

AGRICULTURAL EXPERIMENT STATION

KANSAS STATE AGRICULTURAL COLLEGE
MANHATTAN, KANSAS

DEPARTMENT OF CHEMISTRY

FERTILIZER CONTROL IN 1920

C. O. SWANSON AND W. L. LATSHAW

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EXPLANATORY STATEMENTS

In compliance with the Kansas fertilizer law, samples of the different brands of fertilizer sold in the state are each year collected and analyzed. The analytical report on the samples collected in the spring of 1920 is presented in Table I, and the analytical report on the samples collected in the fall of 1920 in Table II. In the spring 12 towns were visited, 25 dealers called upon, and 55 samples, representing 32 brands, collected. In the fall 32 towns were visited, 43 dealers called upon, and 105 samples, representing 50 brands, collected.

The figures in Tables I and II are given in terms of elements, not compounds. This is in accordance with the Kansas fertilizer law. The figures for compounds are larger than the corresponding figures for elements. Thus 12 percent of phosphoric acid is equivalent to 5.24 percent of phosphorus, 2 percent of potash is equivalent to 1.66 percent of potassium, 2 percent of ammonia is equivalent to 1.65

percent of nitrogen. The relation between the elements and the compounds can be seen from the following rules for converting any one form into terms of its corresponding form.

- Percent nitrogen X 1.22 = percent ammonia
- Percent ammonia X 0.82 = percent nitrogen
- Percent phosphorus X 2.29 = percent phosphoric acid
- Percent phosphoric acid X 0.437 = percent phosphorus
- Percent potassium X 1.2 = percent potash
- Percent potash X 0.83 = percent potassium

The value of a fertilizer is not influenced by the method used in stating results. The value of a fertilizer depends on (1) the amount and kind of plant food elements present, (2) the form of combination or availability of these elements, and (3) the physical texture or ease with which the fertilizer may be handled and applied to the soil. The value of a fertilizer does not depend on a brand name. Different brands having the same formula are equally valuable if the chemical combination of the elements and the physical condition is the same. The elements of value in commercial fertilizers are (1) nitrogen, (2) phosphorus, and (3) potassium.

Nitrogen.—The Kansas fertilizer law requires the manufacturers to register and guarantee total nitrogen only. If the inspection report shows that the total nitrogen present is equal to the guaranty, the manufacturer has complied with the letter of the law, provided that some of this nitrogen does not come from horns, hoofs, hair, leather scrap, or similarly inert material. Some of this inert material may be so treated with compressed steam or sulphuric acid so as to completely change the character of the original material and make the nitrogen available for plant use.

Nitrogen which comes from material soluble in water is available immediately for plant use. Such nitrogen usually comes from such mineral salts as sodium nitrate and ammonium sulphate. Nitrogen which comes from slaughter house products is quickly made available for plant use by the conditions existing in the soil. Most of the nitrogen found in fertilizers sold in Kansas comes from these two sources.

It is a simple matter to determine the amount of water-soluble nitrogen present in a fertilizer. To distinguish between the available water-insoluble and the unavailable water-insoluble is not so simple. Not all nitrogen from slaughter house products or from by-products of seeds is equally available. There is a difference between the availability of nitrogen in steamed bone and in dried blood

Some of the nitrogen from steamed bone is as available as the nitrogen from dried blood and some is not. There are chemical methods for distinguishing between these forms. While these chemical methods have not received the same degree of endorsement by fertilizer chemists as the method for totals of the elements, the results obtained do have a value.

In Table I the results on nitrogen are given in three different forms in addition to the total. The active water-soluble practically all comes from mineral salts and is available immediately. The active water-insoluble represents the nitrogen in such organic form as is readily changed to a form usable by plants. The inactive water-insoluble represents that condition in which the nitrogen becomes available very slowly. It is difficult to place a valuation on nitrogen in such condition. In time such nitrogen will be changed to such forms as are usable by plants. The amount of nitrogen present in commercial fertilizer is relatively small and such as is present is wanted usually for quick action in aiding the plant at the start. For feeding the plant the slow-acting forms present in the soil must be used. While the figures for the different forms of nitrogen present in Table I vary considerable it can be said that in the ordinary mixed fertilizer about one-third, and in bone goods about one-half of the nitrogen is found in the inactive water-insoluble form

Phosphorus.— Phosphorus is given under four headings in Tables I and II Phosphorus in phosphates (1) Soluble in water, (2) available or reverted, (3) insoluble, and (4) total. Most companies do not make a separate guaranty for the water-soluble and available or reverted, but include both under the latter heading. This is just as satisfactory as the two forms have practically the same agricultural value. In the ordinary mixed fertilizer the amount of phosphorus found in insoluble phosphate is small. This is because ordinarily acid phosphate is the source of phosphorus. This insoluble form of acid phosphate has a low value, both commercially and agriculturally, in comparison with the available. The insoluble has the same value as the phosphorus from rock phosphate. In bone goods the conditions are different. From one-third to two-thirds of the phosphorus from bone is in the insoluble form. But this becomes available for plant use much more quickly than the insoluble from the acid phosphate. It is usually best to consider only total phosphorus in bone goods. It is undesirable to mix bone goods with acid phosphate. Bone goods have an established value,

known and understood by farmers. So has acid phosphate. When acid phosphate is mixed with bone goods there is no satisfactory way to distinguish between the insoluble from bone and the insoluble from acid phosphate and the analytical report on such fertilizers shows them to a disadvantage in comparison with fertilizers whose phosphorus comes wholly from acid phosphate.

Potassium.—The only form of potassium recognized by the state law is that soluble in water. The original source of potassium makes no difference provided the carrier of compound containing potassium does not contain any deleterious substances. The sources of most potassium found in fertilizers are potassium sulphate and potassium chloride sometimes called muriate of potash.

ANALYSES OF INSPECTION SAMPLES

In the results of the analyses of inspection samples of fertilizers given in Tables I and II, those which fall below the guaranteed analyses more than one-fifteenth are given in bold-face type. These are deficient according to the state law. The results may be summarized as follows.

	TOTAL ANALYSES	NUMBER DEFICIENT	PERCENT DEFICIENT
Spring			
Total nitrogen	43	3	6.9
Phosphorus in available forms	39	5	12.8
Total phosphorus	52	4	7.7
Water-soluble potassium	25	6	24.0
Fall			
Total nitrogen	77	7	9.1
Phosphorus in available forms	78	6	7.7
Total phosphorus	102	7	6.8
Water-soluble potassium	36	1	2.8
The Year			
Total nitrogen	120	10	8.3
Phosphorus in available forms	117	11	9.4
Total phosphorus	154	11	7.1
Water-soluble potassium	61	7	11.5

This summary shows a notable improvement over the results obtained in 1919. An examination of Tables I and II will show that many more samples were more than one-fifteenth above the guaranty than were more than one-fifteenth below the guaranty.

