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KANSAS STATE AGRICULTURAL COLLEGE

DEPARTMENT OF CHEMISTRY

FERTILIZER CONTROL IN 1918

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The sale of commercial fertilizers is rapidly increasing in Kansas. In 1916 the sales amounted to 7,640 tons; in 1917, 12,900 tons; in 1918, 16,436 tons. These figures are based on the number of tax tags sold. The money expended annually for these fertilizers amounts to between five and six hundred thousand dollars.

This circular gives a statement of the results of inspection of commercial fertilizers sold in Kansas during the spring and fall of 1918. Inspection this year was unusually difficult. Because of labor shortage and transportation difficulties, fertilizers were transferred from the car to the farmer in the shortest possible time. The car containing commercial fertilizers and the inspector did not often happen to be in town at the same time. Very often the inspector found the fertilizer dealer with very little material on hand. For these reasons, not as many samples as usual were obtained. This may also partially account for the fact that a larger percent than usual of the samples taken were not up to guarantee in all the ingredients. From small quantities of fertilizer it was not always possible to secure as good a sample as was desired.

According to the letter of the law, a deficiency not greater than one-fifteenth of the guaranteed percentage of any ingredient shall not be taken as evidence of fraudulent intent. In Table I are given the results of the inspection samples collected in the spring and fall of 1918. Wherever any ingredient falls below the required minimum the figures are printed in bold-face type. In many cases when one ingredient falls below the required minimum, other ingredients are so much above the guarantee that the total money value of the fertilizer is not lowered.

The results in Table I are stated in terms of percents of the elements. Under each element are given the percent found and the percent guaranteed. The number of pounds of any element in a ton of fertilizer can be calculated by taking the given percent of 2,000 pounds. Thus, 0.82 percent nitrogen, means that that particular fertilizer contains 16.4 pounds of nitrogen in one ton.

Nitrogen is given in one form only, namely, in percent of total of the element. The table does not give any information in regard to the form of combination of the nitrogen. The nitrogen in a mixed fertilizer may be from bone, from various kinds of slaughter house residues, from sodium nitrate, from ammonium sulphate, or it may be in part at least from the filler if this is some kind of dried animal manure. These forms of nitrogen do not all have the same value, because not in equally available form. That in sodium nitrate, ammonium salts, such as ammonium sulphate, or in slaughter house products other than bone is the most valuable. That in steamed bone is less valuable, and that in dried manure is the least valuable. This last form of nitrogen is not worth any more agriculturally than the nitrogen in ordinary barnyard manure.

Phosphorus is given under four heads; namely, soluble in water, reverted, insoluble, and total. That soluble in water and the reverted are the most available, hence the most valuable. In such substances as acid phosphate, most of the phosphorus is in the water-soluble form. In rock phosphate the phosphorus present is in insoluble form. When acid phosphate is the sole source of phosphorus, the amount of phosphorus in insoluble form is usually small. Usually the guaranteed amount is 0.22 percent. This form of phosphorus is the least valuable. However, there is a difference between the insoluble from bone, and the insoluble from rock phosphate. That from bone is much more valuable. In bone meal, phosphorus is usually given as total only. Phosphorus in insoluble phosphates from bone and bone products is made available in the soil more readily than phosphorus in insoluble phosphates from rock phosphate.

Potassium in compounds soluble in water is the only form that is recognized in commercial fertilizers. Since 1914, fertilizer manufacturers have had difficulty in obtaining suitable potassium salts. In the pre-war period, potassium was the

cheapest of the three elements. Now it is more expensive than phosphorus in practically all fertilizers, and more expensive than nitrogen in some brands. The amount of potassium put in mixed fertilizers is much less than it was formerly. The small number of results which are below the required minimum shows that the manufacturers are in good faith trying to live up to the requirements of the law.

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, when the salt is present in quantity, are well known, 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.

