.16	2.62			28.36	20379
						25.00	*2.47*	*3.00*			*22.41*	

Table of Analyses.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	Indianapolis Rendering Co., Indianapolis, Ind.	
20509	Corn and Wheat Grower	Manufacturer .....
	The Jarecki Chemical Co., Sandusky & Cincinnati, O.	
20180	Lake Erie Fish Guano	Manufacturer .....
20573		T. S. Mary, London.....
20181	Number One Fish Guano	Manufacturer .....
20182	Little Giant Guano	Manufacturer .....
20574		J. Ritter, Falmouth.....
20183	C. O. D. Phosphate	Manufacturer .....
20575		Woodson Lewis, Greensburg.....
20707		Faucett, Hord & Rice, Campbellsville .....
20184	Ground Bone	Manufacturer .....
20708		J. M. Sloss, Franklin.....
20185	Phosphate with Potash	Manufacturer .....
20709		M. B. Hines, Science Hill.....
20186	Raw Bone and Guano Mixture	Manufacturer .....
20710		J. M. Sloss.....
20187	Fish and Potash Tobacco and Potato Food	Manufacturer .....
20576		R. H. Elliston & Co., Williamstown
20188	Dissolved Bone with Potash ...	Manufacturer .....
20711		J. M. Sloss.....

Table of Analyses.

Pounds in the Hundred.												
Phosphoric Acid.							Nitrogen.	Equivalent to Ammonia.	Potash		Estimated Value per Ton.	Station Number.
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.			From Muriate.	From Sulphate.		
				8.28	2.90	11.18	0.84	1.02	2.47		$16.09	20509
				8.00			*0.82*	*1.00*		*2.00*	*14.46*	
				9.47	1.29	10.76	1.82	2.21		1.84	19.55	20180
				8.38	2.10	10.48	1.46	1.77	2.70		17.98	20573
				8.00		*9.00*	*1.23*	*1.50*	*2.50*		*16.19*	
				9.01	1.42	10.43	1.81	2.20		1.75	18.91	20181
				8.00		*9.00*	*1.03*	*1.25*	*2.00*		*15.09*	
				7.43	1.15	8.58	1.69	2.05		1.14	15.82	20182
				7.81	1.98	9.79	0.85	1.03	1.21		13.92	20574
				7.00		*8.00*	*0.82*	*1.00*	*1.00*		*12.26*	
				15.34	1.88	17.22					15.34	20183
				13.69	3.17	16.86					13.69	20575
				13.88	3.01	16.89					13.88	20707
				14.00		*15.00*					*14.00*	
20.98	8.57					29.55	1.35	1.64			25.97	20184
24.16	8.94					33.10	1.07	1.30			27.90	20708
						20.00	*2.47*	*3.00*			*19.41*	
				12.88	1.68	14.56				1.86	18.36	20185
				10.49	2.44	12.93			2.12		15.69	20709
				10.00		*11.00*			*2.00*		*14.40*	
				9.25	6.59	15.84	1.92	2.33		1.26	21.01	20186
				10.41	7.09	17.50	1.87	2.27	1.20		22.14	20710
				11.00		*16.00*	*1.65*	*2.00*	*1.00*		*21.15*	
				7.19	0.79	7.98	1.20	1.46	0.00	2.57	15.63	20187
				7.55	1.94	9.49	0.78	0.95	4.09		16.27	20576
				8.00		*9.00*	*0.82*	*1.00*	*2.00*	*2.00*	*16.86*	
				12.51	1.10	13.61				3.44	19.58	20188
				9.56	2.07	11.63			4.18		16.48	20711
				10.00		*11.00*			*4.00*		*16.40*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	The Jarecki Chemical Co.	
20189	Tobacco and Truck Grower	Manufacturer .....
20712		Faucett, Hord & Rice.....
20190	Indian Brand Tobacco and Potato Fertilizer	Manufacturer .....
20577		Fremd Grocery Co., Eminence....
20191	Indian Brand Gilead Phosphate	Manufacturer .....
20578		Grant McDaniel, Vanceburg.....
20498	Climax Potato Grower	Manufacturer .....
	The Jones Fertilizing Co. Louisville, Ky.	
20354	Jones Phosphate	Manufacturer .....
20355	Jones High Grade Dissolved Bone	Manufacturer .....
20356	Jones Potash Mixture	Manufacturer .....
20581		W. R. Letcher, Jr., Richmond.....
20713		I. K. Miller & Sons, Campbellsville
20357	Jones Corn and Wheat Grower..	Manufacturer .....
20714		Rogers Harlow Co., Glasgow.....
20358	Jones Reliable	Manufacturer .....
20359	Jones Special Tobacco Grower..	Manufacturer .....
20582		J. W. Webb, Vanceburg.....

Table of Analyses.

Pounds in the Hundred.													
Phosphoric Acid.									Potash				
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.	Nitrogen.	Equivalent to Ammonia.	From Muriate.	From Sulphate.	Estimated Value per Ton.	Station Number.
				8 14	3 21	11.35	2.11	2.56		5.60	$24.10	20189
				8 69	1.62	10.31	1.63	1.98	5.38		21.35	20712
				6.00		*7.00*	*1.65*	*2.00*		*6.00*	*19.75*	
				10.44	1.32	11.76	2.80	3.40		4.30	26.62	20190
				10.46	1.85	12.31	2 65	3.22		3 71	25 69	20577
				9.00		*10.00*	*2.47*	*3 00*		*5.00*	*24.61*	
				8.55	0.90	9.45	1.65	2.00		2.88	19.03	20191
				8.92	1.89	10.81	0.78	0.95	2.94		16.74	20578
				8.00		*9.00*	*0.82*	*1.00*	*3.00*		*15.46*	
				8 92	1.25	10.17	1.77	2.15		1.69	18.54	20498
				8.00		*9.00*	*0 82*	*1.00*	*2.00*		*14.46*	
		7.00	5.00	13.29	1.78	15.07					13.29	20354
				12.00		*13.00*					*12.00*	
		8.00	6.00	15.32	1.32	16.64					15.32	20355
				14.00		*15.00*					*14.00*	
				14.29	0.28	14 57				1.90	19.54	20356
				8 62	0.97	9.59				1.74	12.82	20581
				9 47	2.71	12.18			1.56		14.00	20713
		6.00	4.00	*10.00*		*11.00*			*2.00*		*14.40*	
				9.62	0.49	10.11	1.02	1.24		1.19	16.23	20357
				8.23	2.89	11.12	0.83	1.01		0.66	14.32	20714
		4.00	3.00	*7.00*		*8.00*	*0.82*	*1.00*		*1.00*	*12.46*	
				10.15	0.65	10.80	0.88	1.07		1.48	16.86	20358
		5.00	3.00	*8.00*		*9.00*	*0.82*	*1.00*		*1.50*	*14.26*	
				10.23	0.61	10 84	0.88	1.07		1.47	16.92	20359
				8.40	1 69	10.09	0.75	0.91		1.45	14.75	20582
		5.00	3.00	*8.00*		*9.00*	*0 82*	*1.00*		*1.50*	*14.26*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	The Jones Fertilizing Co.	
20360	Jones Tobacco and Potato Grower	Manufacturer
20583		J. B. Benjamin, Providence
20361	Jones Slaughter House Bone	Manufacturer
20584		A. G. Moss & Co., Greensburg
20362	Jones Miami Valley Phosphate	Manufacturer
20585		W. R. Letcher Jr.
20493	Jones Bone Meal	Manufacturer
20715		Rogers Harlow Co.
20494	Jones Raw Bone	Manufacturer
20716		I. K. Miller & Sons
20543	Jones Grain Grower	Manufacturer
20717		Rogers Harlow Co.
	Kaufman Fertilizer Co., Cincinnati, O.	
20202	Harvest King	Manufacturer
20203	Special Potato and Tobacco Fertilizer	Manufacturer
20204	Kentucky Tobacco Grower	Manufacturer
20205	Banner Crop Grower	Manufacturer
20206	Alkaline Bone and Potash	Manufacturer
20770		H. A. Moore, Big Clifty

Table of Analyses.

Pounds in the Hundred.												
Phosphoric Acid.									Potash			
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.	Nitrogen.	Equivalent to Ammonia.	From Muriate.	From Sulphate.	Estimated Value per Ton.	Station Number.
				6.64	2.07	8.71	2.16	2.62		5.11	$21.41	20360
				7.16	1.80	8.96	1.58	1.92		4.00	18.85	20583
		4.00	*3.00*	*7.00*		*8.00*	*1.65*	*2.00*		*4.00*	*18.55*	
				7.76	1.59	9.35	2.14	2.60		2.05	18.83	20361
				6.25	3.86	10.11	1.52	1.85		1.96	15.95	20584
		5.00	*3.00*	*8.00*		*9.00*	*1.65*	*2.00*		*2.00*	*17.35*	
				12.45	1.24	13.69	1.99	2.42		1.98	23.79	20362
				8.37	2.30	10.67	1.79	2.17		2.62	19.47	20585
		6.00	*4.00*	*10.00*		*11.00*	*1.65*	*2.00*		*2.00*	*19.75*	
26.10	1.67					27.77	2.13	2.59			28.27	20493
21.10	4.95					26.05	2.63	3.19			27.74	20715
						20.00	*0.82*	*1.00*			*14.46*	
19.74	4.94					24.68	2.74	3.33			26.97	20494
21.43	4.39					25.82	2.46	2.99			27.15	20716
						20.00	*2.47*	*3.00*			*19.41*	
				8.31	1.14	9.45	0.45	0.55		3.91	16.47	20543
				8.12	1.50	9.62	0.41	0.50		3.41	15.66	20717
		5.00	*3.00*	*8.00*		*9.00*	*0.41*	*0.50*		*4.00*	*16.03*	
				9.04	1.28	10.32	1.67	2.03		1.86	18.60	20202
				8.00		*9.00*	*1.03*	*1.25*			*15.09*	
				6.86	3.13	9.99	2.05	2.49		5.89	22.70	20203
				6.00		*7.00*	*1.65*	*2.00*		*6.00*	*19.75*	
				7.68	3.45	11.13	1.98	2.40		5.71	23.39	20204
				8.00		*9.00*	*1.03*	*1.25*	*2.00*		*15.09*	
				7.88	0.83	8.71	1.66	2.02		1.14	16.14	20205
				7.00		*8.00*	*0.82*	*1.00*	*1.00*		*12.26*	
				12.94	1.41	14.35				1.88	18.35	20206
				9.90	1.82	11.72			1.92		14.53	20770
				10.00		*11.00*			*2.00*		*14.40*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	Kaufman Fertilizer Co.	
20207	Acid Phosphate	Manufacturer
20208	Pure Bone	Manufacturer
20771		H. A. Moore
20209	Half and Half	Manufacturer
	Louisville Fertilizer Co., Louisville, Ky.	
20178	Eagle Soluble Bone	Manufacturer
20586		G. C. Prather, Somerset
20718		J. W. Marshall, Columbia
20179	Eagle Guano	Manufacturer
20719		J. W. Crume & Bro., Lebanon
20331	Eagle High Grade Dissolved Bone	Manufacturer
20352	Eagle Potash Mixture	Manufacturer
20720		B. S. Sweeza, Glasgow
20333	Eagle Special Corn Grower	Manufacturer
20587		L. S. Brough, Bowling Green
20334	Eagle Slaughter House Bone	Manufacturer
20588		L. S. Brough
20721		B. S. Sweeza
20335	Eagle Special Tobacco Grower.	Manufacturer
20589		T. J. Turley Co., Owensboro

Table of Analyses.

Pounds in the Hundred.												
Phosphoric Acid.									Potash		Estimated Value per Ton.	Station Number.
In Fine Bone	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.	Nitrogen.	Equivalent to Ammonia.	From Muriate.	From Sulphate.		
				16.10	1.45	17.55					$16.10	20207
				14.00		*15.00*					*14.00*	
20.78	3.96					24.74	2.43	2.95			26.29	20208
14.73	14.72					29.45	1.26	1.53			24.39	20771
						20.00	*2.47*	*3.00*			*19.41*	
				8.66	6.95	15.61	1.82	2.21		1.38	20.29	20209
				11.00		*16.00*	*1.65*	*2.00*	*1.00*		*21.15*	
				10.18	0.41	10.59	0.90	1.09		1.56	16.95	20178
				6.44	2.03	8.47	0.91	1.10		1.69	13.30	20586
				8.93	0.59	9.52	0.87	1.06		1.31	15.14	20718
		5.00	*3.00*	*8.00*		*9.00*	*0.82*	*1.00*		*1.50*	*14.26*	
				12.31	1.34	13.65	1.79	2.17		2.06	23.15	20179
				9.21	1.43	10.64	1.82	2.21		1.61	19.01	20719
		6.00	*4.00*	*10.00*		*11.00*	*1.65*	*2.00*		*2.00*	*19.75*	
				15.66	0.63	16.29					15.66	20331
		8.00	*6.00*	*14.00*		*15.00*					*14.00*	
				13.94	0.49	14.43				1.96	19.28	20332
				8.09	1.01	9.10				2.17	12.71	20720
		6.00	*4.00*	*10.00*		*11.00*			*2.00*		*14.40*	
				9.09	0.63	9.72	1.06	1.29		1.19	15.77	20333
				6.98	1.09	8.07	0.80	0.97		0.88	12.28	20587
		4.00	*3.00*	*7.00*		*8.00*	*0.82*	*1.00*		*1.00*	*12.46*	
				8.22	1.45	9.67	2.04	2.48		2.08	19.06	20334
				10.34	1.05	11.39	1.23	1.49		1.87	18.76	20588
				6.62	1.75	8.37	1.95	2.37		2.31	17.26	20721
		5.00	*3.00*	*8.00*		*9.00*	*1.65*	*2.00*		*2.00*	*17.35*	
				10.32	0.37	10.69	0.92	1.12		1.53	17.13	20335
				7.58	1.59	9.17	0.78	0.95		1.60	14.00	20589
		5.00	*3.00*	*8.00*		*9.00*	*0.82*	*1.00*		*1.50*	*14.26*	

TABLE OF ANALYSES.