**Table I—Results of analyses of inspection samples of
fertilizers, Spring, 1920**

(5)

TABLE I—RESULTS OF ANALYSES OF INSPECTION SAMPLES OF FERTILIZERS, SPRING, 1920

MANUFACTURER, BRAND ON SALE, AND DEALER	Compo- sition guaran- teed (G) and found (F)	Percent nitrogen				Percent phosphorus in phosphates				Percent potas- sium soluble in water	Percent chlorine
		Active water- soluble	Active water- in- soluble	Inactive water- in- soluble	Total	Soluble in water	Avail- able or re- verted	In- soluble	Total		
American Agricultural Chemical Company (Empire Carbon Works)											
EMPIRE 16 PERCENT ACID PHOSPHATE	G						6 98	1 74	8 72		
743 Humboldt Mill & Elev Co, Humboldt	F						7 67	47	8 14		
EMPIRE FARMER'S FAVORITE	G				0 82		4 37	22	4 59	0 83	
744 Humboldt Mill & Elev Co, Humboldt	F				92		4 69	53	5 22	85	
Armour & Co.											
ARMOUR'S BIG CROP 2-12-2 BRAND	G				1 65		5 24	22	5 46	1 66	2 00
715 Pittsburg Mod Mfg Co, Pittsburg	F	0 99	0 29	0 49	1 77		5 82	58	6 40	1 30	
ARMOUR'S 1-12-1 FERTILIZER	G				82		5 24	22	5 46	83	1 00
716 Pittsburg Mod Mfg Co, Pittsburg	F	38	30	36	1 04		5 40	52	5 92	95	
732 Cherokee Co Mill & Elev Co, Columbus	F	36	31	36	1 03		5 42	95	6 37	92	
746 Colony Elevator Company, Colony	F	25	30	33	88		5 88	77	6 65	96	
HELMET BRAND No 282 FERTILIZER	G				1 65		3 49		3 49	1 66	1 65
717 Pittsburg Mod Mfg Co, Pittsburg	F	1 26	30	21	1 77		3 24	34	3 58	1 68	
HELMET 16 PERCENT PHOSPHATE	G						6 99	22	7 21		25
718 Pittsburg Mod Mfg Co, Pittsburg	F						6 51	85	7 36		
HELMET BRAND FINE GROUND BEEF BONE	G				2 47		2 62	7 86	10 48		
719 Pittsburg Mod Mfg Co, Pittsburg	F	68	98	1 29	2 95		3 22	6 76	9 98		
730 Cherokee Co Mill & Elev Co, Columbus	F	65	1 00	1 35	3 00		3 86	6 29	10 15		
ARMOUR'S AMMONIATED PHOSPHATE	G				1 65		4 37	22	4 59		1 00
720 Pittsburg Mod Mfg Co, Pittsburg	F	82	39	47	1 68		4 12	59	4 71		
ARMOUR'S NEW RECORD BRAND	G				82		4 37	22	4 59	83	1 00
745 Colony Elevator Company, Colony	F	23	52	24	99		4 82	60	5 42	1 06	
Cochrane Packing Company											
COCHRANE'S CORN AND WHEAT GROWER	G				1 03	2 99	2 49	50	3 98	1 03	30
741 Chanute Grain Company, Chanute	F		66		1 14	27	3 65	53	4 45	1 08	

TABLE I--CONTINUED

MANUFACTURER, BRAND ON SALE, AND DEALER	Compo- sition guaran- teed (G) and found (F)	Percent nitrogen				Percent phosphorus in phosphates				Percent potas- sium soluble in water	Percent chlorine
		Active water- soluble	Active water- in- soluble	Inactive water- in- soluble	Total	Soluble in water	Avail- able or re- verted	In- soluble	Total		
<i>Swift & Co</i>											
SWIFT'S DIAMOND 'A' VEGETABLE AND FRUIT GROWER	G				2 47		3 49	44	3 93	2 49	1 50
710 Crawford Co Farmers' Union, Girard	F	1 73	35	37	2 45	3 85	40	4 25	2 02		
739 Union Implement Company, Independence	F	1 51	28	42	2 21	3 62	84	4 46	2 35		
740 Farmers' Business Assn, Chanute	F	1 60	31	42	2 33	4 14	49	4 63	2 14		
SWIFT'S HIGH GRADE ACID PHOSPHATE 0-16-0	G					6 99	22	7 21			
724 Pittsburg Elevator Company, Pittsburg	F					6 57	59	7 16			
737 Union Implement Company, Independence	F					7 06	1 10	8 16			
748 A. F. Huskey, Colony	F					7 75	20	7 95			
711 Crawford Co Farmers' Union, Girard	F					8 87	63	9 50			
SWIFT'S SUPERPHOSPHATE	G				1 65	3 49	44	3 93	1 66	1 51	
725 Pittsburg Elevator Company, Pittsburg	F	80	52	60	1 92	4 54	50	5 04	91		
SWIFT'S CLAY SOIL SPECIAL 2-12-0	G				1 65	5 24	22	5 46		43	
735 Farmers' Union Co-op Assn, Parsons	F	1 33	05	40	1 78	5 12	58	5 70			
742 Stewart Bragg, Humboldt	F	98	30	35	1 63	5 21	61	5 82			
SWIFT'S AMMONIATED BONE PHOSPHATE AND POTASH,	G				1 65	4 37	43	4 80	42	1 50	
749 A. F. Huskey, Colony	F	79	59	1 08	2 46	4 24	56	4 80	60		
751 Atchison Seed and Flower Co., Atchison	F	1 60	00	59	2 19	4 27	58	4 85	54		
SWIFT'S CHAMPION WHEAT AND CORN GROWER	G				1 65	5 24	22	5 46	1 66	1 88	
752 Barteldes Seed Company, Lawrence	F				1 87	5 79	68	6 47	2 01		
Virginia-Carolina Chemical Company											
BONE MEAL MIXTURE 4-20-0	G				3 30			8 80			
726 Stauffer Commack, Columbus	F	70	66	1 96	3 32			8 29			
Wilson & Co											
WILSON'S BONE MEAL AND ACID PHOSPHATE	G				82	2 25	4 00	3 75	10 00		
731 Cherokee Co Mill & Elev Co Columbus	F	48	32	33	1 13	1 83	3 93	5 72	11 38		

(a) Figures in bold-face type represent results falling below the guaranteed analysis more than one-fifteenth

TABLE II—RESULTS OF ANALYSES OF INSPECTION SAMPLES OF FERTILIZERS, FALL, 1920

MANUFACTURER, BRAND ON SALT, AND DEALER	Composition guaranteed (G) and found (F)	Percent nitrogen	Percent phosphorus in phosphates				Percent potassium soluble in water	Percent chlorine
			Soluble in water	Available or reverted	Insoluble	Total		
American Agricultural Chemical Company (Empire Carbon Works)								
EMPIRE" ECONOMY MIXTURE								
825 K L Jaquetb, Crestline	G	0 82		4 37	0 22	4 59		
	F	1 77		5 19	49	5 68		
"EMPIRE" FARMER'S FAVORITE								
846 Humboldt Mill & Elev Co, Humboldt	G	82		4 37	22	4 59	0 83	1 00
766 Clayton Supply Company, Cherryvale	F	95		4 98	4	5 44	78	42
770 Farmers' Supply Company, Independence	F	85		4 67	58	5 25	92	3 33
805 Anderson & Simmons, Neosho Falls	F	85		5 17	58	5 75	84	2 54
	F	89		4 68	82	5 50	83	1 67
16 PERCENT ACID PHOSPHATE								
785 Farmers' Union Elevator Co, West Mineral	G			6 98	1 74	8 72		
847 Humboldt Mill & Elev Co, Humboldt	F			7 58	80	8 38		
767 Clayton Supply Company, Cherryvale	F			8 09	34	8 43		
769 Farmers' Supply Company, Independence	F			6 25	1 76	8 01		
793 Gaebil & Kelse, Weir	F			7 31	89	8 20		
797 Kelse Grain Company, Pittsburg	F			7 07	90	7 97		
800 Earleton Co-op Assn, Earleton	F			7 39	75	8 14		
806 Anderson & Simmons, Neosho Falls	F			8 08	21	8 29		
	F			7 04	42	7 16		
EMPIRE NITROPHOS ' 2-12 0								
782 Farmers' Union Elevator Co, West Mineral	G	1 65	3 88	1 36	22	5 46		1 00
	F	1 41	3 74	6 19	77	6 96		142
STEAM BONE SUBSTITUTE								
783 Farmers' Union Elevator Co, West Mineral	G	1 65		4 36	27	4 63		
807 Anderson & Simmons, Neosho Falls	F	1 76		5 14	76	5 89		
	F	1 64		5 13	76	5 89		
EMPIRE" SPECIAL BONE MEAL								
784 Farmers' Union Elevator Co, West Mineral	G	1 23				10 91		
808 Anderson & Simmons, Neosho Falls	F	1 14				8 77		
799 Earleton Co-op Assn, Earleton	F	1 94				11 62		
	F	2 03				11 40		
Armour & Co								
HELMFT BRAND FINE GROUND BLEB BONE								
774 Cherokee Co Mill & Elev Co, Coffeyville	G	2 47		2 62	7 86	10 48		
843 Allin Grain Co, Coffeyville	F	2 79				9 88		07
788 Farmers' Union Elevator Co, West Mineral	F	1 88		4 26	9 11	13 37		
	F	2 70		2 95	7 90	10 85		035

