

OCTOBER, 1916.

INSPECTION CIRCULAR No. 3.

AGRICULTURAL EXPERIMENT STATION.  
KANSAS STATE AGRICULTURAL COLLEGE.

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DEPARTMENT OF CHEMISTRY,

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**Analyses of Inspection Samples of Fertilizers, 1915-1916.**

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THIS circular includes a statement of the results of analyses of inspection samples of fertilizers not previously reported, with some comment thereon, financial report bringing the exhibit up to June 30, 1916, and a reprint of the Kansas fertilizer law.

The accompanying table shows the results of analyses of inspection samples of fertilizers. Results found which are more than one-fifteenth below the guaranty are printed in bold-faced type. Examination of these results shows that manufacturers, apparently, are attempting in good faith to conform to the provisions of the law. A departure from the guaranty of one-fifteenth or less is, under the law, not regarded as evidence of fraudulent intent, but the manufacturer is liable to the user for damages.

The samples Nos. 206, 207 and 208 were taken in September, 1914. Sample No. 341 was taken in March, 1915. The results upon these should have been published in Inspection Circular No. 1, but were omitted by oversight. Samples Nos. 301 to 340 were taken in November, 1915, and samples Nos. 342 to 374, from February to April, 1916.



TABLE I. RESULTS OF ANALYSES OF

BRANDS AND MANUFACTURERS.	Name of seller, and place sampled.	Minimum percentage of total nitrogen.	
		Found.	Guaranteed.
ARMOUR PACKING CO.			
354 Armour's Ammoniated Phosphate . . . . .	Armour Packing Co., Kansas City . . . . .	1.57	1.65
351 Armour's New Record Brand . . . . .	Armour Packing Co., Kansas City . . . . .	1.02	.82
365 Armour's New Record Brand . . . . .	Pittsburg Modern Milling Co., Pittsburg, . . . . .	1.01	.82
333 Armour's 1-12-1 Fertilizer . . . . .	J. H. Rust, Altamont . . . . .	.95	.82
352 Armour's Special Grain Grower . . . . .	Armour Packing Co., Kansas City . . . . .	1.71	1.65
373 Armour's Special Grain Grower . . . . .	Pittsburg Modern Milling Co., Pittsburg, . . . . .	1.59	1.65
318 Helmet Brand Ammoniated Dis- solved Bone and Potash . . . . .	J. H. Rust, Altamont . . . . .	1.84	1.65
319 Helmet Brand Ammoniated Dis- solved Bone and Potash . . . . .	E. M. Stice, Oswego . . . . .	1.98	1.65
320 Helmet Brand Ammoniated Dis- solved Bone and Potash . . . . .	Pittsburg Modern Milling Co., Pittsburg, . . . . .	1.77	1.65
321 Helmet Brand Ammoniated Dis- solved Bone and Potash . . . . .	W. S. Randle, Hutchinson . . . . .	1.71	1.65
308 Helmet Brand Fine Ground Beef Bone . . . . .	E. M. Stice, Oswego . . . . .	2.59	2.47
358 Helmet Brand Fine Ground Beef Bone . . . . .	Pittsburg Modern Milling Co., Pittsburg, . . . . .	2.88	2.47
342 Helmet Brand Fine Ground Beef Bone . . . . .	Armour Packing Co., Kansas City . . . . .	2.74	2.47
334 Helmet Brand No. 282 Fertilizer . . . . .	F. H. Porter, Columbus . . . . .	1.52	1.65
301 Helmet Brand Raw Bonemeal . . . . .	F. H. Porter, Columbus . . . . .	3.89	3.71
302 Helmet Brand Raw Bonemeal . . . . .	E. K. Gibbs, Hallowell . . . . .	3.61	3.71
343 Helmet Brand Raw Bonemeal . . . . .	Armour Packing Co., Kansas City . . . . .	4.13	3.71
366 Helmet 16 per cent Phosphate . . . . .	Pittsburg Modern Milling Co., Pittsburg, . . . . .		
CONTINENTAL FERTILIZER CO.			
332 1-12-1 Fertilizer . . . . .	A. M. Smith, Girard . . . . .	1.45	.82
EMPIRE CARBON WORKS.			
361 Bone Black Fertilizer No. 2 . . . . .	H. L. Jacqueth, Galena . . . . .	2.18	2.06
337 Empire Farmer's Favorite . . . . .	Baxter Mill & Elevator Co., Baxter . . . . .	1.09	.82
374 Empire Farmer's Favorite . . . . .	H. L. Jacqueth, Galena . . . . .	1.01	.82
340 Empire Heavy Crop . . . . .	H. L. La Duex, Stillwell . . . . .	1.91	1.65
338 Empire Middle West Grain Grower . . . . .	H. L. Jacqueth, Galena . . . . .	2.02	1.65
304 Empire Pure Raw Bonemeal . . . . .	A. M. Smith, Girard . . . . .	3.71	3.29
305 Empire Pure Raw Bonemeal . . . . .	Baxter Mill & Elevator Co., Baxter . . . . .	3.88	3.29
HULL AND DILLON.			
339 Enterprise Brand . . . . .	Hull & Dillon Packing Co., Pittsburg . . . . .	6.21	6.74
357 Enterprise Brand . . . . .	Hull & Dillon Packing Co., Pittsburg . . . . .	5.49	6.74
MORRIS & CO.			
317 Steamed Bonemeal . . . . .	Charles Henderson, Hallowell . . . . .	1.35	.82
350 Steamed Bonemeal . . . . .	Morris & Co., Kansas City . . . . .	.88	.82
206 Steamed Bonemeal . . . . .	John Jarvis, Columbus . . . . .	.96	.82
207 Steamed Bonemeal . . . . .	O. A. Rhodes, Columbus . . . . .	.81	.82
208 Steamed Bonemeal . . . . .	Car 38725, D. L. & W., K. C. . . . .	.68	.82

INSPECTION SAMPLES OF FERTILIZERS.

