

MARCH 1, 1917.

INSPECTION CIRCULAR No. 4.

AGRICULTURAL EXPERIMENT STATION.
KANSAS STATE AGRICULTURAL COLLEGE.

DEPARTMENT OF CHEMISTRY.

**Analyses of Inspection Samples of Fertilizers,
Fall 1916.**

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THIS circular presents the results of the analyses of inspection samples of fertilizers taken from stocks offered for sale during the fall of 1916.

The accompanying table shows the results. Those which were found to be more than one-fifteenth below the guaranty are printed in italic type. The table shows that there is a very distinct tendency to a shortage in the potassium content. This is doubtless caused by the present scarcity in potassium compounds due to cutting off of trade with Germany, where the great deposits of potassium salts occur.

The value of reports such as this to farmers is obtained by a comparison of the composition of a fertilizer as guaranteed by the manufacturer with that found by analysis of samples taken in the open market. If the goods furnished correspond to the guaranty the manufacturer is at least dealing honestly with the consumer. Whether his price is too high or not is a question that is difficult to determine, as so many factors enter into the business of supplying commercial fertilizers. At the present time the fertilizer trade is greatly disturbed by market conditions growing out of the great war. This does not, however, afford any justification for the sale of commercial fertilizers that do not conform to the guaranty. In some cases a consumer might be willing to concede that a deficiency in one element is offset by an excess of another, so that as a whole he might be getting his money's worth. He is entitled, however, to receive what he pays for.

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 guaranties 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.

While differences of opinion exist concerning the best terms to be used in giving the composition of fertilizers, it seemed to those concerned in drafting the fertilizer law for the state of Kansas that it was best to apply to fertilizers the system of naming used throughout the science of chemistry in almost every relation. The problem is a difficult one to argue in a way intelligible to one who has not studied chemistry, but the old system, using the terms "potash," "phosphoric acid" and "ammonia" is altogether inconsistent with modern views of chemistry, and, in many cases, with the actual composition of the fertilizer. For the convenience of those who have some familiarity in practice with the old terms, there is included in this circular a table showing the quantities or percentages of potassium, phosphorus and nitrogen corresponding to one or more units of "potash," "phosphoric acid" and "ammonia."

In accordance with the provisions of the fertilizer law, this circular also includes a list of Kansas dealers in commercial fertilizers.

TABLE OF EQUIVALENTS IN PERCENTAGE OF CONSTITUENTS OF FERTILIZERS.

Percentage "ammonia," NH ₃ .	Corresponding percentage nitrogen, N.	Percentage "phosphoric acid," P ₂ O ₅ .	Corresponding percentage phosphorus, P.	Percentage "potash," K ₂ O.	Corresponding percentage potassium, K.
1	0.82	1	0.44	1	0.83
2	1.64	2	0.87	2	1.66
3	2.47	3	1.31	3	2.49
4	3.29	4	1.75	4	3.32
5	4.11	5	2.18	5	4.15
6	4.93	6	2.62	6	4.98
7	5.76	7	3.06	7	5.81
8	6.58	8	3.49	8	6.64
9	7.40	9	3.93	9	7.47
10	8.22	10	4.37	10	8.30
11	9.05	11	4.80	11	9.13
12	9.87	12	5.24	12	9.96
13	10.69	13	5.68	13	10.79
14	11.51	14	6.11	14	11.62
15	12.34	15	6.55	15	12.45
16	13.16	16	6.99	16	13.28
17	13.98	17	7.42	17	14.11
18	14.80	18	7.86	18	14.94
19	15.63	19	8.30	19	15.77
20	16.45	20	8.73	20	16.60
21	17.27	21	9.17	21	17.43
22	18.09	22	9.61	22	18.26
23	18.92	23	10.04	23	19.09
24	19.74	24	10.48	24	19.92
25	20.56	25	10.92	25	20.75
26	21.38	26	11.35	26	21.58
27	22.21	27	11.79	27	22.41
28	23.03	28	12.23	28	23.24
29	23.85	29	12.66	29	24.07
30	24.67	30	13.10	30	24.90
31	25.50	31	13.54	31	25.73
32	26.32	32	13.97	32	26.56
33	27.14	33	14.41	33	27.39
34	27.96	34	14.85	34	28.23
35	28.79	35	15.28	35	29.06
36	29.61	36	15.72	36	29.89
37	30.43	37	16.15	37	30.72
38	31.25	38	16.59	38	31.55
39	32.08	39	17.03	39	32.38
40	32.90	40	17.46	40	33.21
41	33.72	41	17.90	41	34.04
42	34.54	42	18.34	42	34.87
43	35.37	43	18.77	43	35.70
44	36.19	44	19.21	44	36.53
45	37.01	45	19.65	45	37.36
46	37.83	46	20.08	46	38.19
47	38.66	47	20.52	47	39.02
48	39.48	48	20.96	48	39.85
49	40.30	49	21.39	49	40.68
50	41.12	50	21.83	50	41.51