TABLE II—CONTINUED

MANUFACTURER, BRAND ON SALE, AND DEALER	Composition guaranteed (G) and found (F)	Percent nitrogen	Percent phosphorus in phosphates				Percent potassium soluble in water	Percent chlorine
			Soluble in water	Available or reverted	Insoluble	Total		
<i>Armour & Co</i>								
ARMOUR'S BIG CROP 1/2 BONE MEAL 1/2 ACID PHOSPHATE	G	1 23		4 80	3 93	8 73		
775 Cherokee Co Mill & Elev Co, Columbus	F	1 38		3 56	5 26	8 82		25
790 Farmers' Union Elevator Co, West Mineral	F	1 52		3 27	5 50	8 77		071
<i>ARMOUR'S NEW RECORD BRAND</i>								
786 Farmers' Union Elevator Co, West Mineral	G	82		4 47	22	4 59	83	1 00
	F	99		4 02	73	4 75		
<i>ARMOUR'S BIG CROP 1-12-1 FERTILIZER</i>								
787 Farmers' Union Elevator Co, West Mineral	G	82		5 24	22	5 46	83	1 00
851 J G Wilson Lumber Company, Piqua	F	99		5 33	78	6 11	1 18	57
855 Woodson Co Grain Company Yates Center	F	1 03		5 26	54	5 80	94	53
	F	96		6 12	1 02	7 14		53
<i>ARMOUR'S 1-8-1 FERTILIZER</i>								
789 Farmers' Union Elevator Co, West Mineral	G	82		3 49	22	3 71	83	1 00
	F	93		3 91	45	4 36	87	
<i>HELMET BRAND RAW BONE MEAL</i>								
824 H L Jaqueth, Crestline	G	3 71		2 18	8 30	10 48		
	F	4 14		3 14	7 41	10 55		
<i>ARMOUR'S BIG CROP 2-12-2 BRAND</i>								
844 Allin Grain Company, Coffeyville	G	1 65		5 24	22	5 46	1 66	2 00
	F	1 96		5 16	2 25	7 41		78
<i>Cochrane Packing Company</i>								
COCHRANE'S CHAMPION GRAIN GROWER	G	1 65		4 37	22	4 59	83	
798 W B Young, Chanute	F	96		3 40	1 05	4 45	61	248
<i>Cudahy Packing Company</i>								
CUDAHY'S BLUE RIBBON STEAMED BONE MEAL	G	2 47				10 48		
764 Farmers' Union Co-op Assn, Parsons	F	2 91				11 25		
773 Stauffer Cammack Grain Company, Columbus	F	2 95				11 11		
794 Pittsburg Mod Mfg Co, Pittsburg	F	2 93				11 63		
804 Colony Elevator Company, Colony	F	3 13				11 10		
<i>Darling & Co.</i>								
DARLING'S PURE GROUND BONE	G	1 85				12 22		
822 E B Davis, Columbus	F	2 62				11 55		

Interstate Fertilizer Company									
INTERSTATE 1-12-1		G	82		5 24	22	5 46	83	1 00
780	Cherokee Co Mill & Elev Co, Columbus	F	91		4 20	1 21	5 41	86	107
845	Farmers' Union Co-op Assn, Parsons	F	78		4 95	1 03	5 98	1 12	21
INTERSTATE 0-15-2		G			6 54	22	6 76	1 66	1 00
756	James H. Cassin, Girard	F			5 86	1 24	7 10	1 71	32
761	Farmers' Union Co-op Assn, Parsons	F			5 69	1 06	6 75	1 48	
INTERSTATE 1-10-0		G	82		4 36	22	4 58		1 00
762	Farmers' Union Co-op Assn, Parsons	F	64		3 90	59	4 79	77	
778	Cherokee Co Mill & Elevator Co, Columbus	F	79		4 04	70	4 74	85	
INTERSTATE 1-29 SLEAM BONE MEAL		G	82		3 17	9 49	12 66		
781	Cherokee Co Mill & Elev Co, Columbus	F	2 10		3 75	8 04	11 79		
Meridian Fertilizer Factory									
UNION SPECIAL ACID PHOSPHATE		G			5 68	1 31	22	7 21	
755	Crawford Co Farmers' Union Co-op Assn, Girard	F			3 31	7 31	1 03	8 34	
MERIDIAN KANSAS SPECIAL 1-10-1		G	82		4 37	87		83	
754	Crawford Co Farmers' Union Co-op Assn, Girard	F	84		1 69	3 68	1 09	6 46	
MERIDIAN EASY DRILLER PHOSPHATE		G			5 68	1 31	22	7 21	
777	Cherokee Co Mill & Elev Co, Columbus	F			5 55	2 00	18	7 73	
Pelican Fertilizer Works									
PELICAN SPECIAL PHOSPHATE		G			5 68	1 31	22	7 21	
796	Kelso Grain Company, Pittsburg	F			5 23	2 21	19	7 63	
Phosphated Manure Company									
WIZARD BRAND PHOSPHATED MANURE 1-9-1		G	82	20	3 59		3 79	1 00	
765	Farmers' Co-op Assn, Parsons	F	1 10	2 23	1 58	28	4 09	1 13	
Swift & Co									
SWIFT'S DIAMOND "K" GRAIN GROWER		G	82		5 24	22	5 46	83	1 50
760	Crawford Co Farmers' Union Co-op Assn, Walnut	F	84		5 57	61	6 18	1 18	
792	Farmers' Union Elev Co, West Mineral	F	93		5 86	90	6 76	84	011
802	E A George, Earleton	F	93		5 63	89	6 52	83	071
809	Farmers Union, Bucyrus	F	1 35		4 95	53	5 48	25	
810	Whitaker Brothers, Paola	F	88		5 12	53	5 65	1 09	39
814	C T Potter, La Cygne	F	96		5 67	83	6 50	1 02	21
820	E B Davis, Columbus	F	82		5 95	57	6 52	1 10	32
827	Gleason Brothers Crestline	F	83		5 60	64	6 24	1 13	25
838	J F Shields, Chetopa	F	1 01		5 24	1 10	6 34	1 26	07
848	Farmers' Grange, Humboldt	F	80		5 43	87	6 30		
850	Piqua Elevator Company, Piqua	F	1 03		5 98	80	6 78	82	21
758	Crawford Co Farmers' Union Co-op Assn, Brazilton	F	82		5 72	72	6 44	1 03	14