Station Number	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	Louisville Fertilizer Co.	
20336	Eagle High Grade Tobacco and Potato Grower	Manufacturer .....
20590		J. W. Crume & Bro., Lebanon ...
20337	Eagle Tobacco Grower	Manufacturer .....
20591		L. S. Brough .....
20407	Eagle Potato Grower	Manufacturer .....
20408	Eagle Special Wheat Grower.	Manufacturer .....
20722		B. S. Sweeza .....
20469	Eagle Phosphate	Manufacturer .....
20723		J. W. Marshall .....
20470	Eagle Bone Meal	Manufacturer .....
20471	Eagle Raw Bone	Manufacturer .....
20592		L. S. Brough .....
20724		J. W. Crume & Bro. .....
20514	Eagle Standard Raw Bone	Manufacturer .....
20540	Eagle Grain Grower	Manufacturer .....
20625	Eagle Raw Bone Mixture	Manufacturer .....

Table of Analyses.

Pounds in the Hundred.												
Phosphoric Acid.									Potash			
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.	Nitrogen.	Equivalent to Ammonia.	From Muriate.	From Sulphate.	Estimated Value per Ton.	Station Number.
				7.03	1.96	8.99	2.18	2.65		5.02	$21.78	20336
				6.10	1.38	7.48	1.81	2.20		3.43	17.42	20590
		4.00	*3.00*	*7.00*		*8.00*	*1.65*	*2.00*		*4.00*	*18.55*	
				8.43	1.93	10.36	2.63	3.19		6.32	26.36	20337
				7.23	0.69	7.92	2.09	2.54		5.68	22.05	20591
		5.00	*3.00*	*8.00*		*9.00*	*2.47*	*3.00*		*6.00*	*24.61*	
				8.41	2.00	10.41	2.65	3.22		6.39	26.51	20407
		5.00	*3.00*	*8.00*		*9.00*	*2.47*	*3.00*		*6.00*	*24.61*	
				9.61	0.28	9.89	1.07	1.30		1.22	16.31	20408
				7.47	2.25	9.72	1.14	1.38		1.11	14.61	20722
		4.00	*3.00*	*7.00*		*8.00*	*0.82*	*1.00*		*1.00*	*12.46*	
				13.73	0.99	14.72					13.73	20469
				9.35	2.48	11.83					9.35	20723
		7.00	*5.00*	*12.00*		*13.00*					*12.00*	
29.86						29.86	2.10	2.55			30.19	20470
						20.00	*0.82*	*1.00*			*14.46*	
21.34	4.07					25.41	2.68	3.25			27.55	20471
20.91	4.91					25.82	2.35	2.85			26.73	20592
18.14	7.06					25.20	2.26	2.74			25.53	20724
						20.00	*2.47*	*3.00*			*19.41*	
13.25	7.13					20.38	4.15	5.04			27.33	20514
						22.00	*3.71*	*4.50*			*24.33*	
				8.47	1.02	9.49	0.44	0.53		3.89	16.56	20540
		5.00	*3.00*	*8.00*		*9.00*	*0.41*	*0.50*		*4.00*	*16.03*	
				8.46	9.27	17.73	1.73	2.10		1.65	21.03	20625
		3.00	*2.00*	*5.00*		*15.00*	*1.65*	*2.00*		*1.00*	*16.15*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	Michigan Carbon Works, Detroit, Mich.	
20397	Homestead A Bone Black Fertilizer	Manufacturer
20593		W. H. Barker, Richmond
20725		Lebanon Carriage & Imp. Co., Lebanon
20398	Homestead Potato and Tobacco Special	Manufacturer
20726		J. R. Davis & Bro., Campbellsville
20399	Homestead Tobacco Grower	Manufacturer
20594		Hatter Hdw. Co., Franklin
20400	Red Line Crop Grower	Manufacturer
20595		Bradford Bros., Glasgow
20772		Norris & Lockett Co., Henderson
20401	Red Line Complete Manure	Manufacturer
20596		Bradford Bros.
20773		Norris & Lockett Co.
20402	Red Line Phosphate with Potash	Manufacturer
20597		W. E. Downing & Co., Scottsville
20727		J. R. Davis & Bro., Campbellsville
20403	Red Line Phosphate	Manufacturer
20404	Red Line Tobacco Manure	Manufacturer
20598		Woodson Lewis, Greensburg

Table of Analyses.

Pounds in the Hundred.												
Phosphoric Acid.									Potash			
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.	Nitrogen.	Equivalent to Ammonia.	From Muriate.	From Sulphate.	Estimated Value per Ton.	Station Number.
				8.33	1.92	10.25	2.08	2.53	1 60		$18.61	20397
				8 25	2.64	10.89	2.23	2.71	1.76		19.41	20593
				8 28	2.98	11.26	2 24	2.72	1.52		19.37	20725
				8.00		*9.00*	*2.06*	*2.50*	*1.50*		*17.68*	
				7.78	2.94	10.72	2.07	2.51	5.14		21.87	20398
				7.64	3.03	10 67	2.72	3.30	5.47		24.01	20726
				8.00		*9.00*	*2.06*	*2.50*	*5.00*		*21.18*	
				10.06	1.97	12.03	2.95	3.58	3.51		25.22	20399
				9.97	2.25	12.22	2.73	3.31	3.67		24.72	20594
				10.00		*11.00*	*2.88*	*3.50*	*3.50*		*24 54*	
				7.29	3.11	10.40	1.86	2.26	2.25		17.82	20400
				8.09	2 87	10.96	2 14	2.60	2.75		20.03	20595
				8.30	2 33	10.63	1.66	2.02	2.11		17 98	20772
				8.00		*9.00*	*1.65*	*2.00*	*2.00*		*16.95*	
				6.23	2.39	8.62	0 86	1 04	1.28		12.30	20401
				6.79	3 42	10 21	1 07	1.30	1.15		13.88	20596
				6.57	2.12	8 69	1 01	1.23	1.00		12.76	20773
				7.00		*8.00*	*0 82*	*1.00*	*1.00*		*12.26*	
				10.95	3.06	14.01			2.24		16.60	20402
				9.93	2 42	12 35			2.12		15 01	20597
				10.73	2.96	13.69			1.87		15.93	20727
				10.00		*11.00*			*2.00*		*14.40*	
				13 10	3.49	16.59					13 10	20403
				14.00		*15.00*					*14.00*	
				7 22	2.61	9 83	0 86	1.04	3.25		15.53	20404
				8.39	1.93	10.32	0.84	1.02	2.92		16.28	20598
				8.00		*10.00*	*0.82*	*1.00*	*3.00*		*15.86*	

Table of Analyses.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	Michigan Carbon Works.	
20405	Wolverine Pure Ground Bone..	Manufacturer .....
20406	Homestead Bone Meal	Manufacturer .....
20599		Cartwright & Co., Elkton .....
20774		W. G. W. Empson, Adairville....
20649	Desiccated Bone	Manufacturer .....
20775		N. F. Hill, Bowling Green .....
	Nelson Morris & Co., Chicago, Ill.	
20323	Big One, Pure Ground Raw Bone	Manufacturer .....
20728		Ovesen-Burba Co., Hodgenville...
20324	Big Two, Pure Bone Meal.....	Manufacturer .....
20600		C. M. Langdon, Science Hill.....
20729		Ovesen-Burba Co. .....
20325	Big Three, Pure Bone Phosphate	Manufacturer .....
20601		C. M. Langdon .....
20326	Big Four, Pure Bone Phosphate	Manufacturer .....
20602		Hatter Hdw. Co., Franklin .....
20327	Big Five, Pure Bone Phosphate	Manufacturer .....
20603		J. W. Gardner, Elizabethtown....
20328	Big Six, Special Bone Meal....	Manufacturer .....
20329	Big Nine, Pure Bone Phosphate	Manufacturer .....
20604		Hatter Hdw. Co. .....

Table of Analyses.

Pounds in the Hundred.													
Phosphoric Acid.										Potash			
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.	Nitrogen.	Equivalent to Ammonia.		From Muriate.	From Sulphate.	Estimated Value per Ton.	Station Number.
18.41	9.07					27.48	2.55	3.10				$27.82	20405
						20.00	*2.47*	*3.00*				*19.41*	
20.23	10.42					30.65	1.02	1.24				25.49	20406
19.66	10.58					30.24	1.38	1.68				26.22	20599
20.40	13.60					34.00	1.01	1.23				27.51	20774
						30.00	*0.82*	*1.00*				*20.46*	
23.24	8.59					31.83	1.30	1.58				27.64	20649
23.81	9.73					33.54	1.16	1.41				28.37	20775
						25.00	*1.23*	*1.50*				*18.69*	
13.51	11.50					25.01	3.54	4.30				28.33	20323
9.71	17.26					26.97	2.75	3.34				26.38	20728
						24.00	*3.29*	*4.00*				*24.27*	
24.82	2.16					26.98	2.16	2.62				27.64	
17.37	9.34					26.71	2.20	2.67				26.10	20324
22.48	5.97					28.45	2.37	2.88				28.67	20600
						28.00	*2.06*	*2.50*				*22.98*	20729
				7.71	2.84	10.55	2.69	3.27		2.44		21.39	20325
				8.19	2.38	10.57	2.77	3.36		2.31		21.86	20601
				6.00		*10.00*	*2.47*	*3.00*		*2.00*		*18.61*	
				8.28	4.08	12.36	4.08	4.95		4.01		28.62	20326
				6.67	3.35	10.02	4.20	5.10		4.12		26.88	20602
				6.00		*12.00*	*4.12*	*5.00*		*4.00*		*26.76*	
				6.75	2.69	9.44	2.52	3.06		2.01		19.15	20327
				6.00	3.48	9.48	2.61	3.17		0.90		17.50	20603
				6.00		*10.00*	*2.47*	*3.00*		*1.00*		*17.41*	
26.28	1.38					27.66	1.30	1.58				25.75	20328
						28.00	*0.82*	*1.00*				*19.26*	
				9.40	1.82	11.22	1.79	2.17		4.81		23.15	20329
				8.50	0.84	9.34	1.72	2.09		5.01		21.71	20604
				8.00		*10.00*	*1.65*	*2.00*		*5.00*		*21.35*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	Nelson Morris & Co.	
20330	Big Ten, Grain Grower	Manufacturer
20605		J. W. Gardner
	Mt. Pleasant Fertilizer Co., Mt. Pleasant, Tenn.	
20268	Big Success Banner Grain Grower	Manufacturer
20606		Collier Bros., Richmond
20730		I. K. Miller & Sons, Campbellsville
20269	Big Success Blood, Bone and Potash	Manufacturer
20607		Powell-Rogers Co., Paducah
20270	Big Success Mt. Pleasant Special Acid Phosphate	Manufacturer
20731		W. F. Jeffries & Son, Columbia
20271	Big Success Universal	Manufacturer
20272	Black Patch Champion Wheat Special	Manufacturer
20273	Black Patch Grain and Seeding Down	Manufacturer
20274	Black Patch Farmer's Friend	Manufacturer
20275	Black Patch Mt. Pleasant Soluble Bone	Manufacturer
20776		D. L. D. Sandefur, Beaver Dam

Table of Analyses.