TABLE I.—RESULTS OF ANALYSES OF INSPECTION

BRANDS AND MANUFACTURERS	Name of seller, and place sampled	Minimum percent of nitrogen	
		Found	Guaranteed
Spring, 1918			
ARMOUR & CO.			
513 Armour's 1-8-1 Fertilizer	Frank Foltz, Garnett	0.78	0.82
514 Armour's 1-12-1 Fertilizer	Frank Foltz, Garnett	1.05	0.82
515 New Record Brand	Frank Foltz, Garnett	0.97	0.82
529 Ammoniated Phosphate	Pittsburg Modern Milling Company	1.68	1.65
EMPIRE CARBON WORKS			
528 Empire Farmers' Favorite	F. B. Baumgartner, Neutral	1.04	0.82
COCHRANE PACKING CO.			
530 Champion Grain Grower	Pittsburg Elevator Company	1.68	1.65
533 Corn and Wheat Grower	Pittsburg Elevator Company	1.86	1.03
WILSON & CO.			
527 Bone Meal and Acid Phosphate.	Cherokee Co. Milling and Elevator Company, Columbus	0.91	0.82
MORRIS & CO.			
526 Steamed Bone Meal	Cherokee Co. Milling and Elevator Company, Columbus	0.88	0.82
LEAVENWORTH DESICCATING WORKS			
535 Sunflower Fertilizer	Leavenworth Desiccating Company	6.48	7.15
SWIFT & CO.			
518 Swift's Diamond "K" Grain Grower	Yates Center Mills	0.98	0.82
520 Swift's No. 3 Manure Mixture	Union Implement and Hardware Company, Independence	1.57	1.65
521 Swift's Ammoniated Bone Phosphate and Potash	Labette Co. Farmers' Coop. Mercantile Union, Parsons	1.47	1.64
522 Swift's Diamond "K" Grain Grower	Labette Co. Farmers' Coop. Mercantile Union, Parsons	0.68	0.82
523 Swift's 1-5-30 Bone Meal	Labette Co. Farmers' Coop. Mercantile Union, Parsons	1.03	1.23
524 Swift's Clay Soil Special	Labette Co. Farmers' Coop. Mercantile Union, Parsons	1.78	1.77
525 Swift's Superphosphate	Labette Co. Farmers' Coop. Mercantile Union, Parsons	1.31	1.65
531 Swift's Complete Fertilizer	Pittsburg Elevator Company	1.39	0.82
532 Swift's Truck Fertilizer	Pittsburg Elevator Company	2.07	2.46
Fall, 1918			
WILSON & CO.			
536 Special Bone Meal	J. L. Teagarden, LaCygne	1.48	0.82
554 Special Bone Meal	Cherokee Mill and Elevator Company, Columbus	1.04	0.82
SWIFT & CO.			
537 Swift's Ammoniated Bone Phosphate and Potash	C. T. Potter, LaCygne	1.76	1.64

(a) This includes the water-soluble.

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SAMPLES OF FERTILIZERS, 1918

Minimum percent of phosphorus in phosphates								Minimum percent of potassium in compounds soluble in water		Maximum percent of chlorine in compounds soluble in water	
Soluble in water		Reverted		Insoluble		Total		Found	Guar-anteed	Found	Guar-anteed
Found	Guar-anteed	Found	Guar-anteed	Found	Guar-anteed	Found	Guar-anteed	Found	Guar-anteed	Found	Guar-anteed
2.24	..	1.47	a3.49	0.23	0.22	3.94	3.71	1.09	0.83	1.20	1.00
2.66	.....	2.27	a5.24	0.60	0.22	5.53	5.46	1.47	0.83	0.80	1.00
2.69	.....	1.14	a4.37	0.22	0.22	4.05	4.59	1.65	0.83	1.60	1.00
2.95	.....	1.27	a4.37	0.31	0.22	4.53	4.59	0.00	0.00	0.86	1.00
3.50	.....	1.48	a4.37	0.36	0.22	5.34	4.59	0.91	0.83	0.40	.....
2.52	.....	1.88	a4.37	1.25	0.22	5.70	4.59	1.00	0.83	1.20	.....
1.64	1.99	1.89	3.49	1.57	0.50	5.10	5.98	1.13	1.03	0.80	0.30
2.80	2.25	2.99	4.00	4.06	3.75	9.85	10.00				
..	.....	.....	.....	.....	.....	13.75	13.97			0.40	Trace
.....	.....	.....	.....	.....	.....	6.33	5.60				
3.36	.....	1.85	a5.24	0.94	0.20	6.15	5.44	0.79	0.83	0.40	1.50
1.21	1.00	2.29	1.18	1.76	2.13	5.26	4.36	1.47	1.66	0.40	1.51
1.94	.....	2.07	a4.37	0.50	0.20	4.51	4.57	0.65	0.41	0.40	1.50
3.86	.....	1.81	a5.24	0.34	0.20	6.01	5.44	0.34	0.83	0.40	1.50
.....	.....	.....	.....	.....	.....	12.02	13.11			2.80	.....
2.44	3.88	2.53	1.36	0.46	0.22	5.52	5.46			1.20	0.43
2.44	1.50	1.96	2.00	0.53	0.43	4.93	3.93	0.86	1.66	0.40	1.51
2.27	2.29	1.43	1.22	0.49	0.16	4.19	3.67	0.77	0.83	0.40	1.50
2.09	.....	1.56	a3.49	0.55	0.20	4.20	3.69	0.80	0.83	0.40	1.50
.....	.....	.....	.....	.....	.....	12.76	13.00				
.....	.....	.....	.....	.....	.....	13.66	13.00				
2.12	.....	2.38	a4.37	0.85	0.20	5.35	4.57	0.56	0.41	0.28	1.50