Soluble in water.		Minimum percentage of phosphorus in phosphates.				Total.		Minimum percentage of potassium in compounds soluble in water.		Maximum percentage of chlorine in compounds soluble in water.	
Found.	Guar-anteed.	Found.	Guar-anteed.	Found.	Guar-anteed.	Found.	Guar-anteed.	Found.	Guar-anteed.	Found.	Guar-anteed.
2.61		1.88	4.37	.71	.22	5.20	4.59				
2.63		1.72	4.37	.47	.22	4.82	4.59	.89	.83	.30	
2.44		1.72	4.37	.58	.22	4.74	4.59	1.14	.83	.20	
4.16		1.97	5.24	.31	.22	6.44	5.46	.72	.83	1.10	
2.10		1.86	3.49	.50	.22	4.46	3.71	.68	.83	.30	
2.36		1.28	3.49	.54	.22	4.18	3.71	.98	.83	.40	
2.78		1.46	4.37	1.00		5.24	4.37	1.86	1.66	1.90	1.65
3.54		1.29	4.37	.83		5.66	4.37	1.55	1.66	1.80	1.65
3.26		1.49	4.37	.55		5.30	4.37	1.57	1.66	1.90	1.65
3.40		1.42	4.37	.72		5.54	4.37	1.69	1.66	1.90	1.65
			2.62		7.86	10.60	10.48				
			2.62		7.86	11.45	10.48				
			2.62		7.86	11.55	10.48				
2.10		1.58	3.49	.60		4.28	3.49	1.76	1.66	1.80	1.65
			2.18		8.30	10.32	10.48				
			2.18		8.30	10.08	10.48				
			2.18		8.30	10.05	10.48				
1.80		5.30	6.99	.40	.22	7.50	7.21				
3.70		1.94	5.24	.42	.22	6.06	5.46	.94	.83	1.20	
2.53		.95	3.49	.80	.27	4.28	3.76	.49		.30	
2.71		1.94	4.37	.75	.22	5.40	4.59	.86	.83	1.00	
2.68		1.23	4.37	.90	.22	4.81	4.59	1.02	.83	1.10	
2.43		1.32	3.49	.39	.87	4.14	4.37	2.34	2.49	2.80	
3.43		1.29	4.80	1.10	.22	5.82	5.02	.65	.83	1.10	
						9.40	8.73				
						10.15	8.73				
.20	Trace.	3.15	2.95	2.31	1.07	5.66	4.02	.13	.44	.20	
.14	Trace.	3.03	2.95	2.39	1.07	5.56	4.02	.13	.44	.20	
						14.50	13.97				
						14.25	13.97				
						13.68	13.97				
						13.86	13.97				
						13.67	13.97				

TABLE I—

BRANDS AND MANUFACTURERS.	Name of seller, and place sampled.	Minimum percentage of total nitrogen.	
		Found.	Guaranteed.
SULZBERGER & SONS CO.			
870 "S & S" Corn and Oat Grower . . . . .	R. M. Gilman, Baxter . . . . .	.85	.82
871 "S & S" Corn and Wheat Special . . . . .	R. M. Gilman, Baxter . . . . .	1.60	1.65
815 "S & S" Raw Bonemeal and Plant Potash.	Farmers' Union Cooperative Association, Girard.	1.74	1.65
316 "S & S" Raw Bonemeal and Plant Potash.	Jacqueth & Gilman, Baxter . . . . .	1.81	1.65
348 "S & S" Raw Bonemeal and Plant Potash.	J. C. Ebenstein, Columbus . . . . .	1.45	1.65
360 "S & S" Special Bonemeal . . . . .	R. M. Gilman, Baxter . . . . .	1.95	1.23
311 Sulzberger's Pure Bonemeal . . . . .	J. C. Ebenstein, Columbus . . . . .	1.97	2.47
349 Sulzberger's Pure Bonemeal . . . . .	J. C. Ebenstein, Columbus . . . . .	2.34	2.47
303 Sulzberger's Pure Raw Bonemeal . . . . .	J. C. Ebenstein, Columbus . . . . .	3.26	3.75
SWIFT & CO.			
355 Swift's Ammoniated Bone Phosphate and Potash.	E. B. Davis, Columbus . . . . .	1.88	1.64
362 Swift's Ammoniated Bone Phosphate and Potash.	Libby Brothers, Altamont . . . . .	1.64	1.64
363 Swift's Ammoniated Bone Phosphate and Potash.	Pittsburg Elevator Co., Pittsburg . . . . .	1.39	1.64
364 Swift's Ammoniated Bone Phosphate and Potash.	Walberts & Tunberlake, Girard . . . . .	1.87	1.64
335 Swift's Diamond A Vegetable and Fruit Grower.	Walberts & Tunberlake, Girard . . . . .	2.29	2.46
336 Swift's Diamond A Vegetable and Fruit Grower.	Union Hardware and Implement Co., Independence.	2.08	2.46
367 Swift's Diamond K Grain Grower . . . . .	Libby Brothers, Altamont . . . . .	.90	.82
368 Swift's Diamond K Grain Grower . . . . .	I. E. Clark, Walnut . . . . .	1.02	.82
369 Swift's Diamond K Grain Grower . . . . .	Pittsburg Elevator Co., Pittsburg . . . . .	.98	.82
328 Swift's Diamond L Grain Grower . . . . .	Pittsburg Elevator Co., Pittsburg . . . . .	1.82	1.69
326 Swift's Diamond L Grain Grower . . . . .	E. B. Davis, Columbus . . . . .	2.02	1.69
322 Swift's Diamond M Grain Grower . . . . .	Chanute Milling Co., Chanute . . . . .	1.85	1.70
323 Swift's Diamond M Grain Grower . . . . .	Olson Brothers, Edna . . . . .	2.09	1.70
324 Swift's Diamond M Grain Grower . . . . .	W. S. McAleer, Parsons . . . . .	1.84	1.70
325 Swift's Diamond M Grain Grower . . . . .	Cherryvale Grain Co., Cherryvale . . . . .	1.66	1.70
327 Swift's Diamond M Grain Grower . . . . .	Union Hardware and Implement Co., Independence.	1.61	1.70
329 Swift's Diamond M Grain Grower . . . . .	J. H. Meyer, Elk City . . . . .	2.02	1.70
309 Swift's Pure Bonemeal . . . . .	Olson Brothers, Edna . . . . .	2.65	2.47
310 Swift's Pure Bonemeal . . . . .	W. S. McAleer, Parsons . . . . .	2.40	2.47
312 Swift's Pure Bonemeal . . . . .	Union Hardware and Implement Co., Independence.	2.79	2.47
313 Swift's Pure Bonemeal . . . . .	Walbert & Tunberlake, Girard . . . . .	3.49	2.47
314 Swift's Pure Bonemeal . . . . .	Chanute Milling Co., Chanute . . . . .	2.88	2.47
344 Swift's Pure Bonemeal . . . . .	Farmers' Union, Erie . . . . .	2.36	2.47
345 Swift's Pure Bonemeal . . . . .	E. B. Davis, Columbus . . . . .	2.78	2.47
347 Swift's Pure Bonemeal . . . . .	Marlow Seed Co., Wichita . . . . .	3.07	2.47