Pounds in the Hundred.												
Phosphoric Acid.									Potash			
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.	Nitrogen	Equivalent to Ammonia.	From Muriate.	From Sulphate.	Estimated Value per Ton.	Station Number.
				9.24	2.09	11.33	1.88	2.28		2.14	$20.14	20330
				7.41	1.66	9.07	1.75	2.12		1 44	16 53	20605
				8.00		*10.00*	*1.65*	*2.00*		*2.00*	*17.75*	
				12.49	7.75	20.24				1.74	20.18	20268
				10.60	2.42	13.02			3.03		16.72	20606
				9 74	6.47	16.21			1.86		16.14	20730
		9.00	*2.00*	*11.00*		*12 00*				*2.00*	*16 00*	
				11 44	4.72	16.16	0 96	1.17		6.60	26.42	20269
				11 63	3.80	15.43	1.00	1.21		6.28	26 02	2.607
		-7.00	*2.00*	*9.00*		*11.00*	*0 82*	*1.00*		*7.00*	*22.46*	
				13.91	3.48	17.39					13.91	20270
				16.75	3.10	19 85					16.75	20731
		12.00	*2.00*	*14.00*		*16.00*					*14.00*	
				11.06	8 33	19 39	0.95	1.15		3.74	23 94	20271
		6.00	*2.00*	*8.00*		*10.00*	*0.82*	*1.00*		*4.00*	*17.66*	
				12 80	6 43	19.23				3.91	22.62	20272
		9.00	*2.00*	*11.00*		*12 00*				*4.00*	*18.40*	
				11.77	4.41	16 18	1.70	2.06	1.87		22 85	20273
		8.50	*2.00*	*10.50*		*12.00*	*1.65*	*2.00*	*2.00*		*20.15*	
				12.66	4.53	17.19	0 99	1.20		2.96	23.52	20274
		8.50	*2.00*	*10.50*		*12.00*	*0.82*	*1.00*		*3.00*	*19 26*	
				14.53	4.02	18.55					14.53	20275
				10 66	4.70	15.36					10 66	20776
		10.00	*2.00*	*12.00*		*14.00*					*12,00*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	Mt. Pleasant Fertilizer Co.	
20276	Black Patch Best by Test.....	Manufacturer .....
20277	Pure Ground Bone	Manufacturer .....
20278	Big Success Potato Special.....	Manufacturer .....
20279	Big Success High Grade Dissolved Bone	Manufacturer .....
20280	Big Success Cantaloupe and Vegetable Special	Manufacturer .....
20281	Big Success Corn Special	Manufacturer .....
20282	Black Patch Tobacco Special..	Manufacturer .....
20608		Bradford Bros., Glasgow .....
20283	Black Patch Tobacco Grower...	Manufacturer .....
20609		Bradford Bros .....
	National Fertilizer Co., Nashville, Tenn.	
20383	Old Hickory Brand Old Hickory Guano	Manufacturer .....
20384	O. H. Br. Corn Grower.....	Manufacturer .....
20732		Rogers Harlow Co., Glasgow.....
20385	O. H. Br. Special Tobacco Grower No. 2	Manufacturer .....
20610		I. K. Miller & Sons, Campbellsville .....

Table of Analyses.

Pounds in the Hundred.													
Phosphoric Acid.									Potash				
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.	Nitrogen.	Equivalent to Ammonia.	From Muriate.	From Sulphate.	Estimated Value per Ton.	Station Number.
				11.00	2.01	13.01	1.67	2.03		6.14	$26.38	20276
		10.00	*2.00*	*12.00*		*14.00*	*1.65*	*2.00*		*6.00*	*27.35*	
22.63	2.24					24.87	2.73	3.31			27.63	20277
						23.00	*2.47*	*3.00*			*21.21*	
				9.32	5.69	15.01	2.39	2.90		6.24	28.12	20278
		5.00	*2.00*	*7.00*		*9.00*	*2.47*	*3.00*		*6.00*	*23.81*	
				13.72	2.99	16.71					13.72	20279
		14.00	*2.00*	*16.00*		*18.00*					*16.00*	
				7.34	3.38	10.72	3.48	4.22		10.95	33.74	20280
		4.00	*2.00*	*6.00*		*8.00*	*3.29*	*4.00*		*10.00*	*29.87*	
				10.35	8.10	18.45	1.69	2.05		2.39	23.60	20281
		6.00	*2.00*	*8.00*		*10.00*	*1.65*	*2.00*	*2.00*		*17.35*	
				10.51	1.85	12.36	1.75	2.12		10.64	31.37	20282
				8.25	3.29	11.54	1.88	2.28	1.34	7.34	27.01	20608
		6.00	*2.00*	*8.00*		*10.00*	*1.65*	*2.00*		*10.00*	*27.35*	
				8.74	11.63	20.37	0.89	1.08		3.71	22.26	20283
				10.20	4.44	14.64	1.12	1.36	1.08	2.47	21.42	20609
		6.00	*2.00*	*8.00*		*10.00*	*0.82*	*1.00*		*4.00*	*17.66*	
				9.27	4.29	13.56	2.39	2.90	4.21		24.22	20383
		5.00	*3.00*	*8.00*		*9.00*	*1.65*	*2.00*	*2.00*		*16.95*	
				11.14	3.01	14.15	0.95	1.15	3.28		20.70	20384
				11.46	2.29	13.75	0.97	1.18	1.74		19.32	20732
		6.00	*4.00*	*10.00*		*11.00*	*0.82*	*1.00*	*1.00*		*15.86*	
				8.83	4.18	13.01	2.62	3.18	6.53		26.66	20385
				8.85	1.78	10.63	1.36	1.65		4.52	20.83	20610
		5.00	*3.00*	*8.00*		*9.00*	*1.65*	*2.00*		*5.00*	*20.95*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	National Fertilizer Co.	
20386	O. H. Br. Corn and Wheat Guano	Manufacturer
20611		I. K. Miller & Sons
20387	O. H. Br. Special Wheat and Corn Grower	Manufacturer
20388	O. H. Br. Sadler's Formula	Manufacturer
20389	O. H. Br. Acid Phosphate and Potash	Manufacturer
20390	O. H. Br. Anti-Trust Acid Phosphate and Potash	Manufacturer
20391	O. H. Br. Acid Phosphate	Manufacturer
20392	O. H. Br. Blood and Bone	Manufacturer
20612		Barnett Bros., London
20488	O. H. Br. Tobacco Grower	Manufacturer
20652	Miller's Acid Phosphate	Manufacturer
20656	Fourteen and Four	Manufacturer
20664	National Wheat Grower	Manufacturer
20733		Rogers Harlow Co.
20665	High Grade Dissolved Bone	Manufacturer
20734		Rogers Harlow Co.

Table of Analyses.

Pounds in the Hundred.													
		Phosphoric Acid.								Potash			
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.	Nitrogen.	Equivalent to Ammonia.	From Muriate.	From Sulphate.	Estimated Value per Ton.	Station Number.
				10.73	3.56	14.29	1.55	1.88	3.78		$22.73	20386
				9.14	1.47	10.61	0.87	1.06	1.92		16.09	20611
		5.00	*3.00*	*8.00*		*9.00*	*0.82*	*1.00*	*2.00*		*14.46*	
				9.73	3.59	13.32	1.49	1.81	5.38		22.97	20387
		5.00	*3.00*	*8.00*		*9.00*	*0.82*	*1.00*	*3.00*		*15.46*	
				13.88	1.41	15.29			3.78		21.00	20388
		8.00	*4.00*	*12.00*		*13.00*			*2.00*		*16.80*	
				12.66	1.51	14.17			3.95		19.74	20389
		7.00	*3.00*	*10.00*		*11.00*			*2.00*		*14.40*	
				12.90	1.59	14.49			8.60		24.72	20390
		7.00	*3.00*	*10.00*		*11.00*			*4.00*		*16.40*	
				14.35	2.15	16.50					14.35	20391
		8.00	*4.00*	*12.00*		*13.00*					*12.00*	
				11.59	2.83	14.42	0.92	1.12	3.32		21.12	20392
				9.15	1.62	10.77	0.87	1.06	1.41		15.65	20612
		7.00	*3.00*	*10.00*		*11.00*	*0.82*	*1.00*	*1.00*		*15.86*	
				9.92	4.48	14.40	2.21	2.68	3.23		23.55	20488
		6.00	*4.00*	*10.00*		*11.00*	*1.65*	*2.00*	*2.00*		*19.35*	
				11.18	0.92	12.10					11.18	20652
		7.00	*3.00*	*10.00*		*11.00*					*10.00*	
				12.94	1.16	14.10			5.61		21.60	20656
		10.00	*4.00*	*14.00*		*15.00*			*4.00*		*21.20*	
				9.50	0.84	10.34	2.27	2.76	8.69		27.24	20664
				10.09	1.92	12.01	1.42	1.72	2.89		20.03	20733
		7.00	*3.00*	*10.00*		*11.00*	*1.65*	*2.00*	*2.00*		*19.35*	
				13.36	0.69	14.05					13.36	20665
				12.44	2.37	14.81					12.44	20734
		10.00	*4.00*	*14.00*							*14.00*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
20671	**National Fertilizer Co.** High Grade Acid Phosphate...	Manufacturer .....
	North-Western Fertilizing Co., Chicago, Ill.	
20438	Horse Shoe Brand Tobacco Grower	Manufacturer .....
20613		Hatter Hdw. Co., Franklin .....
20439	H. S. B. Special Potato Grower.	Manufacturer .....
20440	H. S. B. Raw Bone and Super Phosphate Mixture	Manufacturer .....
20441	H. S. B. Premium Potato Grower	Manufacturer .....
20614		Dickey & Co., Glasgow.....
20442	H. S. B. National Bone Dust...	Manufacturer .....
20615		T. W. Buchanan & Co., Campbellsville .....
20443	H. S. B. Challenge Corn Grower	Manufacturer .....
20616		H. H. Padgett, Kingsville.....
20777		Clarkson Hdw. Co., Clarkson.....
20444	H. S. B. Kentucky Tobacco Grower	Manufacturer .....
20617		Henninger & Tucker, Scottsville.
20445	H. S. B. Corn and Wheat Grower	Manufacturer .....
20618		Henninger & Tucker .....
20735		Dickey & Co.....

Table of Analyses.

Pounds in the Hundred.												
Phosphoric Acid.									Potash			
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.	Nitrogen.	Equivalent to Ammonia.	From Muriate.	From Sulphate.	Estimated Value per Ton.	Station Number.
				14.70	0.96	15.66					$14.70	20671
		11.00	*5.00*	*16.00*							*16.00*	
				7.70	2.76	10.46	2.45	2.97	5.73		23.42	20438
				7.82	2.64	10.46	2.18	2.65	5.55		22.53	20613
		5.00	*3.00*	*8.00*		*10.00*	*2.06*	*2.50*	*5.00*		*21.58*	
				7.42	2.92	10.34	2.46	2.99	5.83		23.28	20439
		5.00	*3.00*	*8.00*		*10.00*	*2.06*	*2.50*	*5.00*		*21.58*	
				6.32	6.28	12.60	3.17	3.85	0.78		20.38	20440
		4.00	*3.00*	*7.00*		*13.00*	*2.47*	*3.00*	*0.50*		*18.71*	
				7.49	2.16	9.65	1.45	1.76	9.64		23.84	20441
				8.15	2.79	10.94	1.03	1.25	5.08		19.07	20614
		5.00	*3.00*	*8.00*		*10.00*	*0.82*	*1.00*	*6.00*		*18.86*	
				7.43	2.88	10.31	2.42	2.94	2.02		19.35	20442
				7.49	2.85	10.34	2.34	2.84	1.59		18.74	20615
		5.00	*3.00*	*8.00*		*10.00*	*2.06*	*2.50*	*1.50*		*18.08*	
				7.42	2.84	10.26	2.32	2.82	1.95		18.95	20443
				7.47	3.39	10.86	2.28	2.77	1.71		18.87	20616
				7.80	3.01	10.81	2.34	2.84	1.56		19.14	20777
		5.00	*3.00*	*8.00*		*10.00*	*2.06*	*2.50*	*1.50*		*18.08*	
				7.77	3.13	10.90	1.95	2.37	2.66		19.08	20444
				7.79	2.32	10.11	1.73	2.10	2.01		17.48	20617
		5.00	*3.00*	*8.00*		*10.00*	*1.65*	*2.00*	*2.00*		*17.35*	
				7.77	3.13	10.90	1.91	2.32	2.74		19.04	20445
				8.17	2.44	10.61	1.80	2.19	2.02		18.20	20618
				7.95	2.74	10.69	1.85	2.25	2.10		18.29	20735
		5.00	*3.00*	*8.00*		*10.00*	*1.65*	*2.00*	*2.00*		*17.35*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	North-Western Fertilizing Co.	
20446	H. S. B. Acidulated Bone and Potash	Manufacturer
20447	H. S. B. Animal Bone Manure	Manufacturer
20619		Watkins & Co., Elizabethtown
20736		Dickey & Co.
20448	H. S. B. Dark Tobacco Grower	Manufacturer
20620		Woodson Lewis, Greensburg
20449	H. S. B. Success Corn Grower	Manufacturer
20450	H. S. B. Cap Sheaf Wheat Grower	Manufacturer
20451	H. S. B. Bone and Potash	Manufacturer
20621		Dickey & Co.
20737		Watkins & Co.
20452	H. S. B. Square Deal Phosphate	Manufacturer
20622		E. P. Barnes & Bro., Beaver Dam.
20453	H. S. B. Quick Acting Phosphate	Manufacturer
20623		Watkins & Co
20738		Watkins & Co.
20454	H. S. B. Special Bone Meal	Manufacturer
20778		Ed. Frost, Central City
20455	H. S. B. Pure Ground Bone	Manufacturer
20624		E. P. Barnes & Bro.
20779		Forbes Mfg. Co., Hopkinsville

Table of Analyses.