TABLE I.—

BRANDS AND MANUFACTURERS	Name of seller, and place sampled	Minimum percent of nitrogen	
		Found	Guaranteed
Fall, 1918—concluded			
SWIFT & Co.			
540 Swift's Ammoniated Bone Phosphate and Potash.....	Haines Hardware Company, Emporia	1 97	1 64
546 Swift's Ammoniated Bone Phosphate and Potash.....	Allin Grain Company, Coffeyville	1 51	1 64
568 Swift's Ammoniated Bone Phosphate and Potash.....	Spalding Brothers, Burlingame.....	1 83	1 64
541 Swift's Complete Fertilizer ..	Haines Hardware Company, Emporia ..	0 84	0 82
565 Swift's Complete Fertilizer....	W. T. Williams Grain Company, Ottawa	1 08	0 82
542 Swift's Special Pure Bone Meal and Potash.....	Haines Hardware Company, Emporia.	1 25	0 82
543 Swift's Bone Meal Fertilizer	W. B. Young & Co., Chanute	0 84	1 03
548 Swift's Bone Meal Fertilizer	Farmers' Union Coop. Assn., Parsons	1 21	1 23
549 Swift's Bone Meal Fertilizer	Farmers' Union Coop. Assn., Parsons..	1 12	1 03
566 Swift's Bone Meal Fertilizer ..	W. T. Williams Grain Company, Ottawa	0 97	1 23
544 Swift's Pure Bone Meal.	Allin Grain Company, Coffeyville	2 07	2 47
545 Swift's Pulverized Sheep Manure	Allin Grain Company, Coffeyville.....	1 94	2 05
547 Swift's Truck Fertilizer ..	Allin Grain Company, Coffeyville.	2 05	2 47
538 Swift's Diamond "K" Grain Grower	Blaker Lumber and Grain Co., Fontana	1 15	0 82
564 Swift's Diamond "K" Grain Grower	W. T. Williams Grain Company, Ottawa ..	1 02	0 82
ARMOUR & Co.			
550 Helmet Brand Fine Ground Beef Bone.....	Pittsburg Modern Milling Company ..	2 31	2 17
551 Armour's 1-12-1 Fertilizer ..	Pittsburg Modern Milling Company ..	1 00	0 82
561 Armour's Ammoniated Phosphate.	H. L. Jaqueth, Galena ..	1 75	1 65
562 Armour's 1-8-1 Fertilizer ..	Rogers & Morganroth, Burlingame.....	0 82	0 82
539 Armour's 1-12-1 Fertilizer.....	Dickerson Hay and Grain Co., Humboldt..	0 98	0 32
COCHRANE PACKING COMPANY			
552 Pulverized Sheep Guano. .	Pittsburg Elevator Company.....	1 53	1 64
555 Corn and Wheat Grower ..	Cherokee Co. Milling and Elevator Company, Columbus.....	1 09	1 03
556 Available Superphosphate and Potash.....	Cherokee Co. Milling and Elevator Company, Columbus ..	0 98	0 82
VIRGINIA-CAROLINA CHEMICAL COMPANY			
557 Virginia-Carolina Grain Grower ..	Stauffer-Cammaek Grain Co., Columbus ..	0 005	..
558 Crescent Wheat Grower.....	Stauffer-Cammaek Grain Co., Columbus.	1 37	1 65
559 Superphosphate.....	Stauffer-Cammaek Grain Co., Columbus ..	0 005	..
MORRIS & Co.			
560 Steamed Bone.....	Cherokee Co. Milling and Elevator Company, Columbus.....	0 79	0 82