CONTINUED.

Minimum percentage of phosphorus in phosphates.								Minimum percentage of potassium in compounds soluble in water.		Maximum percentage of chlorine in compounds soluble in water.	
Soluble in water.		Reverted.		Insoluble.		Total.		Found.	Guaranteed.	Found.	Guaranteed.
Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.
.08	1.43	1.74	2.50	3.24	.....	5.06	4.80	1.14	.83	.55	.....
.72	.....	1.76	.....	4.52	.87	7.00	4.87	.73	1.66	.25	.....
.....	.....	.....	.....	.....	.....	7.65	6.12	1.34	1.66	.50	.....
.....	.....	.....	.....	.....	.....	8.20	6.12	1.70	1.66	.50	.....
.....	.....	.....	.....	.....	.....	8.30	6.12	1.28	1.66	.50	.....
.....	.....	.....	.....	.....	.....	12.70	12.23	.....	.....	.....	.....
.....	.....	5.00	.....	5.85	.....	13.25	10.85	.....	.....	.....	.....
.....	.....	5.00	.....	5.85	.....	13.50	10.85	.....	.....	.....	.....
.....	.....	2.20	.....	7.80	.....	10.50	10.00	.....	.....	.....	.....
2.53	.....	1.37	4.37	.89	.20	4.79	4.57	.44	.41	.60	1.50
3.16	.....	1.32	4.37	.66	.20	5.14	4.57	.92	.41	.55	1.50
2.94	.....	1.10	4.37	1.04	.20	5.08	4.57	.45	.41	.50	1.50
2.74	.....	1.61	4.37	.46	.20	4.81	4.57	.57	.41	.50	1.50
2.76	2.34	1.38	1.19	.28	.18	4.42	3.71	1.75	2.49	1.00	1.50
2.96	2.34	1.67	1.19	.40	.18	5.03	3.71	1.37	2.49	.80	1.50
3.20	.....	1.72	5.24	.60	.20	5.52	5.44	1.41	.83	.50	1.50
3.60	.....	1.45	5.24	.50	.20	5.55	5.44	.80	.83	.90	1.50
2.61	.....	2.20	5.24	.58	.20	5.39	5.44	1.20	.83	1.20	1.50
2.21	3.88	3.01	1.68	.74	.18	5.96	5.38	.83	.79	.70	1.28
3.88	3.88	1.83	1.68	.81	.18	6.52	5.38	.75	.79	.60	1.28
2.60	3.52	2.39	1.33	.73	.18	5.72	5.04	1.13	.82	.70	1.56
2.50	3.52	2.45	1.33	.75	.18	5.70	5.04	.94	.82	.70	1.56
2.86	3.52	2.08	1.33	.70	.18	5.64	5.04	1.09	.82	.60	1.56
2.54	3.52	2.38	1.33	.70	.18	5.62	5.04	.81	.82	.60	1.56
3.07	3.52	2.33	1.33	.68	.18	6.08	5.04	.88	.82	.50	1.56
2.67	3.52	2.51	1.33	.66	.18	5.84	5.04	.87	.82	.60	1.56
.....	.....	.....	.....	.....	.....	11.30	10.48	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	11.75	10.48	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	11.40	10.48	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	10.05	10.48	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	11.50	10.48	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	10.80	10.48	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	11.35	10.48	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	10.75	10.48	.....	.....	.....	.....

TABLE I—

BRANDS AND MANUFACTURERS.	Name of seller, and place sampled.	Minimum percentage of total nitrogen.	
		Found.	Guaranteed.
<i>SWIFT &amp; Co.—concluded.</i>			
359 Swift's Pure Bonemeal.....	I. E. Clark, Walnut.....	2.78	2.47
346 Swift's Pure Raw Bonemeal.....	E. B. Davis, Columbus.....	4.11	3.75
306 Swift's Special Bonemeal.....	E. B. Davis, Columbus.....	1.56	.82
307 Swift's Special Bonemeal.....	Walbert & Tunberlake, Girard.....	1.81	.82
330 Swift's Special Grain Fertilizer.....	Pittsburg Elevator Co., Pittsburg.....	1.92	1.65
331 Swift's Special Grain Fertilizer.....	Kelso Grain Co., Cherokee.....	1.91	1.65
341 Swift's Special Grain Fertilizer.....	Calvert & Beven, Muscotah.....	1.56	1.65
356 Swift's Tomato and Vegetable Fertilizer.	F. B. Davis, Columbus.....	1.88	2.46
372 Swift's Tomato and Vegetable Fertilizer.	Walbert & Tunberlake, Girard.....	2.09	2.46

CONCLUDED.