'TABLE II—CONTINUED

MANUFACTURER, BRAND ON SALE, AND DEALER	Composition guaranteed (G) and found (F)	Percent nitrogen	Percent phosphorus in phosphates				Percent potassium soluble in water	Percent chlorine
			Soluble in water	Available or reverted	Insoluble	Total		
<i>Swift & Co</i>								
16 PERCENT ACID PHOSPHATE	G			6 99	22	7 21		
812 C T Potter, La Cygne	F			7 25	87	8 12		
829 Gleason Brothers Crestline	F			7 89	49	8 38		
831 C D Thomas, Baxter	F			7 80	68	8 48		
849 Piqua Elevator Company, Piqua	F			7 72	80	8 52		
759 Crawford Co Farmers' Union Co-op Assn, Walnut	F			7 34	48	7 82		
795 Pittsburg Elevator Company, Pittsburg	F			6 94	55	7 49		
SWIFT'S DIAMOND L" GRAIN GROWER	G	1 65		5 24	22	5 46	83	1 28
830 Gleason Brothers, Crestline	F	78		4 62	58	5 20	1 94	60
768 Union Implement and Hardware Company Independence	F	1 70		5 92	53	6 45	85	32
815 C T Potter, La Cygne	F	1 28		5 44	1 26	6 70	1 05	21
834 C D Thomas, Baxter Springs	F	1 68		5 99	57	6 56		07
840 Allin Grain Company, Coffeyville	F	1 68		5 90	42	6 32		21
SWIFT'S 1¼-30-0 BONE MEAL FERTILIZER	G	1 03				13 11		
828 Gleason Brothers, Crestline	F	1 20				13 33		
837 J F Shields, Chetopa	F	1 36				13 37		
839 Allin Grain Company, Coffeyville	F	1 47				13 65		
853 Farmers' Elevator Company, Yates Center	F	1 06				11 95		
757 Crawford Co Farmers' Union Co-op Assn, Biazilton	F	1 13				12 00		
SWIFT'S CHAMPION WHEAT AND CORN GROWER	G	1 65		5 24	22	5 46	1 66	1 88
836 J F Shields Chetopa	F	1 88		5 21	65	5 86	1 74	42
841 Allin Grain Company, Coffeyville	F	1 66		5 76	42	6 18	1 65	25
SWIFT'S RAW BONE MEAL	G	3 70				10 04		
753 Crawford Co Farmers' Union Co-op Assn, Girard	F	3 12				8 17		
821 E B Davis, Columbus	F	3 51				6 94		
833 C D Thomas, Baxter	F	3 70				8 02		
SWIFT'S BONE MEAL AND PHOSPHATE	G	8 2				8 74		
813 C T Potter La Cygne	F	2 02				11 99		
823 C D Thomas Baxter	F					8 27		
842 Allin Grain Company, Coffeyville	F	1 59				9 47		
854 Farmers' Elevator Company, Yates Center	F	1 13				8 44		
791 Farmers' Union Elevator Company, West Mineral	F	1 16				8 71		

SWIFT'S SPECIAL GRAIN AND GRASS GROWER								
801	E A George, Farlton	G	1 65		4 37	43	4 80	1 25
852	Farmers' Elevator Company, Yates Center	F	1 88		5 14	90	6 04	1 60
			1 60		4 92	53	5 45	1 25
SWIFT'S 0-14-2 FERTILIZER								
816	C T Potter, La Cygne	G			6 11	44	6 55	1 66
826	Gleason Brothers, Crestline	F			6 56	47	7 03	1 68
					6 55	55	7 10	1 60
SWIFT'S SPECIAL GRAIN FERTILIZER								
811	Whitaker Brothers, Paola	G	1 65		4 37	43	4 80	1 66
		F	1 71		4 85	85	5 70	1 54
SWIFT'S CLAY SOIL SPECIAL 2-12-0								
803	E A George, Earlton	G	1 65		5 24	22	5 46	
		F	1 65		5 54	48	6 02	43
								21
Tupelo Fertilizer Factory								
TUPELO WHEAT BELT 1-12-1 GRAIN GROWER								
817	T P Baumgerner, Columbus	G	82		5 24	23	5 47	83
		F	1 00		6 48	1 16	7 64	1 00
TUPELO 3 & 24 BONE MEAL FERTILIZER								
818	T P Baumgerner, Columbus	G	2 47				10 48	
		F	3 98				10 15	
TUPELO SPECIAL 18 PERCENT ACID PHOSPHATE								
819	T P Baumgerner, Columbus	G			7 86	43	8 29	
		F			8 05	22	8 27	
TUPELO HIGH GRADE 16 PERCENT ACID PHOSPHATE								
823	H L Jaqueth, Crestline	G			6 99	43	7 42	
		F			7 28	99	8 27	
Virginia-Carolina Chemical Company								
BONE MEAL MIXTURE								
835	Stauffer Cammack, Baxter	G	3 30				8 80	
		F	3 54				8 63	
Wilson & Co								
WILSON'S RED "W" BRAND GRAIN GROWER								
776	Cherokee Co Mill & Elev Co, Columbus	G	82	3 50	1 74	26	5 50	83
763	Farmers' Union Co-op Assn, Parsons	F	85	3 43	5 31	85	6 16	1 19
772	Farmers' Co-op Elevator Company, Altamont	F	95	3 65	5 44	65	6 09	96
			1 32	3 09	5 06	73	5 79	1 29
WILSON'S RED "W" BRAND ACID PHOSPHATE								
771	Farmers' Co-op Elevator Company, Altamont	G			6 99	22		
		F			7 07	36	7 43	

(a) Figures in bold-face type represent results falling below the guaranteed analysis more than one-fifteenth

KANSAS INSPECTION CIRCULAR 16

SALE OF FERTILIZERS IN KANSAS

The amount of fertilizers sold in the state can be calculated in two ways: (1) Reports from manufacturers, and (2) sales of tax tags. The Kansas fertilizer law does not mention the 125-pound bag, but requires a tag to be placed on each package of 200 pounds or fraction thereof. The common practice, however, is to sell fertilizer in 125-pound bags. This fact has been taken into consideration in computing the figures given below showing the sales of fertilizer in Kansas for the last four years. It has been assumed that since 1917, 125 pounds represents the average bag. The total number of tons of fertilizer sold during each of the last four years calculated by each method is as follows:

YEAR	TONS SOLD	
	Figures from sale of tax tags	Figures from manufacturers' reports
1917	8,063	6,870
1918	10,585	10,800
1919	16,937	12,412
1920	15,200	12,652

A study of the tabulation will show either that a large amount of fertilizer was sold in less than 125-pound bags during 1919 and 1920, or that, what is more probable, the manufacturers anticipated a much larger sale during those years than actually took place. A price advance of 20 percent in the fall of 1920, and this in the face of a rapid decline in the price of farm products, is no doubt a partial explanation of the figures for that year.

CLASSES OF FERTILIZERS

Fertilizers may be divided into three classes: Bone goods, acid phosphate, and mixed goods. For the last four years the distribution of Kansas sales among these classes has been as follows:

YEAR	BONE GOODS	ACID PHOSPHATE	MIXED GOODS
1917	2,975	486	3,407
1918	3,997	533	6,068
1919	4,127	1,388	6,897
1920	2,855	2,506	7,291

The decrease in the sale of bone goods in 1920 is offset by the increase in the sale of acid phosphate

FORMULAS OF FERTILIZERS SOLD

As a rule fertilizer formulas indicate the percents of ammonia, phosphoric acid and potash, respectively, found in a given fertilizer. The formula of each brand of fertilizer of which more than 100 tons were sold in 1920 is given in the following table.