RESULTS OF ANALYSIS OF INSPECTION SAMPLES OF FERTILIZERS, FALL 1916.

BRANDS AND MANUFACTURERS. Name of seller, and place sampled.	Minimum percentage of total nitrogen.		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.	Guar-anteed.	Found.	Guar-anteed.	Found.	Guar-anteed.	Found.	Guar-anteed.	Found.	Guar-anteed.	Found.	Guar-anteed.	Found.	Guar-anteed.
ARMOUR FERTILIZER WORKS.														
416 Armour's 1-8-1 Fertilizer.														
Kelso Grain Company, Columbus.	1.25	.82			3.65	3.49	.44	.22	4.09	3.71	.63	.83	.15	
417 Armour's 1-8-1 Fertilizer.														
Dickinson Bros., Humboldt.	.88	.82			3.29	3.49	.37	.22	3.66	3.71	.59	.83	.20	
413 Helmet Brand Ammoniated Dissolved Bone and Potash.														
Pittsburg Modern Milling Co., Pittsburg.	2.02	1.65			4.48	4.37	.78		5.26	4.37	1.45	1.66	.40	1.65
414 Helmet Brand Ammoniated Dissolved Bone and Potash.														
Dobbs Grain Company, McLouth.	1.88	1.65			4.57	4.37	.89		5.46	4.37	1.63	1.66	.30	1.65
415 Helmet Brand Ammoniated Dissolved Bone and Potash.														
Thomas Hatfield, Valley Falls.	1.95	1.65			4.62	4.37	.98		5.60	4.37	1.50	1.66	.50	1.65
390 Helmet Brand Fine Ground Beef Bone.														
Henry Greve, Earlton.	2.52	2.47				2.62		7.86	10.55	10.48				
391 Helmet Brand Fine Ground Beef Bone.														
Kelso Grain Co., Columbus.	2.58	2.47				2.62		7.86	10.38	10.48				
409 Helmet Brand No. 282, Fertilizer.														
Kelso Grain Co., Columbus.	1.49	1.65			2.45	3.49	.55		3.00	3.49	1.29	1.66	1.50	1.65
410 Helmet Brand No. 282, Fertilizer.														
Dobbs Grain Co., McLouth.	1.98	1.65			3.52	3.49	.68		4.20	3.49	1.44	1.66	.55	1.65
411 Helmet Brand No. 282, Fertilizer.														
Holton Feed Store, Holton.	1.84	1.65			3.68	3.49	.70		4.38	3.49	1.43	1.66	.50	1.65
412 Helmet Brand No. 282, Fertilizer.														
Thomas Hatfield, Valley Falls.	2.12	1.65			3.67	3.49	.60		4.27	3.49	1.10	1.66	.60	1.65
392 Helmet Brand Raw Bone Meal.														
Kelso Grain Co., Columbus.	3.47	3.71				2.18		8.30	9.23	10.48				
COCHRANE PACKING CO.														
420 Cochrane's Champion Grain Grower.														
Farmers' Coop. Merc. Union, Parsons.	1.99	1.65			3.94	4.37	1.56	.22	5.50	4.59	.75	.83	1.40	
421 Cochrane's Champion Grain Grower.														
Kelso Grain Co., Columbus.	1.85	1.65			4.10	4.37	1.18	.22	5.28	4.59	.76	.83	1.45	

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RESULTS OF ANALYSES OF INSPECTION SAMPLES OF FERTILIZERS, FALL 1916—CONTINUED.