Pounds in the Hundred.													
Phosphoric Acid.									Potash				
In Fine-Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.	Nitrogen.	Equivalent to Ammonia.	From Muriat.	From Sulphate.	Estimated Value per Ton.	Station Number.
				9.94	3.79	13.73	1.10	1.34	1.35		$18.10	20446
		7.00	*3.00*	*10.00*		*12 00*	*0.82*	*1.00*	*1.00*		*16.26*	
				8.04	2.34	10.38	1.24	1.51	1.35		15.66	20447
				8.18	2.71	10.89	1.07	1.30	1.16		15.27	20619
				7.51	2.58	10.09	0.96	1.17	1.03		13.95	20736
		4.00	*3.00*	*7.00*		*8.00*	*0.82*	*1.00*	*1.00*		*12.26*	
				7.66	2.55	10.21	1.19	1.44	1.31		15.09	20448
				7.82	2.48	10.30	1.03	1.25	1.25		14.71	20620
		4.00	*3.00*	*7.00*		*8.00*	*0.82*	*1.00*	*1.00*		*12.26*	
				7.70	2.52	10.22	1.24	1.51	1.33		15.30	20449
		4.00	*3.00*	*7.00*		*8.00*	*0.82*	*1.00*	*1.00*		*12.26*	
				7.70	2.55	10.25	1.25	1.52	1.33		15.34	20450
		4.00	*3.00*	*7.00*		*8.00*	*0.82*	*1.00*	*1.00*		*12.26*	
				8.86	3.22	12.08			2.53		14.45	20451
				9.58	3.02	12.60			1.88		14.59	20621
				11.29	2.51	13.80			1.65		16.20	20737
		7.00	*3.00*	*10.00*		*12.00*			*2.00*		*14.80*	
				13.27	3.35	16.62					13.27	20452
				14.59	2.94	17.53					14.59	20622
		12.00	*2.00*	*14.00*		*16.00*					*14.00*	
				11.42	2.38	13.80					11.42	20453
				11.43	3.33	14.76					11.43	20623
				9.71	2.69	12.40					9.71	20738
		8.00	*2.00*	*10.00*		*12.00*					*10.00*	
						29.40	1.51	1.83			24.70	20454
12.64	16.76					25.36	1.13	1.37			21.50	20778
14.46	10.90					*25.00*	*1.23*	*1.50*			*18.69*	
						21.82	3.66	4.44			26.78	20455
13.52	8.30					24.74	1.73	2.10			22.06	20624
10.14	14.60					23.49	2.25	2.73			23.85	20779
15.03	8.46					*20.00*	*2.47*	*3.00*			*19.41*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	North-Western Fertilizing Co.	
20456	H. S. B. Fine Raw Bone.....	Manufacturer .....
	Packer's Fertilizer Association, Chicago, Ill.	
20457	Boars Head Br. W-O-G. Tobacco and Potato Grower....	Manufacturer .....
20458	B. H. B. World-of-Good Superphospnate	Manufacturer .....
20459	B. H. B. Special Tobacco Grower	Manufacturer .....
20460	B. H. B. Corn and Wheat Grower	Manufacturer .....
20461	B. H. B. Ammoniated Bone and Potash	Manufacturer .....
20462	B. H. B. Faultless Grain Grower	Manufacturer .....
20463	B. H. B. Potash Phosphate.....	Manufacturer .....
20464	B. H. B. Kentucky Potash Mixture	Manufacturer .....
20465	B. H. B. Gilt Edge Phosphate.	Manufacturer .....
20466	B. H. B. Soluble Phosphate ...	Manufacturer .....

TABLE OF ANALYSES.

POUNDS IN THE HUNDRED.												
Phosphoric Acid.									Potash			
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.	Nitrogen.	Equivalent to Ammonia.	From Muriate.	From Sulphate.	Estimated Value per Ton.	Station Number.
18.76	0.99					19.75	3.93	4.77			$27.39	20456
						22.00	*3.29*	*4.00*			*23.07*	
				8.05	2.34	10.39	2.39	2.90	5.78		23.55	20457
		5.00	*3.00*	*8.00*		*10.00*	*2.06*	*2.50*	*5.00*		*21.58*	
				7.67	2.65	10.32	2.31	2.80	1.92		19.11	20458
		5.00	*3.00*	*8.00*		*10.00*	*2.06*	*2.50*	*1.50*		*18.08*	
				7.89	2.98	10.87	1.94	2.36	2.58		19.06	20459
		5.00	*3.00*	*8.00*		*10.00*	*1.65*	*2.00*	*2.00*		*17.35*	
				8.20	2.60	10.80	1.93	2.34	2.61		19.28	20460
		5.00	*3.00*	*8.00*		*10.00*	*1.65*	*2.00*	*2.00*		*17.35*	
				10.61	3.49	14.10	1.09	1.32	1.35		18.75	20461
		7.00	*3.00*	*10.00*		*12.00*	*0.82*	*1.00*	*1.00*		*16.26*	
				8.01	2.34	10.35	1.20	1.46	1.34		15.49	20462
		4.00	*3.00*	*7.00*		*8.00*	*0.82*	*1.00*	*1.00*		*12.26*	
				9.60	2.60	12.20			5.01		17.57	20463
		7.00	*3.00*	*10.00*		*12.00*			*4.00*		*16.80*	
				9.05	3.10	12.15			2.56		14.66	20464
		7.00	*3.00*	*10.00*		*12.00*			*2.00*		*14.80*	
				13.09	3.39	16.48					13.09	20465
		12.00	*2.00*	*14.00*		*16.00*					*14.00*	
				11.49	2.62	14.11					11.49	20466
		8.00	*2.00*	*10.00*		*12.00*					*10.00*	

TABLE OF ANALYSES.

Station number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	Packer's Fertilizer Association.	
20467	B. H. B. Special Bone Meal....	Manufacturer .....
20780		Forbes Mfg. Co., Hopkinsville....
20468	B. H. B. Chicago Bone Meal....	Manufacturer .....
	Pero & Stoecker, Louisville, Ky.	
20393	Pure Bone Meal.....	Manufacturer .....
20739		Watkins & Co., Elizabethtown..
20394	Pure Animal Matter Corn and Wheat Grower	Manufacturer .....
20626		Watkins & Co. .....
20740		Watkins & Co.....
20395	Pure Animal Matter and Potash	Manufacturer .....
	A. W. Pickerill, Hodgenville, Ky.	
20579	Pickerill's Pure Raw Bone.....	Manufacturer .....
20580	Pickerill's Corn and Wheat Grower	Manufacturer .....
20650	Pickerill's Blood, Bone and Potash	Manufacturer .....
	Queen City Fertilizer Co., Cincinnati, O.	
20210	Big Bonanza Tobacco and Potato Grower	Manufacturer .....
20627		C. L. Dudley, Flemingsburg.....
20211	Miami Valley Grain Grower...	Manufacturer .....

Table of Analyses.

Pounds in the Hundred.													
Phosphoric Acid.							Nitrogen	Equivalent to Ammonia.	Potash		Estimated Value per Ton.	Station Number.
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.			From Muriate.	From Sulphate.		
13.35	15.05					28.40	1 76	2 14			$24.99	20467
18.47	8.68					27.15	1.16	1.41			23.47	20780
						25.00	*1.23*	*1.50*			*18.69*	
16.19	6.30					22 49	3.66	4.44			27.71	20468
						20.00	*2.47*	*3.00*			*19.41*	
13.43	8.96					22 39	3.82	4 64			27 58	20393
10.51	10.93					21.44	4.22	5.12			27 63	20739
						22.00	*3 50*	*4 25*			*23.70*	
13.23	2.34					15.57	5.28	6 41			27.82	20394
12.67	2.41					15 08	4.83	5 86			26.08	20626
10.75	1.33					12.08	6.06	7.36			27 58	20740
						10.00	*4.00*	*4.86*			*18.00*	
10.34	2.58					12.92	5.21	6.32		4.19	30.48	20395
						10.00	*4.00*	*4.86*		*4.00*	*22.80*	
14.64	7.88					22 52	3.66	4.44			27.42	20579
						22.50	*3.71*	*4.50*			*24.63*	
				7.87	1.94	9.81	1.41	1.71	4 63		19.08	20580
		5.00	*3.00*	*8.00*		*10.00*	*1.65*	*2.00*	*2.00*		*17.35*	
				7.35	1.82	9.17	0.52	0 63	3.81		14.92	20650
				7.00			*0.41*	*0.50*	*4.00*		*13.63*	
				6.89	1.13	8.02	1 14	1.38	0.00	2 62	15.28	20210
				8.45	1.75	10.20	0.85	1.03	2.73	0 00	16.12	20627
				8.00		*9.00*	*0.82*	*1.00*	*2.00*	*2 00*	*16.86*	
				9.01	1.33	10.34	1.71	2.08		2.56	19.54	20211
				8.00		*9.00*	*1.23*	*1 50*	*2.50*		*16.19*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	Queen City Fertilizer Co.	
20212	Valley Gem Phosphate	Manufacturer .....
20213	Phosphate and Potash	Manufacturer .....
	Read Phosphate Co., Nashville Tenn.	
20501	Read's High Grade Tobacco Special	Manufacturer .....
20502	Read's High Grade Tobacco Grower	Manufacturer .....
20781		J. W. Teaff, Hardinsburg .....
20503	Read's Farmer's Special Manure	Manufacturer .....
20741		Barren Co. Grocery & Hdw. Co., Glasgow .....
20504	Read's Blood and Bone No. 1..	Manufacturer .....
20628		W. T. Kirkman, Elkton .....
20505	Read's Soluble Bone	Manufacturer .....
20742		I. K. Miller & Sons., Campbellsville .....
20506	Read's Alkaline Bone	Manufacturer .....
20507	Read's Special Potash Mixture.	Manufacturer .....
20743		Barren Co. Grocery & Hdw. Co..
20508	Read's XXX Dissolved Bone...	Manufacturer .....

Table of Analyses.

Pounds in the Hundred.												
Phosphoric Acid.									Potash			
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.	Nitrogen.	Equivalent to Ammonia.	From Muriate.	From Sulphate.	Estimated Value per Ton.	Station Number.
				8.79	1.33	10.12	1.76	2.14		1.73	$18.44	20212
				8.00		*9.00*	*1.03*	*1.25*	*2.00*		*15.09*	
				12.74	1.50	14 24				1.97	18.25	20213
				10.00		*11.00*			*2.00*		*14.40*	
				7.70	2 30	10.00	1.99	2.42		9.60	27.65	20501
				8.00			*1.65*	*2.00*		*8.00*	*24.15*	
				7.70	2 51	10.21	2.21	2.68		4.98	22 85	20502
				6.79	2 98	9.77	1.92	2 33	1 12	2 07	18 70	20781
				8.00			*1.65*	*2.00*		*4.00*	*19.35*	
				9.72	2.14	11.86	1.27	1.54	4.59		20 92	20503
				10.70	2 35	13 05	0 69	0 84	1 71		17.56	20741
				10.00			*0.82*	*1.00*	*3.00*		*17.46*	
				8 02	2.14	10.16	2.13	2.59	3 47		20 34	20504
				7 93	1.75	9 68	1 33	1.61	2.92		17 13	20628
				8 00			*1.65*	*2.00*	*2 00*		*16 55*	
				7.74	2.42	10.16	1.48	1.80	3 25		17 95	20505
				7 73	1 92	9 65	0.80	0 97	2 11		14 56	20742
				8 00			*0.82*	*1.00*	*2 00*		*14 06*	
				9 34	2.07	11 41			2 67		14 71	20506
				10 00					*2.00*		*14 00*	
				9 94	1.56	11 50			4 83		17 38	20507
				9 96	1 92	11 88			4.13		16 85	20743
				10.00					*4.00*		*16 00*	
				11 86	2.61	14.47					11 86	20508
				13 00							*13.00*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
20655	**Read Phosphate Co.** Read's Red Diamond Special...	Manufacturer .....
20313	**Smith Brothers, Louisville, Ky.** Soluble Phosphate	Manufacturer .....
20314	Bone and Potash	Manufacturer .....
20315	Success Crop Grower	Manufacturer .....
20316	Corn and Wheat Grower	Manufacturer .....
20629		Lovell Bros., Greenville .....
20782		Planters Hdw. Co., Hopkinsville.
20317	Standard Tobacco Grower	Manufacturer .....
20630		Lovell & Grainger, Franklin.....
20318	Kentucky Tobacco Grower.....	Manufacturer .....
20631		Lovell Bros .....
20319	Special Tobacco Grower	Manufacturer .....
20632		Lovell Bros. .....
20320	High Grade Potato Grower....	Manufacturer .....
20321	Pure Bone Meal	Manufacturer .....
20783		Planters Hdw. Co. .....
20322	Pure Raw Bone	Manufacturer .....
20744		C. R. Perry, Campbellsville.....