(a) This includes the water-soluble.

(b) Discarded.

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CONCLUDED

Minimum percent of phosphorus in phosphates								Minimum percent of potassium in compounds soluble in water		Maximum percent of chlorine in compounds soluble in water	
Soluble in water		Reverted		Insoluble		Total		Found	Guar-anteed	Found	Guar-anteed
Found	Guar-anteed	Found	Guar-anteed	Found	Guar-anteed	Found	Guar-anteed	Found	Guar-anteed	Found	Guar-anteed
2.30	.....	2.00	a4.37	0.71	0.20	5.01	4.57	0.56	0.41	0.41	1.50
1.68	...	2.72	a4.37	0.52	0.20	4.92	4.57	0.54	0.41	0.35	1.50
2.68	.....	1.50	a4.37	0.67	0.20	4.85	4.57	0.59	0.41	0.48	1.50
1.98	2.29	2.35	1.22	0.94	0.16	5.27	3.67	0.98	0.83	0.55	1.50
2.52	2.29	1.38	1.22	0.55	0.16	4.45	3.67	0.98	0.83	0.69	1.50
						9.59	7.85	3.12	3.32	0.00	3.02
						14.02	13.11				
						13.04	13.11				
						13.42	13.11				
						14.09	13.11				
						11.85	10.48				
b	b			0.12		0.67	0.65	2.54	1.24	0.31	1.12
2.62	.....	1.34	a3.49	0.64	0.20	4.60	3.69	0.52	0.83	0.26	1.50
3.40	.....	1.56	a5.24	0.40	0.20	5.36	5.44	0.60	0.83	0.31	1.50
3.28	.....	1.62	a5.24	0.64	0.20	5.54	5.44	0.87	0.83	1.09	1.50
0.22	.....	3.91	a2.62	5.92	7.86	10.05	10.48				
4.16	.....	0.99	a5.24	0.13	0.22	5.28	5.46	0.98	0.83	1.17	1.00
3.46	.....	0.82	a4.37	0.22	0.22	4.50	4.59				
2.90	.....	0.34	a3.49	0.07	0.22	3.31	3.71	1.24	0.83	0.81	1.00
4.22	.....	0.80	a5.24	0.12	0.22	5.14	5.46	0.68	0.83	1.02	1.00
0.20	.....	0.92	a0.87	0.32	0.44	1.24	1.31	1.11	0.83	0.26	0.00
2.68	1.99	0.32	3.49	0.92	0.50	3.93	5.98	0.94	0.30	0.59	0.30
2.80	.....	2.95	a6.53	0.44		6.19	7.00	0.37	0.62	0.07	.....
3.86	3.60	1.58	1.00	3.65	0.79	9.09	5.40	1.58	1.06	0.34	0.70
4.80	4.20	1.46	1.04	0.46	0.76	6.72	6.01			0.08	0.35
6.18	6.37	1.69	0.72	0.48	0.42	8.35	7.52			0.12	0.28
						13.92	13.97			Trace	