Minimum percentage of phosphorus in phosphates.								Minimum percentage of potassium in compounds soluble in water.		Maximum percentage of chlorine in compounds soluble in water.	
Soluble in water.		Reverted.		Insoluble.		Total.					
Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.
.....	.....	.....	.....	.....	.....	11.15	10.48	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	10.25	10.04	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	12.65	12.66	.....	.....	.....	.....
.....	.....	13.90	12.66	.....	.....	13.90	12.66	.....	.....	.....	.....
2.52	1.75	2.02	2.62	1.08	.43	5.62	4.80	1.30	1.66	1.20	1.51
2.60	1.75	1.89	2.62	.79	.43	5.23	4.80	1.67	1.66	1.40	1.51
2.58	1.75	1.79	2.62	.63	.43	5.00	4.80	1.61	1.66	1.80	1.51
2.26	.....	1.57	3.49	1.17	.20	5.00	3.69	.20	.41	.20	1.50
2.37	.....	1.58	3.49	.54	.20	4.49	3.69	1.03	.41	.50	1.50

### Explanation of Fertilizer Terms.

The composition of a commercial fertilizer can not usually be stated in percentages of specific substances or compounds. In a few cases this would be possible, as with Chile saltpeter, where the percentage of sodium nitrate present might be reported, or the percentage of pure potassium sulphate in a commercial article might be stated. But as a rule the fertilizers as brought upon the market are complex mixtures which it would be impossible to analyze so as to show the percentages of each chemical compound present. Even if it were possible to ascertain the percentage of each of the compounds in a fertilizer, these are so numerous that it is doubtful if a statement of them alone would be the most serviceable way of giving the results, though unquestionably the knowledge would be of great value.

Plants can make use of a large number of substances containing given chemical elements, but the value of each of these substances depends not on the amount of the whole substance, but on the amount of the particular elements present in the substance.

On the other hand, the value of a fertilizer is not fixed wholly by the amount of certain chemical elements present, as some compounds of these elements are much more available to plants than are others. Thus, feldspar might show a considerable percentage of potassium, but its value in a fertilizer would be very small because of the very difficult solubility of the feldspar. So, too, leather scraps and feathers are rich in nitrogen, but are of little value in a fertilizer because of their insolubility and the slowness with which they decompose.

A statement of the composition of a fertilizer as prescribed by the Kansas law recognizes the principle set forth in the preceding paragraphs and shows only percentages of the elements nitrogen, phosphorus and potassium in compounds that are valuable as fertilizers. In the case of phosphorus the percentages are shown in three classes of useful phosphorus compounds that differ more or less in value. The total phosphorus considered is that in compounds that are brought into solution by various methods of treatment with acids. This total may include: (a) phosphates that are *soluble* in water; (b) phosphates insoluble in water, but soluble in a solution of ammonium citrate, and designated as *reverted* phosphates; and

(c) phosphates which do not dissolve either in water or ammonium citrate, and are designated as *insoluble* phosphates.

As phosphates soluble in water or in ammonium citrate are much more readily utilized by crops than are the insoluble phosphates, the former two are often considered together and designated as *available* phosphates. Some fertilizer companies do not guarantee soluble and reverted phosphates separately, but class them together as available, and their guarantees in such cases are listed in the table under the head of reverted phosphates, as such manufacturers could conform to their guaranty without including any soluble phosphates. The analysis often shows the presence of soluble phosphates, and in any comparison of the actual with the guaranteed composition the sum of the soluble and the reverted as found on analysis must be compared with the reverted guaranteed.

The guaranty required by the Kansas law also includes a statement of the maximum amount of chlorine present. This is because certain crops are unfavorably affected by chlorides. The most common chloride is common salt, and its bad effects are well known when in quantity, but chlorides in amounts that do not injure ordinary crops are to be avoided with tobacco and potatoes, as the crop produced will probably be inferior in quality.

FINANCIAL STATEMENT—FERTILIZER FEES.

July 1, 1914, to June 30, 1915.

RECEIPTS.

1914.	Balance July 1, 1914	\$1,233.19
117 July 3	Armour & Co., Kansas City, Kan., tax tags	100.00
118 July 16	Sulzberger & Sons Co., Kansas City, Kan., tax tags	50.00
119 Aug. 7	Empire Carbon Works, St. Louis, Mo., tax tags	250.00
120 Aug. 8	Armour & Co., Kansas City, Kan., tax tags	100.00
121 Aug. 12	Continental Fertilizer Co., Chicago, Ill., registration fees	100.00
122 Sept. 1	Morris & Co., Kansas City, Kan., registration fee	25.00
122 Sept. 1	Morris & Co., Kansas City, Kan., tax tags	87.50
123 Sept. 3	Sulzberger & Sons Co., Kansas City, Kan., tax tags	50.00
124 Sept. 14	Sulzberger & Sons Co., Kansas City, Kan., tax tags	50.00
125 Sept. 15	Swift & Co., So. St. Joseph, Mo., tax tags	250.00
126 Sept. 24	Swift & Co., So. St. Joseph, Mo., tax tags	250.00
127 Oct. 1	Empire Carbon Works, St. Louis, Mo., tax tags	100.00
128 Oct. 1	Morris & Co., Chicago, Ill., tax tags	30.00
129 Oct. 1	Morris & Co., Chicago, Ill., tax tags	22.50
130 Oct. 13	Armour & Co., Kansas City, Kan., tax tags	100.00
131 Oct. 13	Armour & Co., Kansas City, Kan., tax tags	100.00
132 Oct. 13	Armour & Co., Kansas City, Kan., tax tags	100.00
133 Oct. 17	Swift & Co., So. St. Joseph, Mo., tax tags	250.00
134 Oct. 22	Armour & Co., Kansas City, Kan., tax tags	50.00