BRANDS AND MANUFACTURERS. Name of seller, and place sampled.	Minimum percentage of total nitrogen.		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.	Guar-anteed.	Found.	Guar-anteed.	Found.	Guar-anteed.	Found.	Guar-anteed.	Found.	Guar-anteed.	Found.	Guar-anteed.	Found.	Guar-anteed.
COCHRANE PACKING CO.—concluded.														
422 Cochrane's Champion Grain Grower. D. S. Lantz, Wagstaff	2.14	1.65			5.47	4.37	.42	.22	5.89	4.59	.38	.83	.70	
386 Cochrane's Pure Bone Meal. Farmers' Coop. Merc. Union, Parsons	1.77	2.47				2.62		7.86	12.45	10.48				
418 Cochrane's Special Grain Producer. Kelso Grain Co., Columbus	1.89	.82			4.68	5.24	1.06	.22	5.74	5.46	91	83	1.00	
419 Cochrane's Special Grain Producer. D. S. Lantz, Wagstaff	2.19	.82			5.78	5.24	.12	.22	5.90	5.46	.47	.83	.70	
385 Raw Bone Meal. Farmers' Coop. Merc. Union, Parsons	3.70								11.00					
EMPIRE CARBON WORKS.														
430 Bone Black Fertilizer, 1916. T. P. Bumgarner, Neutral	2.28	2.06	2.25		1.23	3.49	.80	.27	4.28	3.76	.67	.83	.80	
431 Bone Black Fertilizer, 1916. H. W. Sutton, Weir	2.41	2.06	2.40		1.34	3.49	.82	.27	4.56	3.76	.61	.83	1.00	
428 Bone Black Fertilizer, No. 2. C. S. Bales, South Mound	2.41	2.06	2.51		1.53	3.49	.54	.27	4.58	3.76			.25	
424 Empire Farmer's Favorite. T. P. Bumgarner, Neutral	1.04	.82	2.43		1.70	4.37	.76	.22	4.98	4.59	1.14	.83	.80	
425 Empire Farmer's Favorite. C. S. Bales, South Mound	1.21	.82	2.74		1.76	4.37	.84	.22	5.34	4.59	.67	.83	.70	
393 Empire Pure Raw Bone Meal. T. P. Bumgarner, Neutral	3.64	3.29							10.30	8.73				
394 Empire Pure Raw Bone Meal. H. L. Jacqueth, Galena	3.53	3.29							10.00	8.73				
395 Empire Pure Raw Bone Meal. H. W. Sutton, Weir	3.88	3.29							9.70	8.73				
429 Empire 16 Percent Phosphate. H. W. Sutton, Weir					6.99	6.98	.88	1.74	7.87	8.72				
387 Empire Special Bone Meal. H. L. Jacqueta, Galena	2.17	1.23							9.26	10.91				
388 Empire Special Bone Meal. T. P. Bumgarner, Neutral	2.06	1.23							8.78	10.91				

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RESULTS OF ANALYSES OF INSPECTION SAMPLES OF FERTILIZERS, FALL 1916—CONTINUED.