Table of Analyses.

Pounds in the Hundred.													
Phosphoric Acid.							Nitrogen.	Equivalent to Ammonia.	Potash		Estimated Value per Ton.	Station Number.
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.			From Muriate.	From Sulphate.		
				9.33	1.42	10.75	2.83	3.44	3.85		$24.11	20655
				10.00			*2.47*	*3.00*	*3.00*		*22.41*	
				14.76	0.82	15.58					14.76	20313
		10.00	*4.00*	*14.00*		*16.00*					*14.00*	
				10.91	1.05	11.96			2.14		15.65	20314
		6.00	*4.00*	*10.00*		*12.00*			*2.00*		*14.80*	
				7.42	1.10	8.52	0.85	1.03	1.09		12.98	20315
		5.00	*2.00*	*7.00*		*9.00*	*0.82*	*1.00*	*1.00*		*12.66*	
				9.39	1.32	10.71	1.70	2.06	2.30		19.20	20316
				10.13	2.56	12.69	1.82	2.21	1.96		20.60	20629
				8.23	3.39	11.62	1.43	1.74	1.72		17.25	20782
		6.00	*2.00*	*8.00*		*10.00*	*1.65*	*2.00*	*2.00*		*17.35*	
				8.43	1.50	9.93	1.70	2.06	0.82	1.64	18.61	20317
				9.55	2.32	11.87	1.99	2.42	0.98	0.64	20.11	20630
		6.00	*2.00*	*8.00*		*10.00*	*1.65*	*2.00*		*2.00*	*17.75*	
				7.72	1.41	9.13	1.69	2.05	0.80	3.19	19.52	20318
				10.64	2.14	12.78	2.06	2.50		2.42	22.71	20631
		5.00	*2.00*	*7.00*		*9.00*	*1.65*	*2.00*		*4.00*	*18.95*	
				8.51	1.79	10.30	2.47	3.00	1.08	3.10	23.14	20319
				9.51	2.66	12.17	2.82	3.42		3.43	25.05	20632
		6.00	*2.00*	*8.00*		*10.00*	*2.47*	*3.00*		*4.00*	*22.61*	
				8.29	1.38	9.67	2.29	2.78		6.25	24.87	20320
		6.00	*2.00*	*8.00*		*10.00*	*2.47*	*3.00*		*6.00*	*25.01*	
						27.33	2.93	3.56			30.22	20321
25.15	2.18					24.61	2.61	3.17			26.88	20783
21.41	3.20					*24.00*	*2.47*	*3.00*			*21.81*	
						26.10	3.81	4.63			31.06	20322
19.84	6.26					25.00	4.02	4.88			29.76	20744
13.50	11.50					*22.00*	*3.71*	*4.50*			*24.33*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	Smith Brothers.	
20483	Grain Special	Manufacturer
20654	Pure Bone Meal with Potash	Manufacturer
	Standard Guano & Chem. Mfg. Co. New Orleans, La.,	
20672	Pure Raw Ground Bone	Manufacturer
	Swift & Co., Chicago, Ill.	
20363	Swift's Superphosphate	Manufacturer
20634		L. W. Irvin & Son, Greenville
20745		Farmers Hdw. & Gro. Co., Glasgow
20364	Swift's Complete Fertilizer	Manufacturer
20635		Farmers Hdw. & Gro. Co.
20784		Grayson Co. Supply Co., Leitchfield
2036	Swift's Special Pure Bone Meal	Manufacturer
20746		I. K. Miller & Sons., Campbellsville
20366	Swift's Pure Bone Meal	Manufacturer
20636		W. S. Overstreet, La Grange
20747		Farmers Hdw. and Grocery Co.
20367	Swift's Onion, Potato and Tobacco	Manufacturer
20637		L. W. Irvin & Son

Table of Analyses.

Pounds in the Hundred.													
Phosphoric Acid.							Nitrogen.	Equivalent to Ammonia.	Potash		Estimated Value per Ton.	Station Number.
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.			From Muriat.	From Sulphate.		
				10.66	1.19	11.85	0.88	1.07	2.33		$18.24	20483
		6.00	*4.00*	*10.00*		*12.00*	*0.82*	*1.00*	*2.00*		*17.26*	
19.73	4.63					24.36	1.91	2.32	2.90	0.88	28.25	20654
						23.00	*2.06*	*2.50*	*3.00*		*22.98*	
16.75	8.63					25.38	3.16	3.84			28.06	20672
						20.00	*3.09*	*3.75*			*21.27*	
				9.07	2.01	11.08	1.67	2.03	2.08		18.77	20363
				8.82	0.79	9.61	1.72	2.09	1.79		17.85	20634
				9.30	0.50	9.80	1.90	2.31	1.98		19.04	20745
				8.00		*12.00*	*1.65*	*2.00*	*2.00*		*18.15*	
				9.33	1.43	10.76	1.17	1.42	1.19		16.47	20364
				8.11	1.61	9.72	1.45	1.76	0.86		15.58	20635
				9.24	0.52	9.76	0.94	1.14	1.14		15.26	20784
				8.00		*11.00*	*1.03*	*1.25*	*1.00*		*14.89*	
23.60	8.28					31.88	1.26	1.53			27.63	20365
26.00	4.22					30.22	1.87	2.27			28.94	20746
						27.50	*0.82*	*1.00*			*18.96*	
23.50	3.21					26.71	2.64	3.20			28.65	20366
21.04	5.26					26.30	2.49	3.02			27.46	20636
23.33	6.20					29.53	2.11	2.56			28.71	20747
						25.00	*2.47*	*3.00*			*22.41*	
				8.88	2.85	11.73	1.60	1.94	2.56	4.76	24.87	20367
				9.66	0.72	10.38	1.92	2.33	1.04	6.54	26.53	20637
				8.00		*11.00*	*1.65*	*2.00*		*7.00*	*24.15*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	Swift & Co.	
20368 20638	Swift's Vegetable and Tobacco Grower	Manufacturer E. F. Austin & Bro., Beaver Dam.
20369 20639	Swift's Champion Wheat and Corn Grower	Manufacturer E. F. Austin & Bro
20370 20640	Swift's Special Phosphate and Potash	Manufacturer Farmers Hdw. and Grocery Co...
20371	Swift's Pure Ammoniated Bone and Potash	Manufacturer
26372	Swift's Pure Bone Meal and Blood	Manufacturer
20373 20785	Swift's Pure Bone and Potash	Manufacturer W. S. Overstreet
20374 20748	Swift's Pure Ammoniated Bone.	Manufacturer Farmers Hdw. and Grocery Co...
20375 20641	Swift's Pure Raw Bone Meal..	Manufacturer W. S. Overstreet
20376 20642	Swift's Special Tobacco Fertilizer	Manufacturer Farmers Hdw. and Grocery Co...

Table of Analyses.

Pounds in the Hundred.													
Phosphoric Acid.									Potash				
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.	Nitrogen.	Equivalent to Ammonia.	From Muriat.	From Sulphate.	Estimated Value per Ton.	Station Number.
				7.92	3.03	10.95	2.66	3.23		10.73	$31.57	20368
				8.79	1.94	10.73	2.76	3.35	6.22	3.27	29.75	20638
				8.00		*10.00*	*2.47*	*3.00*		*10.00*	*29.81*	
				9.80	4.20	14.00	1.74	2.11	2.79		21.45	20369
				10.54	2.69	13.23	1.63	1.98	2.29		20.91	20639
				12.00		*13.00*	*1.65*	*2.00*	*2.00*		*21.75*	
				10.17	2.10	12.27			1.95		14.99	20370
				11.00	0.40	11.40			2.00		15.36	20640
				10.00		*11.00*			*2.00*		*14.40*	
13.65	4.08					17.73	4.36	5.29	3.44		29.89	20371
						16.00	*4.74*	*5.75*	*3.00*		*26.82*	
18.64	5.56					24.20	3.58	4.35			28.99	20372
						23.00	*3.71*	*4.50*			*24.93*	
21.35	5.34					26.69	2.19	2.66	3.11		29.96	20373
20.74	5.51					26.25	2.01	2.44	3.65		29.58	20785
						23.50	*2.47*	*3.00*	*3.00*		*24.51*	
17.47	3.84					21.31	4.12	5.00			28.64	20374
13.38	3.35					16.73	5.24	6.36			28.43	20748
						17.00	*4.94*	*6.00*			*25.02*	
20.44	3.89					24.33	4.02	4.88			30.74	20375
16.01	7.53					23.54	4.07	4.94			29.54	20641
						23.00	*3.71*	*4.50*			*24.93*	
				10.49	3.52	14.01	2.53	3.07		3.12	25.33	20376
				9.40	2.09	11.49	2.76	3.35	3.53		23.93	20642
				10.00		*13.00*	*2.47*	*3.00*		*3.00*	*24.21*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	Swift & Co.	
20377	Swift's Kentucky Tobacco Grower	Manufacturer
20643		I. K. Miller & Sons
20378	Swift's Pur Bone Meal and Sulphate of Potash	Manufacturer
	Tennessee Chemical Co., Nashville, Tenn.	
20346	Ox Phosphate	Manufacturer
20347	Ox Potash Mixture	Manufacturer
20348	Ox High Grade Dissolved Bone.	Manufacturer
20349	Ox Special Corn Grower	Manufacturer
20644		T. N. McGlothlin, Irvington
20350	Ox Pride Tobacco Grower	Manufacturer
20645		C. C. Rodus, Berea
20351	Ox High Grade Tobacco and Potato Grower	Manufacturer
20352	Ox Special Tobacco Guano	Manufacturer
20646		Lovell & Grainger, Franklin
20353	Ox Slaughter House Bone	Manufacturer
20647		G. W. Richardson, Somerset
20749		Lebanon Carriage & Implement Co., Lebanon

Table of Analyses.

Pounds in the Hundred.													
Phosphoric Acid.							Nitrogen.	Equivalent to Ammonia.	Potash		Estimated Value per Ton.	Station Number.
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.			From Muriate.	From Sulphate.		
				10.35	3.03	13.38	1.67	2.03		2.10	$21.16	20377
				9.44	0.95	10.39	1.66	2.02	7.63		24.32	20643
				10.00		*13.00*	*1.65*	*2.00*		*2.00*	*20.55*	
20.82	5.87					26.69	2.24	2.72	3.30		30.20	20378
						23.50	*2.47*	*3.00*		*3.00*	*25.11*	
				13.74	1.36	15.10					13.74	20346
		7.00	*5.00*	*12.00*		*13.00*					*12.00*	
				13.99	0.49	14.48				1.81	19.16	20347
		6.00	*4.00*	*10.00*		*11.00*			*2.00*		*14.40*	
				15.95	0.63	16.58					15.95	20348
		8.00	*6.00*	*14.00*		*15.00*					*14.00*	
				9.26	0.63	9.89	1.05	1.27		1.15	15.89	20349
				7.17	2.87	10.04	0.89	1.08		1.37	14.06	20644
		4.00	*3.00*	*7.00*		*8.00*	*0.82*	*1.00*		*1.00*	*12.46*	
				10.24	0.45	10.69	0.86	1.04		1.50	16.85	20350
				9.77	2.00	11.77	1.48	1.80		1.24	18.45	20645
		5.00	*3.00*	*8.00*		*9.00*	*0.82*	*1.00*		*1.50*	*14.26*	
				6.46	2.15	8.61	2.06	2.50		4.87	20.63	20351
		4.00	*3.00*	*7.00*		*8.00*	*1.65*	*2.00*		*4.00*	*18.55*	
				12.23	1.48	13.71	1.81	2.20		1.98	23.08	20352
				10.63	1.56	12.19	1.42	1.72		1.42	19.34	20646
		6.00	*4.00*	*10.00*		*11.00*	*1.65*	*2.00*		*2.00*	*19.75*	
				7.87	1.64	9.51	2.12	2.57		2.13	19.02	20353
				7.01	1.14	8.15	1.94	2.36		2.34	17.50	20647
				9.23	1.64	10.87	1.77	2.15		1.89	19.32	20749
		5.00	*3.00*	*8.00*		*9.00*	*1.65*	*2.00*		*2.00*	*17.35*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	Tennessee Chemical Co.	
20478 20750	Ox Special Wheat Grower.....	Manufacturer ..... I. K. Miller & Son, Campbellsville
20479	Ox Ammoniated Bone	Manufacturer .....
20480	Ox Alkaline Bone	Manufacturer .....
20481	Ox Bone Meal	Manufacturer .....
20482 20751	Ox Raw Bone	Manufacturer ..... Lebanon Carriage & Implement Co .....
20541 20752	Ox Grain Grower	Manufacturer ..... Lebanon Carriage & Implement Co. .....
	Tennessee Valley Fertilizer Co., Florence, Ala.	
20666	Pride of Kentucky	Manufacturer .....
20667	Tiger High Grade Wheat Special	Manufacturer .....
20668	Ashcraft's Special	Manufacturer .....
20669	Ashcraft's Formula	Manufacturer .....
20670	Tiger Potash Guano	Manufacturer .....