June . . . .	B-R Elec. & Telephone Mfg. Co., Kan. City., Mo., electric fan . . . . .	\$13.50
June . . . .	Central Scientific Co., Chicago, Ill., apparatus and chemicals . . . . .	57.18
June . . . .	L. R. Eakin, Manhattan, Kan., linen and cheesecloth . . . . .	3.28
June . . . .	Eimer & Amend, New York, N. Y., hot plate . . . . .	25.13
June . . . .	Electrical Engineering Department, K. S. A. C., Manhattan, Kan., connecting hot plate and oven . . . . .	12.07
June . . . .	Grasselli Chemical Co., St. Louis, Mo., acid . . . . .	14.02
June . . . .	Heat and Power Department, K. S. A. C., Manhattan, Kan., electric current and plumbing connection . . . . .	21.96
June . . . .	Henry Heil Chemical Co., St. Louis, Mo., perchloric acid . . . . .	12.00
June . . . .	J. T. Lardner, Manhattan, Kan., freight . . . . .	3.38
June . . . .	Manhattan Gas Co., Manhattan, Kan., gas . . . . .	9.70
June . . . .	Shop Methods and Practice Department, K. S. A. C., Manhattan, Kan., extensions to soil augers . . . . .	.88
	Total disbursements . . . . .	\$2,497.93

**FINANCIAL STATEMENT—FERTILIZER FEES.**

*July 1, 1915, to June 30, 1916.*

RECEIPTS.

	1915. Balance July 1, 1915 . . . . .	\$1,550.26
143	Aug. 14. . . . Armour & Co., Kansas City, Kan., tax tags . . . . .	200.00
144	Aug. 14. . . . Empire Carbon Works, St. Louis, Mo., tax tags . . . . .	250.00
145	Aug. 30. . . . Sulzberger & Sons Co., Kansas City, Kan., tax tags . . . . .	50.00
146	Aug. 30. . . . Morris & Co., Chicago, Ill., tax tags . . . . .	50.00
147	Sept. 9. . . . Sulzberger & Sons Co., Kansas City, Kan., tax tags . . . . .	50.00
148	Sept. 10. . . . Sulzberger & Sons Co., Kansas City, Kan., tax tags . . . . .	75.00
149	Sept. 16. . . . Empire Carbon Works, St. Louis, Mo., tax tags . . . . .	50.00
150	Sept. 21. . . . Armour & Co., Kansas City, Kan., tax tags . . . . .	100.00
151	Sept. 21. . . . Swift & Co., So. St. Joseph, Mo., tax tags . . . . .	250.00
152	Sept. 25. . . . Empire Carbon Works, St. Louis, Mo., tax tags . . . . .	50.00
153	Sept. 25. . . . Morris & Co., Kansas City, Kan., registration fee . . . . .	25.00
154	Sept. 27. . . . Armour & Co., Kansas City, Kan., tax tags . . . . .	100.00
155	Sept. 30. . . . Morris & Co., Kansas City, Kan., tax tags . . . . .	75.00
156	Oct. 3. . . . Morris & Co., Kansas City, Kan., tax tags . . . . .	25.00
157	Oct. 7. . . . Swift & Co., So. St. Joseph, Mo., tax tags . . . . .	125.00
158	Oct. 21. . . . Swift & Co., So. St. Joseph, Mo., tax tags . . . . .	125.00
159	Canceled.	
	1916.	
160	Feb. 15. . . . Empire Carbon Works, St. Louis, Mo., registration fees . . . . .	75.00
161	Mar. 3. . . . Armour & Co., Kansas City, Kan., tax tags . . . . .	100.00
162	Mar. 15. . . . Swift & Co., So. St. Joseph, Mo., tax tags . . . . .	250.00
163	Mar. 22. . . . Armour Fertilizer Works, Chicago, Ill., registration fees . . . . .	75.00
164	Mar. 22. . . . Hull & Dillon Packing Co., Pittsburg, Kan., tax tags . . . . .	5.00
165	Mar. 22. . . . Sulzberger & Sons Co., Kansas City, Kan., registration fees, . . . . .	100.00
166	Mar. 22. . . . Swift & Co., So. St. Joseph, Mo., registration fees . . . . .	200.00
167	Mar. 29. . . . Empire Carbon Works, St. Louis, Mo., tax tags . . . . .	50.00
168	Canceled.	
169	April 4. . . . Hull & Dillon Packing Co., Pittsburg, Kan., tax tags . . . . .	5.00
170	May 23. . . . Sulzberger & Sons Co., Kansas City, Kan., registration fees. . . . .	25.00
	Total receipts . . . . .	\$4,035.26

DISBURSEMENTS.

1915.	July . . . . Eimer & Amend, New York, N. Y., apparatus . . . . .	\$75.38
July . . . .	Standard Calorimeter Co., East Moline, Ill., washers and tops for bomb . . . . .	24.50
July . . . .	Employees' pay roll . . . . .	30.60