FERTILIZER CONTROL IN 1920

FORMULA	TONS SOLD	FORMULA	TONS SOLD
1-9-1	362		7,053
1-10-1	258	1¼-30-0	1,732
1-12-1	3,860	2-12-0	206
2-10-½	104	2-20-0	217
2-10-2	420	3-24-0	527
2-12-1	615	4½-23-0	139
2-12-2	700	0-15-2	107
1-20-0	436	0-16-0	2,125
1-30-0	187	0-18-0	222
1½-20-0	111	0-20-0	191
Total	7,053	Grand total	12,519

That phosphorus is the leading element in fertilizers is shown not only by the above formulas but also by the amount of each element sold. From the total tons sold were computed the pounds of the different elements. The following approximate results were obtained:

ELEMENT	POUNDS SOLD
Nitrogen	259,310
Phosphorus	2,071,550
Potassium	116,223

The brands of fertilizers registered in Kansas represent 30 different formulas. The tabulation giving the formulas of brands of which not less than 100 tons were sold in Kansas in 1920, shows that there is very little demand for more than one-third of these formulas. Bone goods, acid phosphate, and 1-12-1 represent about 75 percent of all fertilizers sold in Kansas in 1920.

DISTRIBUTION OF SALES

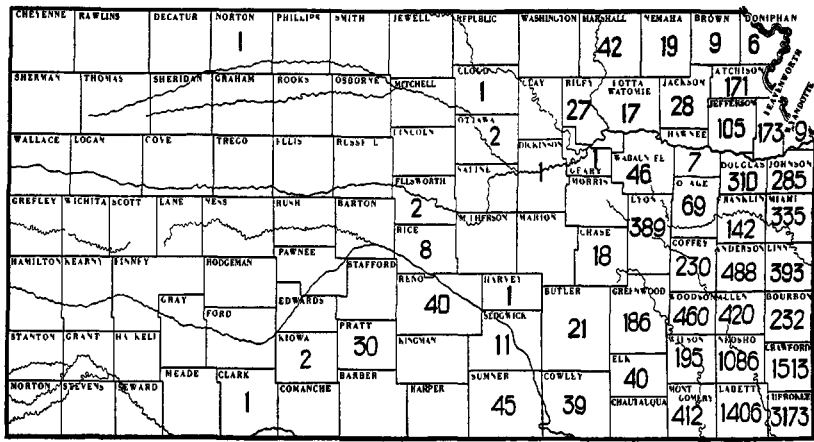
Most of the fertilizers sold in Kansas are used in the southeastern portion. Figure 1 shows the distribution of sales for 1920. In each county on the map are the figures for its total reported shipments. This does not necessarily mean that the figures represent the amount actually used in that county if the shipping point is near the county line. More than one-half, or 7,179 tons, was sold in the four counties: Cherokee, Crawford, Labette, and Neosho. About one-fourth was sold in Cherokee County alone.

PRICES OF COMMERCIAL FERTILIZERS

Farmers will continue to buy commercial fertilizers if their use is profitable. The value of the increase in the crop produced must be more than sufficient to pay for the cost of the fertilizer and the labor involved in its use. This means a certain correlation between the cost of the fertilizer and the selling price of farm products. In the fall of 1920 the price of fertilizer was about 20 percent greater than the spring price, and at the same time there was a decline in the price of farm products.

COMPARISON OF DEALERS' PRICES, 1920

At the time of inspecting fertilizers prices are obtained from local dealers. These prices are found in Table III. The fertilizers are distinguished by their formulas. (See page 14) Many dealers, manufacturers, and brands are omitted. Of the classes of fertilizers mixed goods contain all three or at least two of the elements of plant food, bone meal contains nitrogen (N) and phosphorus (P), and acid phosphate contains phosphorus only. Most brands of acid phosphate have the formula 0-16-0, though brands having the formulas 0-18-0 and 0-20-0 are registered. An acid phosphate having the formula 0-18-0 carries 12½ percent more plant food, and



TONS OF FERTILIZER SOLD IN 1920

FIG 1—Map showing by counties the number of tons of commercial fertilizer sold in Kansas during 1920

one having the formula 0-20-0 carries 25 percent more plant food than one having the formula 0-16-0. This should be considered when comparing prices. There is a difference in availability of phosphorus in bone meal and in acid phosphate. In the latter only that immediately available is figured in the guaranty and in fixing prices. The phosphorus in bone meal is somewhat more slowly available than phosphorus in acid phosphate, but most of it becomes available during the first season and the rest will be available for following crops. This should also be considered in comparing prices. Mixed goods containing nitrogen and phosphorus only furnish the same elements as bone meal. Such fertilizers are often made up of mixtures of bone meal and acid phosphate.

FERTILIZER CONTROL IN 1920

TABLE III—DEALERS PRICES ON COMMERCIAL FERTILIZERS, 1920

DESCRIPTION OF FERTILIZER	Formula	Price per ton	Units of plant food per ton (a)		
			Nitrogen	Phosphorus	Potassium
Spring, 1920					
Mixed goods, N P K	1-10-1	Min \$34 00 Max 40 00 Av 37 00	0 82	4 37	0 83
" " "	1-12-1	Min 36 00 Max 45 00 Av 40 18	82	5 24	83
" " "	2- 8-2	Min 46 00 Max 54 00 Av 50 00	1 65	5 24	1 66
" " "	2-12-1	Min 45 25 Max 45 25 Av 45 25	1 65	5 24	83
" " "	2-12-2	49 50	1 65	5 24	1 66
" " "	2-10-½	42 00	1 65	4 37	42
" " "	3- 8-3	Min 54 00 Max 60 00 Av 57 00	2 47	3 49	2 49
Mixed Goods, N P	1-23-0	46 00	82	6 25	00
" " "	1-29-0	48 00	82	3 17	00
" " "	1¼-30-0	Min 46 75 Max 49 50 Av 48 00	1 03	13 11	00
" " "	2-10-0	42 00	1 65	4 37	00
" " "	2-12-0	Min 42 50 Max 43 50 Av 43 00	1 65	5 24	00
Bone Meal, N P	3-24-0	Min 44 00 Max 48 75 Av 46 43	2 47	10 48	00
" " "	4-20-0	55 00	3 30	8 80	00
" " "	4¼-23-0	Min 53 00 Max 54 75 Av 53 88	3 70	10 04	00
Acid Phosphate, P	0-16-0	Min 29 25 Max 36 50 Av 31 16	00	6 99	00
Fall, 1920					
Mixed Goods, N P K	1- 8-1	Min 41 75 Max 42 00 Av 41 88	82	3 49	83
" " "	1- 9-1	42 00	82	3 79	83
" " "	1-10-1	Min 40 00 Max 46 75 Av 49 19	82	4 37	83
" " "	1-12-1	Min 45 00 Max 48 00 Av 46 61	82	5 24	83
" " "	2- 8-2	53 50	1 65	3 49	1 66
" " "	2-10-1	50 00	1 65	4 37	83

TABLE III—CONCLUDED

DESCRIPTION OF FERTILIZER	Formula	Price per ton	Units of plant food per ton (a)		
			Nitrogen	Phosphorus	Potassium
Fall, 1920					
Mixed Goods, N P K	2-10-2	Min 54 00 Max 55 00 Av 54 66	1 65	4 37	1 66
“ “ “	2-12-1	Min 51 50 Max 56 00 Av 53 88	1 65	5 24	83
“ “ “	2-12-2	Min 46 00 Max 50 25 Av 54 13	1 65	5 24	1 66
“ “ “	2-10-½	37 75	1 65	4 37	42
“ “ “	2-12-½	49 00	1 65	5 24	42
Mixed Goods, N P	1-10-0	39 00	82	4 37	00
“ “ “	1-20-0	Min 50 00 Max 53 00 Av 51 40	82	8 74	00
“ “ “	2-10-0	49 50	1 65	4 63	
“ “ “	1½-20-0	48 00	1 23	8 73	
“ “ “	2-12-0	50 00	1 65	5 24	
Bone Meal, N P	1-29-0	61 00	82	12 66	00
“ “ “	1¼-30-0	Min 59 00 Max 62 00 Av 61 00	1 03	13 11	00
“ “ “	1½-20-0	Min 52 00 Max 53 00 Av 51 00			
“ “ “	2-20-0	Min 53 75 Max 58 00 Av 55 91	1 65	8 73	
“ “ “	2¼-28-0	60 00	1 85	12 22	
“ “ “	3-24-0	Min 57 00 Max 62 00 Av 59 34	2 47	10 48	
“ “ “	4-20-0	55 00	3 30	8 80	
“ “ “	4½-23-0	Min 64 00 Max 66 00 Av 64 75	3 70	10 04	
Mixed Goods P K	0-14-2	Min 45 50 Max 45 50 Av 45 50	0 00	6 11	1 66
“ “ “	0-15-2	41 50	0 00	6 54	1 66
Acid Phosphate, P	0-16-0	Min 33 00 Max 44 00 Av 36 35	0 00	6 99	00
“ “ “	0-18-0	39 00	0 00	7 86	00