Table of Analyses.

Pounds in the Hundred.												
Phosphoric Acid.									Potash			
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.	Nitrogen.	Equivalent to Ammonia.	From Muriate.	From Sulphate.	Estimated Value per Ton.	Station Number.
				6.89	1.62	8.51	1.07	1.30		0.93	$13.25	20478
				8.54	1.37	9.91	0.87	1.06		1.61	15.34	20750
		4.00	*3.00*	*7.00*		*8.00*	*0.82*	*1.00*		*1.00*	*12.46*	
				12.57	1.20	13.77	1.77	2.15		1.97	23.23	20479
		6.00	*4.00*	*10.00*		*11.00*	*1.65*	*2.00*		*2.00*	*19.75*	
				13.96	0.56	14.52				1.90	19.25	20480
		7.00	*5.00*	*12.00*		*13.00*			*2.00*		*16.80*	
29.07						29.07	2.18	2.65			29.80	20481
						20.00	*0.82*	*1.00*			*14.46*	
21.25	4.05					25.30	2.73	3.31			27.62	0482
22.50	3.37					25.87	2.36	2.87			27.10	20751
						20.00	*2.47*	*3.00*			*19.41*	
				8.81	0.95	9.76	0.45	0.55		3.85	16.92	20541
				7.28	1.48	8.76	0.45	0.55	0.86	2.39	14.41	20752
		5.00	*3.00*	*8.00*		*9.00*	*0.41*	*0.50*		*4.00*	*16.03*	
				7.74	2.29	10.03	1.04	1.26	11.10		24.39	20666
				10.00			*0.82*	*1.00*		*4.00*	*19.26*	
				8.94	2.43	11.37	0.98	1.19	12.50		27.14	20667
				10.00			*1.65*	*2.00*		*4.00*	*21.75*	
				9.19	2.26	11.45	1.16	1.41	6.72		22.13	20668
				10.00			*1.65*	*2.00*		*2.00*	*19.35*	
				10.17	1.34	11.51			3.62		16.36	20669
				10.00						*2.00*	*14.40*	
				8.45	2.10	10.55			6.28		17.26	20670
				10.00						*4.00*	*16.80*	

TABLE OF ANALYSES.

Station Number	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	Tuscarora Fertilizer Co., Chicago, Ill.	
22030	Ammoniated Phosphate	Manufacturer
20303	Tuscarora Standard	Manufacturer
20304	Tuscarora Trucker	Manufacturer
20305	Big Four	Manufacturer
20306	Bone and Potash	Manufacturer
20307	Acid Phosphate	Manufacturer
20308	Tuscarora Bone Phosphate	Manufacturer
20309	Tuscarora Raw Bone Meal	Manufacturer
20310	Animal Bone	Manufacturer
20311	Wheat and Corn Grower	Manufacturer
20312	Tobacco Special	Manufacturer
	Virginia-Carolina Chemical Co., Memphis, Tenn.	
20486	Scott's State Standard Guano	Manufacturer

Table of Analyses.

Pounds in the Hundred.													
		Phosphoric Acid.								Potash			
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.	Nitrogen.	Equivalent to Ammonia.	From Muriate.	From Sulphate.	Estimated Value per Ton.	Station Number.
				7.34	1.01	8.35	0.88	1.07	1.21		$13.06	20302
		5.00	*2.00*	*7.00*		*9.00*	*0.82*	*1.00*	*1.00*		*12.66*	
				9.02	1.56	10.58	1.73	2.10	2.28		18.91	20303
		6.00	*2.00*	*8.00*		*10.00*	*1.65*	*2.00*	*2.00*		*17.35*	
				8.21	2.24	10.45	3.98	4.83		6.56	30.56	20304
		6.00	*2.00*	*8.00*		*10.00*	*4.12*	*5.00*		*7.00*	*31.16*	
				7.76	1.30	9.06	1.81	2.20	1.24	3.05	20.16	20305
		5.00	*2.00*	*7.00*		*9.00*	*1.65*	*2.00*		*4.00*	*18.95*	
				10.84	0.55	11.39			1.98		15.21	20306
		6.00	*4.00*	*10.00*		*12.00*			*2.00*		*14.80*	
				16.11	0.52	16.63					16.11	20307
		10.00	*4.00*	*14.00*		*16.00*					*14.00*	
				11.41	0.51	11.92					11.41	20308
		6.00	*4.00*	*10.00*		*12.00*					*10.00*	
19.02	7.03					26.05	3.97	4.82			31.35	20309
						22.00	*3.71*	*4.50*			*24.33*	
23.61	2.92					26.53	3.06	3.71			29.82	20310
						24.00	*2.47*	*3.00*			*21.81*	
				10.86	1.55	12.41	1.62	1.97		2.24	21.20	20311
		6.00	*4.00*	*10.00*		*12.00*	*1.65*	*2.00*		*2.00*	*20.15*	
				9.29	1.06	10.35	1.66	2.02		4.97	22.51	20312
		6.00	*2.00*	*8.00*		*10.00*	*1.65*	*2.00*		*5.00*	*21.35*	
				8.72	1.25	9.97	1.90	2.31	2.50		19.16	20486
		6.00	*2.00*	*8.00*		*10.00*	*1.65*	*2.00*	*2.00*		*17.35*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
20487	**Virginia-Carolina Chemical Co.** National Tobacco Fertilizer....	Manufacturer .....
20499	Beef, Blood and Bone Fertilizer	Manufacturer .....
20648		T. W. Buchanan & Co., Campbellsville .....
20657	Royal Tobacco Fertilizer.....	Manufacturer .....
20658	Champion Corn and Wheat Grower	Manufacturer .....
20659	Capital Bone & Potash Compound	Manufacturer .....
20660	Capital Dissolved S. C. Bone...	Manufacturer .....
20661	Frisco Special Wheat Fertilizer.	Manufacturer .....
20662	Royal Grain Grower	Manufacturer .....
20663	Royal High Grade Guano	Manufacturer .....
	Wood, Stubbs & Co., Louisville, Ky.	
20260	Acme Br. Special Truckers Fertilizer	Manufacturer .....
20261	Acme Br. Wheat and Corn Fertilizer	Manufacturer .....

Table of Analyses.

Pounds in the Hundred.													
Phosphoric Acid.							Nitrogen.	Equivalent to Ammonia.	Potash		Estimated Value per Ton.	Station Number.
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.			From Muriate.	From Sulphate.		
				8.89	2.80	11.69	2.53	3.07	3.95		$23.33	20487
		5.00	*2.00*	*7.00*		*9.00*	*1.65*	*2.00*		*4.00*	*18.95*	
				9.13	2.69	11.82	1.77	2.15	2.28		19.63	20499
				7.55	2.26	9.81	1.66	2.02	2.01		16.95	20648
		6.00	*2.00*	*8.00*		*10.00*	*1.65*	*2.00*	*2.00*		*17.35*	
				9.00	2.58	11.58	2.54	3.08	5.10		24.55	20657
		6.00	*2.00*	*8.00*		*10.00*	*1.65*	*2.00*		*5.00*	*21.35*	
				9.00	2.94	11.94	1.12	1.36	2.55		17.89	20658
		6.00	*2.00*	*8.00*		*10.00*	*0.82*	*1.00*	*2.00*		*14.86*	
				8.93	2.75	11.68			2.36		14.18	20659
		8.00	*2.00*	*10.00*		*12.00*			*2.00*		*14.80*	
				13.53	2.74	16.27					13.53	20660
		10.00	*2.00*	*12.00*		*14.00*					*12.00*	
				9.22	2.65	11.87	2.36	2.87	2.56	3.56	26.03	20661
		6.00	*2.00*	*8.00*		*10.00*	*1.98*	*2.40*		*6.00*	*23.54*	
				8.24	1.25	9.49			4.56		14.95	20662
		8.00	*2.00*	*10.00*		*12.00*				*4.00*	*17.60*	
				11.10	2.75	13.85	1.95	2.37	2.71		22.98	20663
		8.00	*2.00*	*10.00*		*12.00*	*1.65*	*2.00*	*2.00*		*19.75*	
				9.63	0.46	10.09	2.97	3.61	0.86	2.03	23.95	20260
				8.00		*10.00*	*2.47*	*3.00*		*2.00*	*20.21*	
				9.82	0.59	10 41	1.23	1.49		2.54	18.76	20261
				10.00		*12.00*	*0.82*	*1.00*		*2.00*	*17.66*	

TABLE OF ANALYSES.

Station Number.	Name and Address of Manufacturer and Name of Brand.	From Whom Obtained.
	Wood, Stubbs & Co.	
20262	Acme Br. Potato and Tobacco Fertilizer	Manufacturer
20263	Acme Br. Blood, Bone and Potash	Manufacturer
20264	Acme Br. High Grade Vegetable Fertilizer	Manufacturer
20265	Acme Br. Raw Bone Meal	Manufacturer
20266	Acme Br. Steamed Bone Meal	Manufacturer
20267	Acme Br. Complete Grass Grower	Manufacturer

December 31st, 1907

Table of Analyses.

Pounds in the Hundred.												
Phosphoric Acid.									Potash			
In Fine Bone.	In Medium Bone.	Soluble.	Reverted.	Available.	Insoluble.	Total.	Nitrogen.	Equivalent to Ammonia.	From Muriate.	From Sulphate.	Estimated Value per Ton.	Station Number.
				9.15	0.41	9.56	3.04	3.69		6.96	$28.61	20262
				8.00		*10.00*	*2.47*	*3.00*		*6.00*	*25.01*	
				10.82	0.69	11.51	2.27	2.76		2.94	23.60	20263
				10.00		*12.00*	*1.65*	*2.00*		*2.00*	*20.15*	
				10.46	0.81	11.27	3.70	4.49		4.42	29.27	20264
				10.00		*12.00*	*3.29*	*4.00*		*4.00*	*27.47*	
15.26	5.93					21.19	3.79	4.60			27.14	20265
						22.00	*3.29*	*4.00*			*23.07*	
21.22	7.45					28.67	2.21	2.68			28.08	20266
						28.00	*2.47*	*3.00*			*24.21*	
				5.27	11.53	16.80	4.22	5.12	6.11		29.70	20267
				16.00			*4.12*	*5.00*	*7.00*		*38.56*	

M. A. SCOVELL, Director and Chemist.
H. E. CURTIS, Chemist, Fertilizers.
GEORGE ROBERTS, Assistant Chemist.

Division of Chemistry

ANALYSES OF MINERAL WATERS

by

S. D. Averitt and O. M. Shedd.

BOURBON COUNTY.

17507—Chalybeate water, brought March 29, 1907, by I. F. Chanslor, Sr., Millersburg, Ky., from a spring on his farm one-half mile south of that place.

ANALYSIS.

One gallon contains 30.3 grains of solid matter (0.52 grams per liter), composed of calcium carbonate, magnesium carbonate and ferrous carbonate, with a very little sodium chloride, potassium chloride, and silica.

It is a good chalybeate water of moderate strength.

CALDWELL COUNTY.

17745—Mineral water, sent by Thomas H. Mott, Crider, Ky., from a well 11 feet deep, dug 30 years ago. The water is said to act freely on the kidneys.

ANALYSIS.

One gallon contains 185.2 grains of solid matter (2.456 grams per liter), composed of magnesium sulphate, calcium carbonate, sodium chloride, and calcium sulphate. There are also traces of ferrous carbonate, potassium sulphate, and silica.

Magnesium sulphate is present in sufficient quantity to render it diuretic, and mildly laxative.

It would be classed as a magnesia water.

CASEY COUNTY.

17817—Supposed mineral water, brought August 20, 1907, by John W. Bates, Middleburg, Ky., from well of J. J. Hogue at Evona. The well was dug several years ago.

Analysis.

One gallon contains 17.5 grains of solid matter (0.3 gram per liter), composed of sodium chloride, calcium carbonate, magnesium carbonate, with traces of ferrous carbonate, potassium sulphate, and silica.

It is about the same in mineral matter as the average well water and should be a good water for domestic purposes.

CHRISTIAN COUNTY.

17622—Sulphur water, sent by D. L. Lander, Salubria Springs, Pembroke, Ky., June 12, 1907, from a spring near that place.

Analysis.