July	Employees' pay roll	\$3.60
Aug.	Eimer & Amend, New York, N. Y., chemicals	18.74
Aug.	Eimer & Amend, New York, N. Y., apparatus	88.64
Aug.	Printing Department, K. S. A. C., Manhattan, Kan., paper	3.90
Aug.	Eimer & Amend, New York, N. Y., balance	60.80
Aug.	Chemical Publishing Co., Easton, Pa., slide rule	8.00
Aug.	J. T. Lardner, K. S. A. C., Manhattan, Kan., freight	5.44
Aug.	C. O. Swanson, Manhattan, Kan., traveling expenses	60.70
Aug.	J. T. Lardner, K. S. A. C., Manhattan, Kan., freight and express	25.20
Aug.	Employees' pay roll	53.32
Sept.	J. Bishop & Co., Malvern, Pa., repair of crucibles	7.95
Sept.	Eimer & Amend, New York, N. Y., absorption tube	2.26
Sept.	Eimer & Amend, New York, N. Y., absorption tubes	9.02
Sept.	C. O. Swanson, Manhattan, Kan., traveling expenses	43.54
Sept.	Employees' pay roll	83.97
Oct.	General Repair Department, K. S. A. C., Manhattan, Kan., glass	5.35
Oct.	Electrical Engineering Department, K. S. A. C., Manhattan, Kan., installing oven	5.54
Oct.	Manhattan Gas Co., Manhattan, Kan., gas	13.70
Oct.	Henry Heil Chemical Co., St. Louis, Mo., glass beads	5.05
Oct.	H. Mueller Manufacturing Co., Decatur, Ill., gas hose cocks	33.00
Oct.	L. E. Knott Apparatus Co., Cambridge, Mass., rubber	20.20
Oct.	L. E. Knott Apparatus Co., Cambridge, Mass., rubber	5.40
Oct.	Eimer & Amend, New York, N. Y., crucible holders	2.68
Oct.	Central Scientific Co., Chicago, Ill., apparatus	30.36
Oct.	J. T. Lardner, K. S. A. C., Manhattan, Kan., freight	2.03
Oct.	Shop Practice Department, K. S. A. C., Manhattan, Kan., belt lacing	.60
Oct.	C. O. Swanson, Manhattan, Kan., traveling expenses	15.36
Oct.	Employees' pay roll	103.89
Nov.	J. T. Baker Chemical Co., Phillipsburg, N. J., chemicals	19.69
Nov.	L. R. Eakin, Manhattan, Kan., Mason jars	5.40
Nov.	Eimer & Amend, New York, N. Y., filter paper	3.31
Nov.	Eimer & Amend, New York, N. Y., chemicals	2.51
Nov.	E. H. Sargent & Co., Chicago, Ill., glassware	4.55
Nov.	J. T. Lardner, K. S. A. C., Manhattan, Kan., freight	2.80
Nov.	Employees' pay roll	75.00
Dec.	Heat and Power Department, K. S. A. C., Manhattan, Kan., repairs	1.69
Dec.	Heat and Power Department, K. S. A. C., Manhattan, Kan., material and labor	109.64
Dec.	B. R. Hull, Manhattan, Kan., sheet lead	3.35
Dec.	E. H. Sargent & Co., Chicago, Ill., funnels	4.04
Dec.	Eimer & Amend, New York, N. Y., hot plate	34.17
Dec.	J. T. Lardner, Manhattan, Kan., express	1.71
Dec.	Troy Laundry Machinery Co., Chicago, Ill., caustic soda	27.00
Dec.	R. C. Wiley, Manhattan, Kan., traveling expenses	80.92
Dec.	Employees' pay roll	80.29
1916.		
Jan.	Heat and Power Department, K. S. A. C., Manhattan, Kan., repairs	4.65
Jan.	Simplex Electric Heating Co., Cambridge, Mass., immersion coil	11.63
Jan.	J. T. Lardner, K. S. A. C., Manhattan, Kan., express	1.43
Feb.	Heat and Power Department, K. S. A. C., Manhattan, Kan., connections and repairs	32.35
Feb.	Wm. Stingley, Manhattan, Kan., steam bath	6.50
Feb.	Grasselli Chemical Co., St. Louis, Mo., acid	38.37
Feb.	Heat and Power Department, K. S. A. C., Manhattan, Kan., installing steam bath	2.00
Feb.	Henry Heil Chemical Co., St. Louis, Mo., chemicals	.70
Feb.	Graham Paper Co., Kansas City, Mo., wrapping paper	2.16
Feb.	Heat and Power Department, K. S. A. C., Manhattan, Kan., connections	1.41