LIST OF KANSAS DEALERS IN FERTILIZERS, 1918

PLACE	DEALER	MANUFACTURER
Altamont	Altamont Grange	Wilson & Co.
Altamont	Libby Brothers	Swift & Co.
Altoona	Ball & Commons	Swift & Co.
Altoona	Ball & Commons	Meridian Fertilizer Works
Angola	Lugeanbeal & Olson	Swift & Co.
Arcadia	Dunton Hardware Co.	Swift & Co.
Atchison	Atchison Seed and Floral Co.	Swift & Co.
Baldwin	Williams & Brown	Thomas Ruddy Co.
Baldwin	Douglas County Farmers' Cooperative Assn.	Swift & Co.
Bartlett	E. E. Bickford	Swift & Co.
Birmingham	L. B. Longenecker	Swift & Co.
Brazilton	A. F. La Forge	Thomas Ruddy Co.
Bucyrus	Farmers' Cooperative Assn.	Swift & Co.
Bucyrus	T. Lenahan	American Agri. Chem. Co.
Bronson	Noble Grain Co.	Swift & Co.
Burlingame	E. G. Spalding	Swift & Co.
Burlington	Woodford & Gifford	Swift & Co.
Caney	Jno. Todd Hardware and Supply Co.	Swift & Co.
Chanute	Robert Griffin	Thomas Ruddy Co.
Chanute	W. B. Young & Co.	Swift & Co.
Cherryvale	Cherryvale Grain Co.	Swift & Co.
Chetopa	J. F. Shields	Swift & Co.
Chetopa	J. F. Shields	Virginia-Carolina Chem. Co.
Coffeyville	Allin Grain Co.	Swift & Co.
Coffeyville	Rea-Patterson Milling Co.	Virginia-Carolina Chem. Co.
Colony	H. R. Rhodes	Thomas Ruddy Co.
Colony	L. Crosby & Son	Thomas Ruddy Co.
Colony	Denton Hay Co.	Swift & Co.
Columbus	T. P. Bumgarner	American Agri. Chem. Co.
Columbus	J. E. Laubach	American Agri. Chem. Co.
Columbus	E. B. Davis	Thomas Ruddy Co.
Columbus	E. B. Davis	Swift & Co.
Columbus	Stauffer-Cammack Grain Co.	Virginia-Carolina Chem. Co.
Crestline	H. L. Jaqueth	American Agri. Chem. Co.
Cummings	F. W. Kauffman	Swift & Co.
Denton	Curtis Hardware Co.	Swift & Co.
De Soto	Gordon Grain Co.	Swift & Co.
Devon	Devon Grain Co.	Swift & Co.
Earlton, R. No. 1	Lewis Taylor	Swift & Co.
Edna	W. S. Wilmoth	Swift & Co.
Edna	Wilmoth Grain Co.	Swift & Co.
Edgerton	W. H. Kelly	Swift & Co.
Effingham	Snyder & Sells	Swift & Co.
Elk City	J. H. Meyer	Swift & Co.
Elk Falls	Finley & Frakes	Swift & Co.
Elmont, R. No. 10	Will Griffith	Swift & Co.
Emporia	Haines Hardware Co.	Swift & Co.
Emporia	Henry Lynn	Thomas Ruddy Co.
Erie	Johnson & Son	Swift & Co.
Eskridge	W. Trusler	Swift & Co.
Eudora	E. W. Kraus	Swift & Co.
Faulkner	A. R. Nash	American Agri. Chem. Co.
Fontana	Blaker Lumber Co.	Swift & Co.
Fort Scott	Mead Grain Co.	Swift & Co.
Galesburg	J. N. Shaw Estate	Swift & Co.
Galesburg	Carl Brunenn	Thomas Ruddy Co.
Gardner	Ward Grain Co.	Swift & Co.
Garnett	Frank Flotz	Swift & Co.
Girard	Crawford County Farmers' Union	Swift & Co.
Girard	Walberts & Timberlake	Swift & Co.
Gridley	Olson & Bahr	Swift & Co.
Hallowell	Fred Cowley	Morris & Co.
Harris	J. H. Turrell	Swift & Co.
Hartford	R. D. Carpenter	Thomas Ruddy Co.
Hartford	O'Connor & Stratton	Swift & Co.
Hepler	C. M. Orr	Swift & Co.