One gallon contains 128. grains of solid matter (2.196 grams per liter), composed of sodium chloride, magnesium chloride, calcium carbonate, magnesium sulphate, also traces of ferrous carbonate, sodium sulphide, potassium chloride, sodium iodide, sodium bromide, lithium carbonate, and silica.

The total hydrogen sulphide, both free and combined, is 3.02 grains per gallon (0.052 gram per liter).

This is a saline sulphur water, and would probably have some medicinal value.

17891—Mineral water, sent, November 2, 1907, by Sam Fleming, Hopkinsville, Ky., from a well recently dug one-quarter mile east of the city, near the asylum.

Analysis.

One gallon contains 24.5 grains of solid matter (0.421 gram per liter), composed of sodium carbonate, calcium carbonate,

sodium chloride, magnesium carbonate, with traces of ferrous carbonate, strontium carbonate, potassium sulphate and silica.

This is a moderately alkaline water, and may possess some medicinal value as such.

FAYETTE COUNTY.

17475—Mineral water, sent in March, 1907, by David H. James, Lexington, Ky., from a well 123 feet deep on his farm 7 miles west of that place.

Analysis.

One gallon contains 46. grains of solid matter (0.739 gram per liter), composed of sodium chloride, calcium carbonate, magnesium carbonate, with traces of potassium sulphate, ferrous carbonate, zinc carbonate and silica.

It contains more mineral matter than the average well water of this region. The constituents are those generally found in such waters as the so-called "Lexington Lithia" water, which have been used medicinally with good results.

17540—Water from the same well as 17475 sent by David James, April 24, 1907.

Analysis.

	Grams per Liter.	Grains per Gallon.
Total solids	0.356	20.8
Ignited solids	0.279	16.3
Organic and volatile matter	0.077	4.5
Chlorine	0.090	5.2
Nitrogen of Nitrites	.25 part per million	
Nitrogen of Nitrates	4. parts per million	
Free ammonia	A trace	
Sulphates	Small	
Calcium	Small	
Magnesium	Very small	

This analysis shows that the water is much weaker in mineral matter than when first analyzed.

17569—Mineral water, sent by James Kearns, Lexington, Ky., May 9, 1907.

ANALYSIS.

One gallon contains 43.4 grains of solid matter (0.745 gram per liter), composed of sodium chloride, sodium carbonate, calcium carbonate, a little magnesium carbonate, potassium sulphate, and silica; also traces of iron, lithium and strontium, probably as carbonates, and a trace of sodium bromide.

The water is alkaline in character, and should be a good table water.

17572—Water from a spring on the farm of E. R. Bradley, 6 miles from Lexington, on the Old Frankfort pike, Idle Hour Stock Farm. Sample brought May 14, 1907.

ANALYSIS.

	Grams per Liter.	Grains per Gallon.
Calcium Carbonate	0.1545	9.0
Magnesium carbonate	0.0146	.9
Sodium chloride	0.0082	.5
Sodium sulphate	0.0133	.8
Silica	0.0074	.4
Total	0.1980	11.6
Total solids at 100° C	0.2230	13.0
Ignited solids	0.1750	10.2

17574—Sulphur water, sent, May 21, 1907, by Mrs. A. E. McKenzie, Lexington, Ky., from a well 90 feet deep, one-quarter mile from city limits, on the Georgetown pike.

ANALYSIS.

One gallon contains 63.9 grains of solid matter (1.096 grams per liter), composed of sodium chloride, sodium carbonate, calcium carbonate, magnesium chloride. There are traces of ferrous carbonate, potassium sulphate, lithium carbonate, sodium sulphide, and silica.

The water is strongly alkaline, due to the sodium carbonate present. This is an alkaline sulphur water, hydrogen sulphide, free and combined, being present to the extent of 2.7 grains per gallon.

17575—Mineral water, sent, May 23, 1907, by J. Will Stoll, Lexington, Ky., from a well 122 feet deep, at the Country Club, about 3 miles northeast of the city, on the Maysville road.

ANALYSIS.

One gallon contains 185.4 grains of solid matter (3.18 grams per liter), consisting of sodium chloride, sodium carbonate, small amounts of calcium carbonate and magnesium carbonate, with traces of potassium sulphate, sodium iodide, sodium bromide, ferrous carbonate, lithium and strontium carbonate, and silica.

This is a moderately strong alkaline saline water.

17867—Water from a spring near Greendale, brought, October 8, 1907, by H. E. Curtis, Lexington, Ky.

ANALYSIS.

One gallon contains 18.3 grains of solid matter (0.312 gram per liter), composed of sodium chloride, sodium carbonate, calcium carbonate, and small amounts of magnesium carbonate, calcium sulphate, and ferrous carbonate. There are traces of potassium sulphate, lithium carbonate, and silica.

The water is strongly alkaline, due to the sodium carbonate present, which is an unusual constituent of spring waters in this locality.

FRANKLIN COUNTY.

17913—Mineral water sent, in December, 1907, by Dr. R. B. Gwinn, Elmville, Ky. The source of the water was not given, probably a well near that place.

Analysis.

One gallon contains 192.4 grains of solid matter (3.3 grams per liter), composed of magnesium sulphate, calcium carbonate, and sodium chloride, with traces of ferrous carbonate, potassium sulphate, lithium carbonate, and silica.

This is a slightly alkaline magnesian water. It would doubtless prove laxative and diuretic.

GRANT COUNTY.

17829—Mineral water, brought, August 3, 1907, by Dr. W. B. Robinson, Corinth, Ky., from a spring on his farm in Grant county, on the Q. & C. Ry., near the Scott and Harrison county lines. There is an abundant flow of water, and it has been used with beneficial results in stomach and bowel troubles.

Analysis.

	Grams per Liter.	Grains per Gallon.
Total solid matter	2,558	148.1
Ignited solid matter	2.068	120.6
Organic and volatile matter	0.490	27.5

Chloride, moderate; a considerable amount of sulphate; a moderate amount of calcium, and a good deal of magnesium.

This water doubtless has enough magnesium sulphate to be classed as a magnesium water, and it should be a laxative in effect. It resembles the Beechwood water in composition.

JEFFERSON COUNTY.

17568—Mineral water sent by A. R. Burkhart, Fisherville, Ky.,

in May, 1907, from a well 40 feet deep, at that place and near the "Blue Rock" sulphur well. The water foams badly in his boilers.

ANALYSIS.

	Grams per Liter.	Grains per Gallon.
Total solids at 100° C.	0.782	45.6
Ignited solids	0.639	37.3
Organic and volatile matter	0.143	8.3

The mineral matter is composed of sodium chloride, sodium carbonate, calcium carbonate, a little magnesium carbonate and potassium sulphate, and traces of sodium bromide and lithium carbonate. The total alkalinity is equivalent to .162 gram of calcium carbonate per liter. It should not have any corrosive action nor produce a hard scale if the boilers are properly cared for. The sodium carbonate present is the probable cause of the foaming. It should be a good drinking water, provided the source is not liable to contamination, and may have some medicinal value.

JESSAMINE COUNTY.

17795—Mineral water, from a well at Keene, Ky., belonging to Mrs. John Frost. The well is about 75 feet deep, with a strong flow. Sample brought August 6, 1907.

ANALYSIS.

One gallon contains 23.8 grains of solid matter (0.408 gram per liter), composed of sodium chloride, calcium carbonate, magnesium carbonate, sodium carbonate, and traces of iron, zinc, lithium and strontium, probably as carbonate; also traces of potassium sulphate and silica.

This is an alkaline saline water and should have some medicinal properties. It would be a good table water, especially if carbonated.

17796—Sulphur water, sent by G. W. Sandusky, Keene, Ky., in

August, 1907, from a well 113½ feet deep, at that place.

ANALYSIS.

One gallon contains 215. grains of solid matter (3.687 grams per liter), composed of sodium chloride, calcium carbonate, magnesium carbonate, a little ferrous carbonate, lithium carbonate, sodium bromide, potassium sulphate, and zinc sulphide. The water also contains 0.35 grain of hydrogen sulphide to the gallon (.006 gram per liter). The quantity of zinc in the water was quite notable.

It is a weak alkaline saline sulphur water.

17831—Another sample from the same well as No. 17796, brought by G. W. Sandusky, Geene, Ky., September 9, 1907.

ANALYSIS.

One gallon contains 218. grains of solid matter (3.74 grams per liter). The analysis is practically a duplicate of No. 17796.

LEWIS COUNTY.

17861—Mineral water, brought by P. B. Huffman, from a spring on his farm, near Petersville, Ky. It is thought to be a magnesium water.

ANALYSIS.

One gallon contains 149.6 grains of solid matter (2.566 grams per liter), composed of magnesium sulphate, sodium sulphate, calcium carbonate, magnesium carbonate, and sodium chloride. There are traces of potassium sulphate, ferrous carbonate, strontium carbonate, and silica. The water is distinctly alkaline.

This is an alkaline magnesium water, containing sufficient magnesium sulphate to render it laxative.

LIVINGSTON COUNTY.

17877—Black sulphur water sent in October, 1907, by Hade Nelson, Hampton, Ky., from a spring on his farm.

Analysis.

One gallon contains 111.4 grains of solid matter (1.911 grams per liter), composed of magnesium sulphate, calcium carbonate, sodium sulphate, sodium chloride, with a small quantity of ferrous carbonate. There are traces of potassium sulphate, lithium and strontium carbonates, and silica. There is 0.5 grain of free hydrogen sulphide per gallon.

This is a weak sulphur water, containing a little iron.

OWEN COUNTY.

17453—Beechwood water, from the Beechwood well in Owen county, brought by M. B. Forwood about February 21, 1907.

Analysis.

Ignited solids 259.6 grains per gallon (4.452 grams per liter).

17862—Same water as 17453. Sample taken October 2, 1907. The well, at this time, was low.

Analysis.

	Grams per Liter.	Grains per Gallon.
Ignited solids	3.308	192.9
Chlorine	.052	3.0
Equivalent to sodium chloride	.086	5.0
Calcium carbonate by titration	.50	29.0

This water varies in strength as noted in the Nineteenth Report (page 272).

SCOTT COUNTY.

17844—Mineral water from the Sadieville public well, on Main

street, 150 feet east of mile post 54 on the C. N. O. & T. P. Ry. The well is 192 feet deep, the water standing about 80 feet in the well. Sent in September, 1907.

ANALYSIS.

One gallon contains 63.9 grains of solid matter (1.096 grams per liter), composed of sodium chloride, sodium carbonate, with small amounts of calcium carbonate and magnesium carbonate, There are also traces of iron; silica, zinc, potassium chloride, lithium carbonate and sodium bromide.

This is a weak alkaline saline water.

17860—Salt water, brought September 28, 1907, by M. B. Forwood, Georgetown, Ky. Water from a well 170 feet deep recently bored at the new creamery, Stamping Ground, Ky.

ANALYSIS.

One gallon contains 466.6 grains of solid matter (8.003 grams per liter), composed of sodium chloride, calcium carbonate, magnesium carbonate and calcium sulphate, with small amounts of iron, lithium and strotium, probably as carbonates; also traces of potassium sulphate, sodium bromide, sodium borate and silica.

This is a moderately strong salt water.

17462—Mineral water, sent by J. H. DeGaris, Georgetown, Ky., in March, 1907, from a well 700 feet deep, one mile northeast of Georgetown.

ANALYSIS.

One gallon contains 161.3 grains of solid matter (2.767 grams per liter), consisting of sodium chloride, sodium sulphate, calcium carbonate, magnesium carbonate, with traces of potassium sulphate, ferrous carbonate, lithium and strontium carbonates and silica. The water also contains 1.2 grains hydrogen sulphide per gallon (.02 gram per liter).

This would be classed as a saline sulphur water.

17868—Salt water sent October, 1907, by John S. Hunter, Georgetown, Ky. The water is from a well drilled 15 years ago at Long Lick, 12 miles northwest of Georgetown. The well is 160 feet deep.

ANALYSIS.

One gallon contains 635.6 grains of solid matter (10.902 grams per liter), composed of sodium chloride, calcium carbonate, magnesium chloride, sodium sulphate. There are small amounts of ferrous carbonate and sodium bromide, also traces of potassium sulphate, lithium carbonate, and silica.

This is a rather strong salt water, with sufficient iron to render it weakly chalybeate.

17876—Salt sulphur water brought, October 23, 1907, by W. W. Blackford, Stamping Ground, Ky., from a well about 200 feet deep at that place.

ANALYSIS.

One gallon contains 605.7 grains of solid matter (10.38 grams per liter), composed of sodium chloride and sodium carbonate, with small amounts of calcium carbonate, magnesium carbonate and sodium sulphide. There are traces of potassium sulphate, lithium and strontium carbonates, sulphide of iron, sodium borate, and silica. The hydrogen sulphide, free and combined, in the sulphides amounts to 3. grains per gallon (.052 gram per liter). This is a strong salt-sulphur water, somewhat like "Blue Lick," containing about the same amount of solid matter, but much less calcium and magnesium.