BRANDS AND MANUFACTURERS. Name of sculer, and place sampled.	Minimum percentage of total nitrogen.		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.	Guar-anteed.	Found.	Guar-anteed.	Found.	Guar-anteed.	Found.	Guar-anteed.	Found.	Guar-anteed.	Found.	Guar-anteed.	Found.	Guar-anteed.
<i>EMPIRE CARBON WORKS—concluded</i>														
389 Empire Special Bone Meal. H. W. Sutton, Weir.	2.13	1.23							8.44	10.91				
426 Steam Bone Substitute. H. W. Sutton, Weir.	1.99	1.65	2.75		1.15	4.36	1.12	.27	5.02	4.63			.30	None.
427 Steam Bone Substitute. T. P. Bumgarner, Neutral	1.96	1.65	2.58		1.36	4.36	.99	.27	4.93	4.63			.40	None.
<i>HULL & DILLON.</i>														
423 Enterprise Brand. Hull & Dillon Packing Co., Pittsburg..	6.17	6.74				2.95		1.07	6.26	4.02	.23	.44	.05	
<i>MORRIS & Co.</i>														
396 Steamed Bone Meal. Fred Cowley, Faulkner.	1.25	.82		Trace.					11.00	13.97				
<i>SWIFT & Co.</i>														
401 Swift's Ammoniated Bone Phosphate and Potash. E. M. Stice, Oswego	1.42	1.64	2.68		1.72	4.37	.62	.20	5.02	4.57	.30	.41	.50	1.50
404 Swift's Ammoniated Bone Phosphate and Potash. Walberts & Timberlake, Girard.	1.88	1.64	3.28		1.83	4.37	.74	.20	5.85	4.57	.49	.41	.60	1.50
405 Swift's Ammoniated Bone Phosphate and Potash. E. B. Davis, Columbus	1.60	1.64	3.06		1.44	4.37	.50	.20	5.00	4.57	.98	.41	.40	1.50
406 Swift's Ammoniated Bone Phosphate. Pittsburg Elevator Co., Pittsburg	1.56	1.64	2.82		1.38	4.37	.48	.20	4.68	4.57	.19	.41	.60	1.50
408 Swift's Clay Soil Special. Farmers' Coop. Merc. Union, Parsons	2.14	1.77	3.73		1.61	5.24	.76	.22	6.10	5.46			.60	.43
397 Swift's Diamond "K" Grain Grower. Olson Bros., Edna . . . . .	.97	.82	3.40		2.08	5.24	.48	.20	5.96	5.44	1.11	.83	.40	1.50
398 Swift's Diamond "K" Grain Grower. Pittsburg Elevator Co., Pittsburg	1.18	.82	3.58		2.06	5.24	.46	.20	6.10	5.44	.89	.83	.50	1.50
399 Swift's Diamond "K" Grain Grower. E. M. Stice, Oswego	1.05	.82	3.40		2.14	5.24	.48	.20	6.02	5.44	.70	.83	.45	1.50
400 Swift's Diamond "K" Grain Grower. Denton & Limbocker, South Mound. . . . .	.97	.82	3.42		2.02	5.24	.52	.20	5.96	5.44	.75	.83	.60	1.50

RESULTS OF ANALYSES OF INSPECTION SAMPLES OF FERTILIZERS, FALL 1916—CONCLUDED.