Feb. . . . J. T. Lardner, K. S. A. C., Manhattan, Kan., freight and express. . . .	\$2.07
Feb. . . . Employees' pay roll . . . . .	81.11
Mar. . . . Denny Tag Co., Westchester, Pa., tax tags. . . . .	42.42
Mar. . . . Wm. Stingley, Manhattan, Kan., pliers. . . . .	.50
Mar. . . . Central Scientific Co., Chicago, Ill., nipples for filter. . . . .	.78
Mar. . . . Wm. Stingley, Manhattan, Kan., connect exhaust pipe with hood. . . .	9.80
Mar. . . . Heat and Power Department, K. S. A. C., Manhattan, Kan., repairs, . . . .	.42
Mar. . . . Eimer & Amend, New York, N. Y., pencils for writing on glass. . . . .	1.91
Mar. . . . J. T. Lardner, K. S. A. C., Manhattan, Kan., freight and express. . . .	9.71
Mar. . . . Chemistry Department, K. S. A. C., Manhattan, Kan., chemicals and apparatus . . . . .	4.50
Mar. . . . R. C. Wiley, Manhattan, Kan., traveling expenses. . . . .	44.68
Mar. . . . Employees' pay roll . . . . .	47.75
April . . . Wm. Stingley, Manhattan, Kan., cover for water bath. . . . .	2.50
April . . . Eimer & Amend, New York, N. Y., sieve. . . . .	3.03
April . . . J. T. Lardner, K. S. A. C., Manhattan, Kan., freight. . . . .	6.33
April . . . Employees' pay roll. . . . .	17.12
May . . . Central Scientific Co., Chicago, Ill., filter tubes. . . . .	4.14
May . . . Heat and Power Department, K. S. A. C., Manhattan, Kan., repairs, . . . .	.34
May . . . Manhattan Gas Co., Manhattan, Kan., gas. . . . .	37.10
May . . . Printing Department, K. S. A. C., Manhattan, Kan., blanks. . . . .	3.65
May . . . Grasselli Chemical Co., St. Louis, Mo., acid and ammonia. . . . .	33.35
May . . . Armour Fertilizer Works, Chicago, Ill., chemicals . . . . .	2.01
May . . . Heat and Power Department, K. S. A. C., Manhattan, Kan., repairs, . . . .	.70
May . . . L. R. Eakin, Manhattan, Kan., Mason jars. . . . .	11.00
May . . . Eimer & Amend, New York, N. Y., copper wire. . . . .	1.18
May . . . R. C. Wiley, Manhattan, Kan., traveling expenses. . . . .	46.16
May . . . Bemis Brothers Bag Co., Kansas City, Mo., canvas bags . . . . .	29.86
May . . . C. O. Swanson, Manhattan, Kan., traveling expenses. . . . .	16.24
May . . . C. O. Swanson, Manhattan, Kan., traveling expenses. . . . .	17.84
May . . . Employees' pay roll. . . . .	111.35
June . . . Heat and Power Department, K. S. A. C., Manhattan, Kan., install- ing electric oven . . . . .	1.98
June . . . Heat and Power Department, K. S. A. C., Manhattan, Kan., oil. . . . .	1.80
June . . . J. T. Baker Chemical Co., Phillipsburg, N. J., chemicals. . . . .	2.41
June . . . Heat and Power Department, K. S. A. C., Manhattan, Kan., punch for filters . . . . .	.51
June . . . Eimer & Amend, New York, N. Y., chemicals. . . . .	6.03
June . . . Shop Practice Department, K. S. A. C., Manhattan, Kan., belt lacing, . . . .	.20
June . . . Grasselli Chemical Co., St. Louis, Mo., acid. . . . .	7.60
June . . . Grasselli Chemical Co., St. Louis, Mo., acid. . . . .	21.50
June . . . L. R. Eakin, Manhattan, Kan., Mason jars. . . . .	11.00
June . . . Central Scientific Co., Chicago, Ill., apparatus. . . . .	.56
June . . . Eimer & Amend, New York, N. Y., metallic tubing. . . . .	2.00
June . . . C. O. Swanson, Manhattan, Kan., traveling expenses. . . . .	24.32
June . . . J. T. Lardner, K. S. A. C., Manhattan, Kan., freight. . . . .	9.02
June . . . Manhattan Gas Co., Manhattan, Kan., gas. . . . .	17.10
June . . . Heat and Power Department, K. S. A. C., Manhattan, Kan., repairs, . . . .	.39
June . . . Standard Calorimeter Co., East Moline, Ill., washers for bomb. . . . .	.53
June . . . Employees' pay roll. . . . .	222.56
Total disbursements . . . . .	\$2,818.95

**The Fertilizer Law.**

(Chapter 217, Laws of 1907.)

**RELATING TO THE MANUFACTURE AND SALE OF FERTILIZERS.**

AN ACT providing for the registration, inspection and taxation of commercial fertilizers, providing punishments for violation of its provisions, and repealing all acts or parts of acts in conflict therewith.

*Be it enacted by the Legislature of the State of Kansas:*

SECTION 1. Any substance shall be deemed to be a commercial fertilizer if by reason of its chemical composition it is sold, offered or held for sale for the purpose of increasing the crops produced by land. The provisions of this act shall not apply to raw materials in the hands of manufacturers, nor to salt, lime, gypsum, or the dung of domestic animals, when sold as such, and each unmixed with anything else. Nothing in this law shall be construed as preventing any one from mixing commercial fertilizing materials for his own use only, if these have been purchased under official tag and legal label as hereinafter specified. By the term "brand," as used in this act, is to be understood (1) the name, number, trade-mark or other designation under which a fertilizer is sold, and (2) the fertilizer itself sold under such name, number, or trade-mark.

SEC. 2. Except as herein provided, it shall be unlawful within the state of Kansas to sell, offer for sale or possess for sale any commercial fertilizer which has not been officially registered by the director of the Agricultural Experiment Station of the Kansas State Agricultural College. The manufacturer or seller of any brand of commercial fertilizer, on application to the said director for registration of the same, shall submit a statement of its guaranteed composition in the following terms: (1) The minimum percentage of phosphorus in phosphates soluble in water; (2) the minimum percentage of phosphorus in reverted phosphates; (3) the minimum percentage of phosphorus in insoluble phosphates; (4) the minimum percentage of total phosphorus; (5) the minimum percentage of potassium in compounds soluble in water; (6) the maximum percentage of chlorine in compounds soluble in water; (7) the minimum percentage of nitrogen in nitrates; (8) the minimum percentage of nitrogen in ammonium salts; (9) the minimum percentage of total nitrogen; and (10) a guaranty that the fertilizer contains no horn, hoof, hair, feathers or other similarly inert nitrogenous matter; but any manufacturer desiring to do so may waive the privilege of stating the percentage of nitrogen in nitrates and nitrogen in ammonium salts. The manufacturer or seller shall also state the sources of the constituents of the brand of fertilizer offered for registration, which statement and the information contained therein shall be recorded for reference, but shall not be disclosed by the said director unless the materials used are such as are liable to lower the standard of the fertilizer or give it deleterious properties. If the materials used in said brand of fertilizer are found satisfactory, and the guaranteed composition as described above is the same as that previously guaranteed within the period through which a fertilizer law has been in force in the state of Kansas, the said director shall officially

register the said brand and its guaranteed composition, and the manufacturer or seller of the said brand shall pay a registration fee of twenty-five dollars. Such registration shall be permanent, unless revoked for cause, and no change may be made in composition guaranteed for the fertilizer or in the general character of the materials used in its manufacture.