WARREN COUNTY.

17832—Salt sulphur water from a well bored in the summer of 1907 on one of the school lots in Warren county. Sent by Dr. Souther, Oakland, Ky., September 2, 1907.

ANALYSIS.

	Grams per Liter.	Grains per Gallon.
Calcium sulphate	2.937	171.4
Magnesium sulphate	1.061	61.9
Magnesium chloride	1,864	108.7
Sodium chloride	13.250	772.3
Potassium chloride	0.164	9.6
Sodium sulphide	0.880	51.3
Silica	0.009	0.5
Total solid matter	20.165	1175.7

The water contains, also, notable quantites of iodides and bromides, traces of borates and phosphates, a little iron and zinc and traces of strontium and lithium. It is a very strong alkaline saline sulphur water.

Meteorological Summaries

FOR THE YEAR 1907.

Compiled from the records of the U. S. Weather Bureau Station in the main college building.

PRESSURE.

Elevation of the Barometer Cistern Above Mean Sea Level, December 31, 989 feet.

Months.	Monthly In.	Highest Observ'd In.	Date	Lowest Observ'd In.	Date	Absolute Range In.
January	29.14	29.54	21	28.70	12	.84
February	29.05	29.47	23	28.62	19	.85
March	29.03	29.37	16	28.75	13	.62
April	28.91	29.42	1	28.57	23	.85
May	28.95	29.34	21	28.65	15	.59
June	28.89	29.23	17	28.43	2	.80
July	28.94	29.10	18	28.82	29	.28
August	28.99	29.24	14	28.84	1	.40
September	28.99	29.30	15	28.69	24	.61
October	29.09	29.35	14	28.83	27	.51
November	29.04	29.28	12	28.61	2	.67
December	28.97	29.40	5	28.25	23	1.15
	Mean	Highest		Lowest		Mean
	29.00	29.54	Jan. 21.	28.25	Dec. 23.	.68

PRECIPITATION.

(Amount in inches and hundredths.)

Elevation of top of gauge above ground, December, 68 feet.

MONTH.	Total Amount.	Greatest Amount in any 24 consecutive hours.		No. days on which .01 in. or more fell.	No. days on which no rain, except "Trace," fell.	Greatest No. of consecutive days without rainfall (dates inclusive).	Normal rainfall.
		Am't.	Date.				
January	9.06	1.77	14—15	17	3	4	3.83
February	1.89	0.96	23—24	9	6	6	3.23
March	4.13	1.56	13—14	11	4	14	4.72
April	1.83	0.76	23	15	3	3	3.34
May	3.89	1.01	5— 6	16	2	3	3.52
June	3.65	1.08	12—13	13	4	5	3.99
July	4.42	1.30	11—12	12	3	8	4.44
August	2.07	0.66	16—17	11	2	5	3.57
September	2.72	1.60	2— 3	5	4	17	2.42
October	2.76	1.33	3— 4	7	3	18	2.22
November	2.67	1.02	1— 2	9	5	14	3.48
December	2.28	1.09	22—23	16	2	4	3.32
Total	41.37	.....	.....	141	41	.....	42.08

NUMBER OF DAYS.

MONTHS.	Thunder Storms	Snows	Hail	Fog
January	3	2	0	2
February	0	5	0	1
March	3	3	0	0
April	4	3	0	0
May	4	0	1	1
June	15	0	1	0
July	10	0	0	0
August	9	0	0	1
September	6	0	1	3
October	0	0	0	0
November	0	1	0	2
December	0	7	0	0
Summary	54	21	3	10

CLOUDINESS.

MONTHS	Mean Cloudn's (0 to 10)		Character of Day.		
	8 A. M.	Monthly	Clear	Partly Clo'dy	Clo'dy
January	8.3	7.1	7	6	18
February	6.2	6.2	9	7	12
March	6.7	4.3	16	7	8
April	6.5	5.4	11	7	12
May	5.8	3.7	20	5	6
June	6.2	3.4	20	4	6
July	4.8	3.3	20	8	3
August	5.5	4.8	11	13	7
September	5.0	4.2	15	8	7
October	4.5	5.0	14	3	14
November	5.5	6.1	8	8	14
December	7.4	8.4	3	4	24
Summary	.....	.....	154	80	131
Mean	6.0	5.2	.....	.....	.....

WIND.

Elevation of the Anemometer Cups above ground Dec. 31, 102 feet.

MONTHS.	Prevailing Direction.	Maximum hourly velocity during month.			No. of days with gales *	No. of Calms
		Miles	From	Date		
January	S.	54	S. W.	19	4	0
February	N. W.	46	W.	14	1	0
March	S. W.	57	N. W.	1	1	0
April	N. E.	50	W.	7	3	0
May	S. W.	36	N. W.	27	0	0
June	S. W.	48	N.	7	1	0
July	S. W.	46	N. W.	10	1	0
August	W.	37	S.	16	0	0
September	S. W.	30	W.	28	0	0
October	S. W.	32	N. W.	8	0	0
November	N. W.	37	S.	1	0	1
December	W.	48	W.	30	1	0
Mean	S.	.....	.....	.....	.....	.....

*Days with 40 miles per hour and over.

TEMPERATURE.

MONTHS.	Elevation of the Dry Thermometer Bulb Above Ground Dec. 31st, 75 Feet. From Self-Registering Instruments. Mean. Max.	Mean. Min.	Mean. Monthly	Highest	Date.	Lowest.	Date.	Range. Absolute.	Range. Mean daily.	Mean daily change.	No. of Days. Max. below 32 degrees.	Max. above 90 degrees.	Min. below 32 degrees.	Normal Monthly Temperature.
January	49.2	31.5	40.4	68	19	1	27	67	18	9	4	0	15	33
February	40.4	24.5	32.4	65	13	7	6	58	16	7	9	0	21	36
March	60.6	42.4	51.5	83	28	24	6	59	18	7	0	0	9	43
April	53.7	36.9	45.3	78	29	23	2	55	17	7	0	0	9	54
May	68.7	49.5	59.1	83	23	37	5	46	19	7	0	0	0	64
June	77.1	60.2	68.6	88	18	51	3	37	17	4	0	0	0	73
July	84.8	66.2	75.5	92	9	56	3	36	18	3	0	7	0	77
August	81.6	64.0	72.8	90	12	56	4	34	18	3	0	0	0	75
September	77.5	58.5	68.0	89	19	42	26	47	19	4	0	0	0	68
October	63.4	43.5	53.4	83	3	30	29	53	20	6	0	0	1	56
November	49.7	34.8	42.2	67	8	25	13	42	15	4	0	0	10	45
December	43.9	29.5	36.7	62	27	17	5	45	14	5	4	0	23	36
Mean	62.6	45.1	53.8	Max. 92	July 9	Min. 1	Jan 27	48	17	5	17	7	88	For year 55

INDEX

Adams Fund, receiptts and expenditures ..... vi, viii
work of ix
Adulterants of feeding stuffs xxvi
Analyses of commercial feeding stuffs collected in 1906-7 xxvi
commercial fertilizers in 1907 120-195
of mineral waters 197-208
Auditing Committee, report of vi
Bates, John W., analysis of mineral water from 198
Beechwood Well, analysis of water from 205
Blackford, W. W., analysis of mineral water from 207
Board of Control of the Experiment Station v
Board of Trustees of the A. & M. College iii
Bourbon County, analysis of mineral water from 197
Bradley, E. R., analysis of mineral water from 200
Bulletins available for distribution 47
Bulletin, 129—Tobacco 3
130—Food of the Crow Blackbird, corn root-worms 17
131—Concentrated commercial feeding stuffs 49
132—Analyses of commercial fertilizers 109
Burkhart A. R., analysis of mineral water from 202
Caldwell County, analysis of mineral water from 197
Casey County, analysis of mineral water from 198
Certificate for free analysis of feeding stuffs 68
for free analysis of fertilizers 116
Chanslor, I. F., chalybeate water from 197
Chemical Division, work of ..... xi, 197
Christian County, analyses of mineral water from 198
Commercial feeding stuffs, analyses of samples collected in 1906-7 ..... 70- 95
free analyses for consumers 68
materials from which made 65- 67
registered in 1907 96-107
Commercial fertilizers, analyses of samples collected in 1907 120-195
Bulletin 132, analyses of 111
free analyses for purchasers 116
how to take samples for analysis 116
importance of plant food in 111
number of brands on sale 111
number of samples analyzed 111
results of the analyses 112
value of constituents of 118
Concentrated commercial feeding stuffs law 53
Concentrated commercial feeding stuffs, Bulletin 131 on 51
Condimental stock and poultry foods xxvi
Convictions under the food law xviii
Corn root-worms 42
life history of 45
Country Club, analysis of mineral water from 201
Crow 21- 35
Crow blackbird, beetles eaten by 30
bulletin on, by H. Garman 19
opinions of farmers on 34
vegetable food eaten 33
Curtis, H. E., analysis of mineral water from 201
Bulletin 132, commercial fertilizers, by 111
De Garis, J. H., analysis of mineral water from 206
Diabrotica 12 punctata and D. longicornis 42
Division of chemistry, work of xi
agronomy, work of xiii
animal husbandry, work of xiii
entomology and botany, work of xi
feed control, work of xiv
fertilizer control, work of xiii
food control, work of xiv
English sparrow, destructiveness of 21

Fayette County, analyses of mineral water from 199-200-201
Feeding stuffs, adulterants 60
classification of 65
composition of 63, 65-67, 70- 95
essential ingredients of 57
function of nutrients in 63
how to buy 58
method of inspection 61
standards of composition 59
system of tagging 59
Feeding stuffs law 53
necessity of 51
objects of 57
report on the enforcement of xxv
Feeding stuffs registered for sale in 1907 96-107
Fleming Sam, analysis of mineral water from 198
Food of Crow Blackbird 19, 24
Foods inspected and analyzed xvii
Food law, report on the enforcement of ..... xvi-xxv
Food standards adopted xxiii
Forwood, M. B., analysis of mineral water from 205-206
Franklin County, analysis of mineral water from 202
Frost, Mrs. John, analysis of mineral water from 203
Garman, H., Bulletin 130, Crow Blackbird and corn root-worm 19
Grant County, analysis of mineral water from 202
Gwinn, R. B., analysis of mineral water from 202
House-burn of tobacco 13
Huffman, P. B., analysis of mineral water from 204
Hunter, John S., analysis of mineral water from 207
Improvements at the Station x
Insects eaten by the Crow Blackbird 30
James, David H., analysis of mineral water from 199
Jefferson County, analysis of mineral water from 202
Jessamine County, analyses of mineral water from 203-204
Kearns, James, analysis of mineral water from 200
Labeling of foods xxi
Lander, D. L., analysis of sulhpur water from 198
Letter of transmittal iv
Lewis County, analysis of mineral water from 204
List of bulletins available for distribution 47
Livingston County, analysis of mineral water from 205
Manufacturers of feeding stuffs registered in 1907 96-107
Meteorological summaries for 1907 209-212
Mineral waters, analyses of 197-208
Mott, Thomas H., analysis of mineral water from 197
Nelson, Hade, analysis of sulphur water from 205
Officers of the Experiment Station v
Owen County, analysis of mineral water from 205
Paris green, use of on tobacco 12
Publications issued in 1907 x
Quiscalus quiscula, food of 19, 24
Rainfall recorded in 1907 210
Report of the Auditing Committee vi
of the Director viii
on the enforcement of the feeding stuffs law xxv
on the enforcement of the State food law xvi
Roberts, George, Bulletin 132, commercial fertilizers by 111
Robinson, W. B., analysis of mineral water from 202
Sadieville public well, analysis of water from 205
Salubria Springs, analysis of water from 198
Sandusky, G. W., analysis of sulphur water from 204
Scherffius, W. H., Bulletin 129 on tobacco, by 3
Scott County, analyses of mineral water from 205-207
Scovell, M. A., Bulletin 132, commercial fertilizers, by 111
Souther, Dr., analysis of sulphur water from 207
Standards of purity of foods xxiii
Station staff ..... v, xvi
Stoll, J. Will, analysis of mineral water from 201
Tagging of feeding stuffs xxvii
Temperature record in 1907 212

Tobacco, amount produced 5
breeding 5
Bulletin No. 129, on 3
elimination of undesirable varieties 15
house burn of 13
improved methods for handling the crop 10
protecting seed heads from cross fertilization 6
seed separator for grading seed 10
selection of seed plants and care of seed 5
structure of the flower 8
use of Paris green on 12
uses for the kinds raised in Kentucky 3, 4
Trustees of the A. & M. College iii
Turner, J. D., bulletin on feeding stuffs, by 51
U. S. appropriations, receipts and expenditures under ..... vi, viii
Warren County, analysis of mineral water from 207
Weather record in 1907 209-212
Work of the Station viii