BRANDS AND MANUFACTURERS. Name of seller, and place sampled.	Minimum percentage of total nitrogen.		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.	Guar-anteed.	Found.	Guar-anteed.	Found.	Guar-anteed.	Found.	Guar-anteed.	Found.	Guar-anteed.	Found.	Guar-anteed.	Found.	Guar-anteed.
<i>SWIFT & Co.—concluded.</i>														
407 Swift's Diamond "K" Grain Grower. Walberts & Timberlake, Girard.....	1.11	.82	3.54	.....	1.40	5.24	.59	.20	5.53	5.44	.76	.83	.55	1.50
402 Swift's Diamond "L" Grain Grower. Farmers' Coop. Merc. Union, Parsons.....	1.61	1.69	3.88	.....	1.48	5.17	.74	.21	6.10	5.38	.53	.79	.40	1.28
375 Swift's Pure Bone Meal. E. B. Davis, Columbus.....	2.80	2.47	.....	.....	.....	.....	.....	.....	11.65	10.48	.....	.....	.....	.....
376 Swift's Pure Bone Meal. Pittsburg Elevator Co., Pittsburg.....	2.87	2.47	.....	.....	.....	.....	.....	.....	11.10	10.48	.....	.....	.....	.....
377 Swift's Pure Bone Meal. Farmers' Coop. Merc. Union, Parsons.....	3.00	2.47	.....	.....	.....	.....	.....	.....	11.55	10.48	.....	.....	.....	.....
378 Swift's Pure Bone Meal. Walberts & Timberlake, Girard.....	2.50	2.47	.....	.....	.....	.....	.....	.....	10.90	10.48	.....	.....	.....	.....
379 Swift's Pure Raw Bone Meal. Denton & Limbocker, South Mound.....	4.08	3.75	.....	.....	.....	.....	.....	.....	10.45	10.04	.....	.....	.....	.....
380 Swift's Pure Raw Bone Meal. E. B. Davis, Columbus.....	1.53	3.75	.....	.....	.....	.....	.....	.....	9.70	10.04	.....	.....	.....	.....
381 Swift's Special Bone Meal. E. B. Davis, Columbus.....	2.17	.82	.....	.....	.....	.....	.....	.....	11.24	12.66	.....	.....	.....	.....
382 Swift's Special Bone Meal. Denton & Limbocker, South Mound.....	1.08	.82	.....	.....	.....	.....	.....	.....	14.70	12.66	.....	.....	.....	.....
403 Swift's Special Grain fertilizer. Kelso Grain Co., Cherokee.....	1.89	1.65	2.47	.....	2.23	4.37	.84	.43	5.54	4.80	1.59	1.66	1.40	1.51
<i>WILSON & Co.</i>														
383 Wilson's Special Bone Meal. Farmers' Coop. Merc. Union, Girard.....	1.35	.82	.....	.....	.....	.....	.....	.....	14.13	13.00	.....	.....	.....	.....
384 Wilson's Special Bone Meal. Farmers' Coop. Merc. Shipping Co., Girard.....	1.56	.82	.....	.....	.....	.....	.....	.....	13.58	13.00	.....	.....	.....	.....