SEC. 3. After official registration of any brand of commercial fertilizer, it shall be the duty of the manufacturer or seller securing such registration to notify the director aforesaid of the names and addresses of all dealers within the state of Kansas, who will probably sell such brand, so far as shall then be known, and quarterly thereafter to furnish him a revised, complete and true list of dealers in that brand. It shall be the duty of each seller of fertilizers within the state of Kansas, not included in the preceding, to notify the director aforesaid, annually, of the brands of fertilizers which he sells or offers for sale; such notification to be sent on or about January 1 of each year, and at least quarterly thereafter, if additional brands are offered for sale by him. If the manufacturer or seller securing registration of any brand of commercial fertilizer shall fail to give such quarterly information, the said director of the Experiment Station may revoke the registration of such brand.

SEC. 4. Every package of commercial fertilizer sold, exposed or offered for sale, by sample or otherwise, or in the possession of any one within the state of Kansas, shall bear a distinctly printed label in the English language, which shall state: (1) The name and address of the manufacturer, (2) the brand of the fertilizer, (3) the number of net pounds in the package, and (4) the chemical composition guaranteed by the manufacturer, in the terms set forth in section 2 of this act; and nothing else shall be stated on such label.

SEC. 5. An inspection tax shall be collected upon all commercial fertilizers sold, offered for sale or held for sale within the state of Kansas, which tax shall be at the rate of twenty-five cents per ton, except as hereinafter provided. Every package of commercial fertilizer sold, exposed or offered for sale, by sample or otherwise, or in the possession of any one within the state of Kansas, shall bear at least one tag certifying that the tax aforesaid has been paid upon two hundred pounds of the fertilizer, or a fraction of two hundred pounds. If any package contains more than two hundred pounds, it shall bear one tag for each two hundred pounds or fraction thereof; and in case the fertilizer is sold in bulk, one such tag shall be delivered with each two hundred pounds or fraction thereof. All tags required under the provisions of this section shall be obtained from the director of the Experiment Station aforesaid, in lots of two hundred or multiples thereof, and he shall receive from the manufacturer or seller five dollars for each two hundred so furnished. Such tags shall be good until used, but counterfeiting them or using them more than once is prohibited. The director of the Agricultural Experiment Station shall account to the state treasurer, at the close

Names of dealers to be furnished.

Penalty.

Label.

Inspection tax.

Tags.

of each month, for all fees collected under this act, and all fees turned in to the state treasury during the fiscal years 1908 and 1909 are hereby appropriated to be applied towards paying the expenses of the Agricultural Experiment Station for such years. Such expenses shall be paid out on warrants drawn by the state auditor on itemized vouchers filed with the state auditor and approved by the director of the Agricultural Experiment Station.

SEC. 6. In so far as the revenues provided for herein or otherwise may suffice, it shall be the duty of the chemist of the Experiment Station aforesaid, personally or by deputies duly authorized in writing, to make such inspection of fertilizers sold or offered for sale in the state of Kansas as in his judgment may be deemed necessary to ascertain whether or not manufacturers and others within this state are complying with all of the provisions of this law. Toward this end he or his authorized deputies shall procure at least one sample annually of each brand of fertilizer registered for sale in this state, and shall make or cause to be made an analysis of the same according to the methods of the Association of Official Agricultural Chemists, and a certified statement of the results of such analysis shall be final evidence in any legal action within the state of Kansas concerning such brand of commercial fertilizer.

SEC. 7. In sampling fertilizers in lots of ten or less packages, portions shall be taken from each package; in lots of more than ten packages and not more than five tons, samples shall be taken from not less than ten packages and from not less than ten per cent of the packages; in lots of over five tons, portions shall be taken from not less than twenty packages. In sampling fertilizers in bulk, not less than ten portions shall be drawn, and these from various parts, so as to represent fairly the whole. The portions drawn shall be carefully mixed, and from the mixture two samples of about two pounds each reserved and placed in sealed bottles or jars, and accurately labeled. One of these samples shall be delivered to the owner of the fertilizer or his representative; the other taken for the use of said chemist of the Experiment Station. Sampling shall be during ordinary business hours, and the owner of the fertilizer or his representative may be present, but any refusal by such owner or his representative to permit sampling shall be taken as sufficient evidence of violation of the law by him.

SEC. 8. Any manufacturer, seller or holder of commercial fertilizers who shall fail to comply with all of the provisions of this act, or who shall sell, offer for sale or hold for sale any commercial fertilizer the composition of which is not in accordance with that guaranteed, upon conviction shall be deemed guilty of a misdemeanor, and fined not less than fifty dollars nor more than two hundred dollars and costs for the first offense, and not less than one hundred dollars nor more than five hundred dollars and costs for each subsequent offense; provided, that any seller shall be exempt from the penalty for sale of fertilizers that are below the guaranteed standard if he has a written guaranty from the manufacturer or seller

Inspection  
and analysis:

Sampling  
for analysis.

Penalties for  
violation of  
law.

of the fertilizer that said fertilizer is registered and of the guaranteed composition, if said manufacturer or seller is a resident of the state of Kansas. Suit may be brought for the recovery of penalties under the provisions of this act in the district court of the county where the offense is alleged to have been committed, and shall be prosecuted by the county attorney in the name of the state of Kansas, upon complaint of the said director of the Experiment Station or of some reputable citizen of the county. Each sale shall constitute a separate offense. Penalties recovered under this act shall be turned in to the school fund of the county wherein the offense was committed. In cases involving the composition of the fertilizer, a deficiency not greater than one-fifteenth of the guaranteed percentage of any ingredient shall not be taken as evidence of fraudulent intent, but the seller of any fertilizer that does not possess the composition guaranteed shall be liable for damages resulting to the user in consequence thereof.

SEC. 9. The Experiment Station aforesaid shall publish at least annually a bulletin giving a list of the fertilizers registered for sale in this state, with their guaranteed composition, and such other information as may be deemed valuable to the public concerning them and their use. This bulletin shall also contain a list of the manufacturers and sellers of fertilizers in this state according to the statements secured under the provisions of section 3.

SEC. 10. All acts and parts of acts in conflict with this law are hereby repealed.

SEC. 11. This act shall go into effect on the 30th day of September after its publication in the statute-book.