(a) Units per ton × 20 = pounds per ton

The figures in the column headed "Formula" in Table III, show percents of ammonia, phosphoric acid, and potash. These percents are equivalent to units and a unit is equal to 20 pounds per ton. Thus a fertilizer having the formula 1-12-1 contains 1 percent, or one unit ammonia, 12 percent, or 12 units, phosphoric acid, and 1 percent, or one unit, potash. Rules for converting these percents into equivalent percents of nitrogen, phosphorus, and potassium are given on page 2. Thus a fertilizer with the formula 1-12-1 contains in one ton, 20 pounds of ammonia, 240 pounds of phosphoric acid, and 20 pounds of potash, or 164 pounds of nitrogen, 104.88 pounds of phosphorus, and 166 pounds of potassium. The units of plant food per ton of the different fertilizers have been calculated and are given in Table III. (Twenty times the number of units per ton equals the number of pounds per ton.)

Prices were obtained for all fertilizers inspected, but in Table III only the minimum, maximum, and average prices are given for the different brands represented by the given formulas. The "average" is the average of the prices obtained from all the different dealers, not the mean between the minimum and maximum. The prices show more than usual variation. For that reason it is very difficult to judge the worth of the figures giving averages. Thus the price of acid phosphate varied in the spring from \$29.25 to \$30.50 per ton and in the fall from \$33 to \$44 per ton. This seems to be an unjustifiable range in prices. The mixed fertilizer, 1-12-1, varied from \$36 to \$45 per ton in the spring, but in the fall the variation was only from \$45 to \$48 per ton.

**COST OF NITROGEN AND POTASSIUM IN COMPARISON WITH
 PHOSPHORUS**

Eliminating the extreme price of \$44 per ton for acid phosphate, the average price from 17 dealers in the fall was \$36 per ton. This amounts to 25.7 cents per pound of phosphorus or \$2.25 per unit of phosphoric acid. In the 1919 price was 20 cents per pound or \$175 per unit. As acid phosphate was the only fertilizer sold in 1920 which contained only one element, phosphorus is the only element to which a definite price per pound can be given. The cost of the additional elements nitrogen or potassium or both can be calculated as follows. Multiply the units representing phosphorus by the cost per unit of acid phosphate and subtract from the total cost per ton of the fertilizer. The cost of a unit of acid phosphate is obtained by dividing the price per ton of acid phosphate by 16 if the formula is 0-16-0, by 18, if the formula is 0-18-0, and by 20, if the formula is 0-20-0. The difference between the cost of the phosphorus in a

fertilizer and the price per ton, is what is paid for the additional elements nitrogen or potassium or both. To illustrate: The average fall price of 1-12-1 was \$46.61 per ton. The 12 units representing phosphorus would cost at the rate it costs in acid phosphate, \$27. The difference between this and the price paid for 1-12-1 is paid for having the 16.4 pounds nitrogen and 16.6 pounds of potassium mixed with the one ton of fertilizer. The same method of calculation can be applied to the additional cost of nitrogen or potassium in any fertilizer. It is easily shown that the presence of nitrogen or potassium or both greatly adds to the cost of fertilizers. Kansas soils need phosphorus more than any other element.

According to the above calculation the cost of 16.4 pounds of nitrogen and 16.6 pounds of potassium when bought in 1-12-1 cost the farmer about \$19. This emphasizes the value of farm manure and other materials on the farm which have a fertilizing value. One ton of average barnyard manure contains 10 pounds of nitrogen, two pounds of phosphorus, and 8 pounds of potassium, or two tons of this manure contain more nitrogen than one ton of 1-12-1 fertilizer and practically the same amount of potassium. When the farmer bought the nitrogen and potassium in 1-12-1, it cost him in the fall of 1920 the equivalent of \$19. It may be said that the nitrogen and potassium are more available in 1-12-1 commercial fertilizer than they are in barnyard manure, but even if they are only half as available in the manure it still shows the great value of manure.

One ton of alfalfa hay contains, on the average, 50 pounds of nitrogen, 3 pounds of phosphorus, and 50 pounds of potassium, or one ton of alfalfa hay contains three times as much nitrogen and three times as much potassium as one ton of 1-12-1 fertilizer. One ton of wheat straw contains 10 pounds of nitrogen, 1 pound of phosphorus, and 8 pounds of potassium, or two tons of wheat straw contain more nitrogen and practically the same amount of potassium as one ton of 1-12-1 fertilizer. This suggests sources of nitrogen and potassium which should be utilized.

The cheapest element in fertilizers in 1920 was phosphorus and this element is needed most. When farmers buy more phosphorus in their fertilizers the profits in their use will be greater. Fertilizer have been used with the most profit on wheat and alfalfa and phosphorus is the most important element. The percent of phosphorus in wheat grain is 0.5 and in alfalfa hay, 0.175, or 0.3 of a pound per bushel of wheat and 3.5 pounds per ton of alfalfa hay. One ton of acid phosphate would then supply all the phosphorus which goes into 466 bushels of wheat or 40 tons of alfalfa hay.

BRANDS OF FERTILIZERS REGISTERED IN KANSAS

The Kansas fertilizer law requires the publication of a list of the fertilizers registered and their guaranteed composition. Table IV gives this list for the year 1920.¹ A list of Kansas dealers in fertilizers in 1920 and a financial statement covering the period, July 1, 1919, to June 30, 1920, are included also in the following pages.

¹ The list of brands of fertilizers registered in Kansas from 1907 to 1919, inclusive, is given in Kansas Inspection Circular 12 (See "Part I, Fertilizer Control in 1919," Table V, pp 26-31)