APPENDIX.

LIST OF KANSAS DEALERS IN FERTILIZERS, 1916.

PLACE.	Dealer.	Manufacturer.
Abilene . . .	Rice-Johntz-Nicolay Lumber Co. . .	Armour Fertilizer Works.
Altamont . . .	Altamont Grange . . .	Wilson & Co.
Altamont . . .	Libby Bros.	Swift & Co.
Altamont . . .	J. H. Rust	Armour Fertilizer Works.
Altoona . . .	Ball & Commons	Swift & Co.
Arcadia . . .	Denton Hardware Co.	Swift & Co.
Atchison . . .	Atchison Seed and Flower Store . .	Swift & Co.
Augusta . . .	J. J. Mannion	Armour Fertilizer Works.
Augusta . . .	J. J. Mannion	Swift & Co.
Axtell	W. H. Connet	Swift & Co.
Baldwin . . .	Douglas County Farmers' Coop. Assn. .	Cochrane Packing Co.
Baldwin . . .	Douglas County Farmers' Coop. Assn. .	Swift & Co.
Bartlett . . .	T. P. Burns Supply Co.	Armour Fertilizer Works.
Bartlett . . .	Grant Owen	Swift & Co.
Baxter Springs . .	Jaqueth & Gilman	Armour Fertilizer Works.
Birmingham . .	I. B. Longnecker Co.	Swift & Co.
Blue Rapids . . .	Blue Rapids Lumber Co.	Armour Fertilizer Works.
Bonner Springs . .	G. A. Perkins & Co.	Armour Fertilizer Works.
Brazilton . . .	A. J. Hayden	Armour Fertilizer Works.
Brazilton . . .	C. H. Ryan	Swift & Co.
Bronson . . .	Noble Grain Co.	Swift & Co.
Bucyrus . . .	B. V. Kirby	Swift & Co.
Buffalo . . .	Nichol & Jefferson	Swift & Co.
Burlingame . . .	E. G. Spaulding	Swift & Co.
Burlington . . .	Ralph A. Woodford	Swift & Co.
Carbondale . . .	S. L. Reid	Swift & Co.
Caney	Todd Hardware & Supply Co.	Swift & Co.
Chanute . . .	Chanute Milling Co.	Swift & Co.
Chanute . . .	C. D. Resler	Armour Fertilizer Works.
Cherokee . . .	Kelso Grain Co.	Cochrane Packing Co.
Cherokee . . .	Kelso Grain Co.	Swift & Co.
Cherokee . . .	Kelso Grain Co.	Armour Fertilizer Works.
Cherryvale . . .	Cherryvale Grain Co.	Swift & Co.
Cherryvale . . .	Jas. M. Davidson	Armour Fertilizer Works.
Chetopa . . .	St. Elmo Porter	Swift & Co.
Clay Center . . .	Home Lumber and Coal Co.	Armour Fertilizer Works.
Clay Center . . .	W. W. Smith & Sons	Swift & Co.
Coffeyville . . .	Isham Hardware Co.	Armour Fertilizer Works.
Coffeyville . . .	Square Deal Seed Co.	Swift & Co.
Colony	Fred H. Rhodes Lumber Co	Swift & Co.
Columbus . . .	E. B. Davis	Cochrane Packing Co.
Columbus . . .	E. B. Davis	Swift & Co.
Columbus . . .	J. C. Ebenstein	Armour Fertilizer Works.
Columbus . . .	Kelso Grain Co.	Armour Fertilizer Works.
Concordia . . .	Robinson & McCrary	Armour Fertilizer Works.
Crestline . . .	F. M. Gust	Armour Fertilizer Works.
Cummings . . .	F. W. Kauffman	Swift & Co.
Dearing . . .	O. O. Crane	Swift & Co.
Dennis	W. S. Mortimer	Armour Fertilizer Works.
Dennison . . .	Coleman & Artman	Armour Fertilizer Works.
Denton	J. H. Curtis	Swift & Co.
De Soto	Gardner Grain Co.	Swift & Co.
Earlton	E. A. George	Swift & Co.
Earlton	Henry Greve	Armour Fertilizer Works.
Earlton	Lewis Taylor	Swift & Co.
Edgerton . . .	W. H. Kelly	Swift & Co.
Edgerton . . .	C. J. Musick	Armour Fertilizer Works.
Edna	Olson Bros.	Swift & Co.
Edna	W. S. Wilmoth	Armour Fertilizer Works.
Effingham . . .	Effingham Lumber Co.	Armour Fertilizer Works.
Effingham . . .	Snyder, Smith & Co.	Swift & Co.
El Dorado . . .	Beaumont Feed & Seed Store	Swift & Co.
Elk City	A. R. Quigg & Son	Armour Fertilizer Works.
Elk City	J. H. Meyer	Swift & Co.
Elmont	Will Griffith	Swift & Co.
Elsmore	Krokstrom Bros.	Armour Fertilizer Works.
Emporia	U. S. Wolfe	Armour Fertilizer Works.
Erie	Farmers' Union Cooperative Assn . . .	Swift & Co.
Eudora	E. W. Kraus	Cochrane Packing Co.
Eudora	E. W. Kraus	Swift & Co.
Eureka	A. F. Jenne	Swift & Co.
Everest	F. H. Geiger	Armour Fertilizer Works.
Farlington . . .	J. F. Harris	Swift & Co.
Farlington . . .	J. W. Peterson	Armour Fertilizer Works.

LIST OF KANSAS DEALERS IN FERTILIZERS, 1916—CONTINUED.