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PLACE	DEALER	MANUFACTURER
Humboldt	Stewart-Bragg	Swift & Co.
Humboldt	Grange Supply Co.	Thomas Ruddy Co.
Humboldt	Frank Stevens	Thomas Ruddy Co.
Hlatville	Williams Hardware Co.	Swift & Co.
Hutchinson	Young & Sons Mercantile Co.	Swift & Co.
Iola	Newton Milling and Elevator Co.	Swift & Co.
Independence	Union Implement and Hardware Co.	Swift & Co.
Labette	Labette Grange 1656.	Thomas Ruddy Co.
La Cygne	W. J. Dyer	American Agri. Chem. Co.
La Cygne	J. L. Teagarden	Wilson & Co.
La Harpe	C. L. Wilson & Son	Swift & Co.
Lawrence	Barteldes Seed Co.	Swift & Co.
Lawrence	R. E. Jackman	Thomas Ruddy Co.
Lone Elm	M. Carrier Estate	Swift & Co.
Longton	M. M. Miller	Swift & Co.
Louisburg	Interstate Mercantile Co.	Thomas Ruddy Co.
Louisburg	Louisburg Hardware and Implement Co.	Swift & Co.
Madison	W. O. Waymire	Swift & Co.
McCune	M. L. Westervelt	American Agri. Chem. Co.
Moline	E. R. Walker	Swift & Co.
Moran	Moran Grain Co.	Swift & Co.
Moran	Moran Grain Co.	Thomas Ruddy Co.
Neodesha	S. D. Logan	Swift & Co.
Neosho Falls	Neosho Falls Lumber Co.	Swift & Co.
Osawatomie	J. B. Remington	Swift & Co.
Osage City	Osage City Grain and Elevator Co.	Swift & Co.
Olpe	Bradfield & Hathway	Swift & Co.
Olpe	Bradfield & Hathway	Thomas Ruddy Co.
Oswego	E. M. Stice & Co.	Swift & Co.
Ottawa	W. S. Williams Grain Co.	Swift & Co.
Ottawa	F. H. Stannard	Thomas Ruddy Co.
Peabody	Moffett & Co.	Swift & Co.
Parsons	Labette County Farmers' Cooperative Union	Swift & Co.
Pleasanton	Blaker Lumber and Grain Co.	Swift & Co.
Paola	Fowler Commission Co.	Swift & Co.
Pittsburg	Kelso Grain Co.	Swift & Co.
Pittsburg	Kelso Grain Co.	Thomas Ruddy Co.
Pittsburg	Pittsburg Elevator Co.	Swift & Co.
Pittsburg	Pittsburg Modern Milling Co.	Virginia-Carolina Chem. Co.
Reading	Haines Hardware Co.	Swift & Co.
Redfield	Redfield Lumber Co.	Swift & Co.
Savonburg	W. H. Roberts	Swift & Co.
Scranton	F. E. Michaels	Thomas Ruddy Co.
Sherwin Junction	J. A. Zimmerman	American Agri. Chem. Co.
South Mound	Labette County Farmers' Cooperative Union	Swift & Co.
Spring Hill	Spring Hill Cooperative Assn.	Swift & Co.
St. Paul	Farmers' Cooperative Elevator Assn.	Swift & Co.
Thayer	O. L. Cross & Son	Swift & Co.
Topeka	D. O. Coe	Fertile Chemical Co.
Tyro	Davex Mahaffy	Swift & Co.
Tyro	O. F. Fields	Thomas Ruddy Co.
Uniontown	H. M. Griffith	Swift & Co.
Weir	H. W. Sutton	Virginia-Carolina Chem. Co.
Walnut	J. M. Mason	Swift & Co.
Walnut	Crawford County Cooperative Assn.	Swift & Co.
Wellsville	M. C. Everett	Swift & Co.
Wichita	Ross Brothers Seed Co.	Fertile Chemical Co.
Williamsburg	DeFogle Mercantile Co.	Swift & Co.
Yates Center	Yates Center Mills	Swift & Co.
Yates Center	Woodson County Grain Co.	Thomas Ruddy Co.
Parker	Wm. Hartford	Swift & Co.
Pittsburg	Pittsburg Modern Milling Co.	Meridian Fertilizer Works
South Mound	C. S. Boles	Meridian Fertilizer Works
Leavenworth	D. L. Goosey	Leavenworth Desic- cating Works