TABLE IV — BRANDS OF FERTILIZERS REGISTERED IN KANSAS, 1920

NAME OF BRAND	Date of registration		Percent nitrogen	Percent phosphorus in phosphates				Percent potassium soluble in water	Percent chlorine
	Mo	Yr		Soluble in water	Available or reverted	Insoluble	Total		
American Agricultural Chemical Company									
Empire Nitrophos	4	1920	1 65	3 88	1 36	0 22	5 46	1 00	
Arkansas Fertilizer Company									
White Diamond "20th Century" (2-9-2)	4	'20	1 65	2 95	98	44	4 37	1 66	1 00
White Diamond Economy (1-10-2)	4	'20	82	3 27	1 09	44	4 80	1 66	1 00
White Diamond Number 39 (1-10-1)	4	'20	82	3 28	1 09	44	4 81	83	1 00
White Diamond Special Acid Phosphate	4	'20		5 24	1 75	87	7 86		
White Diamond Vegetable Fertilizer	4	'20	2 00	2 40	87	33	3 60	2 49	1 50
Darling & Co									
Darling's Bone and Acid Phosphate Half and Half	8	'20	82		4 36	5 64	10 04		
Darling's General Crop	8	'20	1 64		5 24	43	5 67		
Darling's Pure Ground Bone	8	'20	1 85				12 22		
Interstate Fertilizer Company									
Interstate 1-9-1	7	'20	82		3 93	22	4 15	83	1 00
Interstate 0-15-2	7	'20			6 54	22	6 76	1 66	1 00
Jacob Doid Packing Company									
Steam Bone Fertilizer	4	'20	2 47				10 47		
Meridian Fertilizing Factory									
Easy Driller Phosphate	6	'20		5 68	1 31	22	7 21		
Meridian Farm Special	6	'20	1 65	3 64	72	14	4 50		
Meridian Wheat Special	6	'20	82	4 37	87	16	5 40	83	
Pelican Fertilizer Works									
Pelican Special Phosphate	6	'20		5 68	1 31	22	7 21		
Pelican Grain Special	6	'20	1 65	4 37	87	16	5 40		
Pelican High Grade	6	'20	1 65	4 37	87	16	5 40	1 66	
Swift & Co									
Swift's Pioneer 2-12-0 Fertilizer	9	'20	1 65		5 24	22	5 46		43
Swift's Pioneer 2-10-2 Fertilizer	9	'20	1 65		4 37	44	4 81	1 66	1 50
Swift's Pioneer 1-12-1 Fertilizer	9	'20	1 50		5 24	22	5 46	83	1 50
Swift's Pioneer High Grade Acid Phosphate	9	'20			6 99	22	7 21		

Tupelo Fertilizer Factory									
Tupelo 3 & 24 Bone Meal Fertilizer	9	'20	2 47				10 48		
Tupelo Special 18 Percent Acid Phosphate	9	'20			7 86		8 29		
Tupelo Wheat Belt 2-12-2 Grain Fertilizer	9	'20	1 65		5 24	23	5 47	1 66	1 50
Tupelo Wheat Belt 1-15-0 White Soil Special	9	'20	82		6 53	23	6 76		
Tupelo High Grade 16 Percent Acid Phosphate	9	'20			6 99	43	7 42		
Tupelo Wheat Belt 2-12-0 Special Fertilizer	9	'20	1 65		5 24	23	5 47		
Tupelo Wheat Belt 1-12-1 Grain Grower	9	'20	82		5 24	23	5 47	83	1 00
Virginia-Carolina Chemical Company									
V C 20 Percent Superphosphate	7	'20			8 80	42	8 80		
V C 18 Percent Superphosphate	7	'20			7 92	43	8 35		

KANSAS DEALERS IN FERTILIZERS, 1920

PLACE	DEALER	MANUFACTURER
Aliceville	Aliceville Elevator Company	American Agr Chemical Company
Alma	Mi Conrad Mueller	Swift & Co
Almena	E E Keckley & Sons	Cudahy Packing Company
Altamont	Libby Brothers	Swift & Co
Altamont	L B Van Slyke	Wilson & Co
Altamont	Libby Brothers	Meridian Fertilizer Factory
Altamont	Farmers Coop Assn	Wilson & Co
Altoona	Ball & Hamilton	Swift & Co
Arcadia	Dunton Hardware Company	Swift & Co
Arkansas City	A W Ralston	Cudahy Packing Company
Arkansas City	R C Howard	Cudahy Packing Company
Arma	Kelso Grain Company	Swift & Co
Atchison	Atchison Seed and Flower Store Company	Swift & Co
Baldwin	Jordan & Co	Wilson & Co
Baldwin (Mont Ida)	C A Lane	Wilson & Co
Bartlett	E E Bickford	Swift & Co
Baxter Springs	Chas D Thomas	Swift & Co
Beagle	Farmers Union Coop Assn	Swift & Co
Beatrice	Mi McMahan	Swift & Co
Belle Plaine	Albert Hatfield	Swift & Co
Benedict	Bur Knaut	American Agr Chemical Company
Berne	J A Minger	Swift & Co
Beulah	Crawford County Farmers Union Coop Assn	Swift & Co
Blue Mound	H B Smith & Son	Swift & Co
Boicourt	Edd Calvin	Meridian Fertilizer Factory
Boicourt (La Cygne)	K C Leisure	Meridian Fertilizer Factory
Brazilton	Crawford County Farmers Union Coop Assn	Swift & Co
Bremen	Prell Mercantile Company	Swift & Co
Bronson	Bronson Grain Company	Swift & Co
Burlingame	Bucyrus Farmers Coop Assn	Swift & Co
Burlington	Farmers Elevator Company	Cudahy Packing Company
Burlington	D O Gifford	Swift & Co
Burlington	Farmers Coop Elevator and Mercantile Company	Armour & Co
Caney	J M Mason	Swift & Co
Carona	Erwin Evans	Tupelo Fertilizer Factory
Cedar Vale	L C Adams Mercantile Company	Swift & Co
Chanute	W W Kaney	American Agr Chemical Company
Chanute	Farmers Coop Business Assn	Swift & Co
Chanute	Chanute Grain Company	Armour & Co
Cherokee	Kelso Grain Company	Swift & Co
Cherokee	C A Webster	Virginia-Carolina Chemical Company
Cherryvale	Cherryvale Grain Company	Swift & Co
Cherryvale	Clayton Supply Company	American Agr Chemical Company
Chetopa	J F Shields	Swift & Co
Chiles	R S Williar	Swift & Co
Clay Center	W W Smith & Sons	Swift & Co
Coffeyville	Allin Grain Company	Armour & Co
Coffeyville	Allin Grain Company	Swift & Co
Colby	H F Davis	Cudahy Packing Company
Colony	Colony Elevator Company	Cudahy Packing Company
Colony	A F Huskey	Swift & Co
Colony (Northcott)	W S Bozeman	Swift & Co
Colony	Colony Elevator Company	Armour & Co
Columbus	J E Lobauch	American Agr Chemical Company
Columbus	Stauffer-Camnack Grain Company	Cudahy Packing Company
Columbus	Cherokee County Mill and Elevator Company	Meridian Fertilizer Factory

FERTILIZER CONTROL IN 1920

PLACE	DPALEER	MANUFACTURER
Columbus	Stauffer-Cammack Grain Company	Virginia-Carolina Chemical Company
Columbus	Cherokee County Mill and Elevator Company	Interstate Fertilizer Company
Columbus	E B Davis	Phosphated Manure Company
Columbus	T P Bumgarner	Tupelo Fertilizer Factory
Columbus	Landis Company	Tupelo Fertilizer Factory
Columbus	E B Davis	Swift & Co
Columbus	Cherokee County Mill and Elevator Company	Armour & Co
Columbus	Cherokee County Mill and Elevator Company	Wilson & Co
Concordia Bowman Brothers Seed Company	Swift & Co
Conway Springs	C C Smith	Swift & Co
Cottonwood Falls	Crawford & Co	Swift & Co
Crestline	H L Jaqueth	Armour & Co
Crestline	H L Jaqueth	Tupelo Fertilizer Factory
Cummings	C A Volk	Swift & Co
Dearing	H C Lemon Lumber Company	American Agr Chemical Company
De Soto Associated Mill and Elevator Company	Armour & Co
Earlton	Earlton Grain and Coop Assn	American Agr Chemical Company
Earlton	E A & J E George	Swift & Co
Earlton	E A George	Armour & Co
Edgerton	Farmers Union Coop Business Assn	Swift & Co
Edna	Wilmoth-Pearce Grain Company	Swift & Co
Edna	Wilmoth-Pearce Grain Company	Armour & Co
Elk City	C R Long Grain Company	Swift & Co
Elk Falls	Finley & Frakes	Swift & Co
Elsmore	Price & Cox	Swift & Co
Emporia	Farmers Supply Company	American Agr Chemical Company
Emporia	Riverside Gardens Company	Cudahy Packing Company
Emporia	Alfalfa Milling Company	Cudahy Packing Company
Emporia	Hayes Hardware Company	Swift & Co
Englevale	Karns Coal and Mercantile Company	Swift & Co
Erle	Johnson & Son	Swift & Co
Eskridge	E A McKnight	Swift & Co
Eudora	E W Karns	Swift & Co
Eureka	Burt & Raby	Swift & Co
Everest	Alexander Lumber Company	Swift & Co
Farlington	Wood Brothers	Armour & Co
Farlington	Crawford County Farmers Union Coop Assn	Swift & Co
Faulkner	A R Nash	American Agr Chemical Company
Faulkner	P B White	Virginia-Carolina Chemical Company
Faulkner	P B White	Tupelo Fertilizer Factory
Fontana	Blaker Lumber and Grain Company	Swift & Co
Fostora	Shehl Brothers	Swift & Co
Frankfort	Gano Grain and Coal Company	Swift & Co
Fredoma	Wiley Milling Company	Swift & Co
Fort Scott	Meade Grain Company	Swift & Co
Galena	H L Jaqueth	Armour & Co
Galena	J C Ebenstein	Wilson & Co
Galesburg	J N Shaw, Estate	Phosphated Manure Company
Gardner	William Higgins	Cudahy Packing Company
Gardner	F S Turner	Cudahy Packing Company
Gardner	Ward Grain Company	Swift & Co
Gardner	J F Rankin	Armour & Co
Garnett	Frank Foltz	Swift & Co
Garnett	Frank Foltz	Armour & Co
Girard	Crawford County Farmers Union Coop Assn	Meridian Fertilizer Factory
Girard	J E Burk	Virginia-Carolina Chemical Company