PLACE.	Dealer.	Manufacturer.
Faulkner	Fred Cowley	Morris & Co.
Pontana	Blaker Lumber Co.	Swift & Co.
Fort Scott	Brooks Wholesale Co	Swift & Co.
Fort Scott	Mead Grain Co.	Armour Fertilizer Works.
Fort Scott	Mead Grain Co.	Swift & Co.
Fredonia	J. N. Shannon Implement Co	Armour Fertilizer Works.
Fredonia	J. N. Shannon Implement Co.	Swift & Co.
Fredonia	J. H. Simpson	Swift & Co.
Fulton	Fulton Lumber Co	Armour Fertilizer Works.
Fulton	Fulton Lumber Co.	Swift & Co.
Furley	C. F. Wright	Swift & Co.
Galesburg	Z. A. Eaton	Swift & Co.
Garden City	Garden City Grain & Produce Co	Swift & Co.
Gardner	J. F. Rankin	Armour Fertilizer Works.
Garnett	Thomas Baxter & Son	Swift & Co.
Garnett	Frank Foltz	Armour Fertilizer Works.
Germantown	Germantown Grain & Supply Co	Armour Fertilizer Works.
Gerard	Farmers' Cooperative Union Assn	Wilson & Co.
Gerard	L. E. Shannon	Armour Fertilizer Works.
Gerard	Walberts & Timberlake	Swift & Co.
Gridley	J. B. Walthall	Swift & Co.
Haddam	Potter Bros. Mercantile Co	Armour Fertilizer Works.
Hallowell	J. M. Forbes	Armour Fertilizer Works.
Hallowell	E. K. Gibbs	Armour Fertilizer Works.
Hamilton	Sanderson Bros	Swift & Co.
Hanover	Koenig & Son	Armour Fertilizer Works.
Harris	Pattie & Turrell	Swift & Co.
Hartford	O'Conner & Stratton	Swift & Co.
Havensville	N. W. Krings	Swift & Co.
Hepler	Clements & Co.	Swift & Co.
Herington	Herington Hardware Co	Swift & Co.
Hattville	Williams Hardware Co.	Swift & Co.
Hiawatha	C. N. Welcome	Armour Fertilizer Works.
Holton	Holton Feed Store	Armour Fertilizer Works.
Horton	Duff Brothers	Swift & Co.
Horton	Martin Hardin	Armour Fertilizer Works.
Humboldt	Dickinson Bros. Grain and Hay Co.	Armour Fertilizer Works.
Humboldt	Markley Bros	Swift & Co.
Hutchinson	W. S. Randle	Armour Fertilizer Works.
Hutchinson	Young & Sons	Swift & Co.
Independence	Union Implement and Hardware Co	Swift & Co.
Iola	Wishard & Bollinger	Swift & Co.
Junction City	J. J. and W. F. Muenzenmayer	Swift & Co.
Kincaid	Hensley & Brossius	Swift & Co.
La Cygne	D. H. Aul	Swift & Co.
La Cygne	C. T. Potter	Armour Fertilizer Works.
La Cygne	J. L. Teagarden	Wilson & Co.
La Harpe	Hackney & Son	Armour Fertilizer Works.
La Harpe	C. L. Wilson & Son	Swift & Co.
Lawrence	Barteldes Seed Co.	Swift & Co.
Leavenworth	T. F. Reyburn	Swift & Co.
Leavenworth	A. Schanze	Armour Fertilizer Works.
Leavenworth	H. H. Young & Son	Swift & Co.
Le Roy	G. W. Ringle	Swift & Co.
Lindsborg	E. L. Christian	Armour Fertilizer Works.
Linn	H. C. Heerman	Swift & Co.
Linwood	F. H. Grobb	Armour Fertilizer Works.
Linwood	Meinke Bros	Swift & Co.
Longton	M. M. Miller	Swift & Co.
Louisburg	Louisburg Hardware Co	Swift & Co.
McCune	McCauslin & Son	Swift & Co.
McCune	J. M. Stewart & Son	Armour Fertilizer Works.
McLouth	Dobbs Grain Co.	Armour Fertilizer Works.
McLouth	E. J. Jones	Swift & Co.
McPherson	J. O. Hanson	Armour Fertilizer Works.
Madison	Carey Sowder	Swift & Co.
Madison	W. O. Waymire	Swift & Co.
Manhattan	Geo. T. Fielding	Swift & Co.
Mayetta	R. L. Miller	Swift & Co.
Moran	Moran Grain Co.	Swift & Co.
Morganville	R. E. Miller	Armour Fertilizer Works.
Morrill	W. E. Robertson	Armour Fertilizer Works.
Mound City	Adams Lumber Co	Swift & Co.
Neodesha	Bauman Grain Co.	Swift & Co.

LIST OF KANSAS DEALERS IN FERTILIZERS, 1916--CONCLUDED.

PLACE.	Dealer.	Manufacturer.
Neosho Falls...	White & McDaniel	Swift & Co.
Netawaka...	Netawaka Lumber Co.	Swift & Co.
Newton	John Ensz	Armour Fertilizer Works.
Nortonville	J. J. Speck	Armour Fertilizer Works.
Nortonville..	J. J. Speck	Swift & Co.
Olathe	Weber Milling Co.	Swift & Co.
Olpe	Bradfield & Hathway	Swift & Co.
Onaga	Onaga Lumber and Grain Co.	Armour Fertilizer Works.
Oneida	Emery Conwell	Swift & Co.
Oneida	Oneida Farmers' Shipping Association.	Armour Fertilizer Works.
Osage City	Kansas Lumber and Supply Co.	Swift & Co.
Osawatomie	Barr Brothers	Swift & Co.
Osawatomie..	Osawatomie Lumber Co.	Armour Fertilizer Works.
Oskaloosa	L. H. Kimmel	Swift & Co.
Oswego	Oswego Milling Co.	Cochrane Packing Co.
Oswego	Oswego Milling Co.	Swift & Co.
Ottawa	Forest Park Milling Co.	Armour Fertilizer Works.
Ottawa	W. S. Williams Grain Co.	Swift & Co.
Paola	Fowler Commission Co.	Swift & Co.
Paola	Griffith & Co.	Armour Fertilizer Works.
Parsons	Labette County Farmers' Merc. Union.	Cochrane Packing Co.
Parsons	McAler Mill and Elevator Co.	Swift & Co.
Parsons	Parsons Union No. 866, Harry Neath	Swift & Co.
Peabody	Moffett & Co.	Swift & Co.
Piqua	J. G. Wilson Lumber Co.	Armour Fertilizer Works.
Piqua	J. G. Wilson Lumber Co.	Swift & Co.
Pittsburg	Pittsburg Elevator Co.	Swift & Co.
Pittsburg	Pittsburg Modern Milling Co.	Armour Fertilizer Works.
Pittsburg	J. Luther Taylor	Swift & Co.
Pleasanton	Blaker Lumber Co.	Swift & Co.
Powhattan	J. H. Kinnear	Armour Fertilizer Works.
Prescott	Cummings Bros. & Carse	Swift & Co.
Quenemo	F. C. White	Swift & Co.
Redfield	Redfield Lumber Co.	Armour Fertilizer Works.
Sabetha	Pace Feed Store	Swift & Co.
Sabetha	C. T. Rook	Armour Fertilizer Works.
Salina	Western Seed House	Armour Fertilizer Works.
Seneca	D. H. Ferguson & Co.	Armour Fertilizer Works.
Seneca	J. P. Koelzer Lumber Co.	Swift & Co.
Severy	The Robinson Co.	Swift & Co.
South Mound.	Denton & Limbocker	Swift & Co.
Spring Hill	Spring Hill Cooperative Association	Swift & Co.
Thayer	C. L. Cross & Son	Swift & Co.
Tonganoxie	Zellner Mercantile Co.	Swift & Co.
Topeka	T. A. Beek	Armour Fertilizer Works.
Topeka	D. O. Coe	Swift & Co.
Tyro	G. L. Taylor	Cochrane Packing Co.
Tyro	Tyro Supply Co.	Swift & Co.
Uniontown	Goodlander & Conantz	Swift & Co.
Urbana	Lewis Taylor	Cochrane Packing Co.
Valley Falls	Thos. Hatfield	Armour Fertilizer Works.
Wagstaff	D. S. Lentz	Cochrane Packing Co.
Wagstaff	Wagstaff Mercantile Co.	Swift & Co.
Wanut	J. E. Clark	Swift & Co.
Wanut	Pat Diskin	Swift & Co.
Wanut	Farmers' Union Mercantile Co.	Wilson & Co.
Wanut	J. M. Mason	Swift & Co.
Wanut	Robison Bros	Armour Fertilizer Works.
Wamego	J. W. Machin & Son	Swift & Co.
Washington	E. A. Mueller	Armour Fertilizer Works.
Waverly	C. L. Foster	Swift & Co.
Wellsville	M. C. Everitt	Swift & Co.
Whiting..	W. G. Higby	Swift & Co.
Wichita	Marlow Seed Co.	Swift & Co.
Wichita	Ross Bros.	Armour Fertilizer Works.
Yates Center	Yates Center Mills	Swift & Co.