PLACE	DEALER	MANUFACTURER
Girard	J D Miller	Virginia-Carolina Chemical Company
Girard	J H Cassin	Inteirstate Fertilizer Company
Girard	Crawford County Farmers Union Coop Assn	Swift & Co
Girard	Crawford County Farmers Union Coop Assn	Armour & Co
Grenola	Grenola Mill and Elevator Company	Swift & Co
Gridley	O M Hawkinson	American Agr Chemical Company
Gridley	Henry Bahr	Swift & Co
Geuda Springs	L E Hollinsworth	Cudahy Packing Com- pany
Hallowell	Farris & Landis	Armour & Co
Hallowell	J M Forbes	Swift & Co
Hallowell	J M Forbes	Armour & Co
Hallowell	J Eaile Wetts	Swift & Co
Harris	J H Turell	Swift & Co
Hartford	F G Welch	American Agr Chemical Company
Haitford	O'Connor & Stratton	Swift & Co
Hartford	R D Carpenter & C F West	Armour & Co
Harveyville	Harveyville Grange Coop Business Assn	Swift & Co
Havana	L C Pendleton	Swift & Co
Hepler	C M Orr	Swift & Co
Hattville	Williams Hardware Company	Swift & Co
Hattville	Farmers Union Coop Assn	Armour & Co
Hawatha	L E Chase	Meridian Fertilizer Works
Holton	Bernard Brothers	Swift & Co
Howard	Gibbon Lumber Company	Swift & Co
Humboldt	Grange Supply Company	Swift & Co
Hutchinson	Young & Sons	Swift & Co
Independence	Farmers Supply and Exchange Company	American Agr Chemical Company
Independence	M Winters	American Agr Chemical Company
Independence	Union Implement and Hardware Company	Swift & Co
Iola	Graf & Anderson	Swift & Co
Jetmore	A H Ling & Co	Cudahy Packing Com- pany
Kansas City, Kan	Walter Muntz	Cudahy Packing Com- pany
Kincaid	Hensley & Brosius	Swift & Co
Labette	Labette Mercantile Company	Swift & Co
La Cygne	C T Potter	Swift & Co
La Cygne	J L Teagarden	Armour & Co
La Cygne	J L Teagarden	Wilson & Co
La Harpe	Hackney & Sons	Armour & Co
La Harpe	C L Wilson & Sons	Swift & Co
Lamar	Farmers Coop Company	American Agr Chemical Company
Lawrence	J Underwood & Sons	American Agr Chemical Company
Lawrence	Barteldes Seed Company	Swift & Co
Leavenworth	Reyburn Hardware Company	Swift & Co
Leavenworth	Fuller & Faulkner	Armour & Co
Lebo	Associated Mill and Elevator Company	Swift & Co
Lecompton	Ilf Mercantile Company	Swift & Co
Lenexa	L A Krumm	Cudahy Packing Com- pany
Leon	Max Stern Ranch Company	Cudahy Packing Com- pany
Leon	Wentz Grain Company	Swift & Co
Liberty	Liberty Coop Assn	Swift & Co
Linwood	Linwood Elevator Company	Swift & Co
Linwood	C C Hemphill	Armour & Co
Lone Elm	C D Clark & Sons	Swift & Co
Lone Elm	A F Schoemg	Cudahy Packing Com- pany
Louisburg	J W Brullman	Swift & Co
Louisburg	Farmers Union Store	Armour & Co
Louisburg	Lee McQuirk	Cudahy Packing Com- pany
Lyndon	Schroeder Brothers Grain Company	Swift & Co

FERTILIZER CONTROL IN 1920

PLACE	DEALER	MANUFACTURER
Madison	W O Waymure	Swift & Co
Manhattan	Geo T Fielding & Sons	Swift & Co
Marysville	Thompson Brothers	Swift & Co
McCune	G F Samp	American Agr Chemical Company
McCune	McCashn & Son	Swift & Co
McCune	Crawford County Farmers Union Coop Assn	Swift & Co
McFarland	August F Hanson	Swift & Co
Medicine Lodge	Vaughn Brothers	Cudahy Packing Company
Monmouth	Crawford County Farmers Union Coop Assn	Swift & Co
Moran	Moran Grain Company	Swift & Co
Morehead	Morehead Lumber and Grain Company	Swift & Co
Moscow	Western Lumber Company	Cudahy Packing Company
Moscow	Locke Mercantile Company	Cudahy Packing Company
Mound Valley	Call Brothers	Swift & Co
Mulvane	Paul & Penley	Swift & Co
Muncie	V Z Newman	Cudahy Packing Company
Muscotah	M E Bevens	Swift & Co
Muscotah	J B Reeves	Swift & Co
Nekoma	F E Mills	Cudahy Packing Company
Neodesha	S D Logan	Swift & Co
Neosho Falls	S R Scott	Swift & Co
Neosho Falls	Anderson & Simmons	American Agr Chemical Company
Nortonville	E R Rathert	Swift & Co
Olathe	Hadley Milling Company	Swift & Co
Olpe	Bradfield & Hathaway	Swift & Co
Olpe	Bradfield & Hathaway	Armour & Co
Onaga	Peter Gaume	Cudahy Packing Company
Oneida	E Conwell & Co	Armour & Co
Opolis	Orlo Moore	Armour & Co
Opolis	Harry McCool	Interstate Fertilizer Company
Opolis	Fred Ferguson	Interstate Fertilizer Company
Opolis	Opolis Elevator Company	Swift & Co
Osawatomie	J B Remington Lumber and Grain Company	Swift & Co
Osawatomie	Osawatomie Feed and Fuel Company	Wilson & Co
Oskaloosa	Bert T Gay	Armour & Co
Oswego	W N Reynolds & Son	Swift & Co
Oswego	L Baker	Armour & Co
Oswego	W N Reynolds & Son	Meridian Fertilizer Factory
Ottawa	Farmers Coop Assn	Swift & Co
Overbrook	Overbrook Farmers Union Coop Assn	Swift & Co
Oxford	L M Barton	Swift & Co
Paola	Whitaker Brothers	Swift & Co
Parker	W M Hartford	Swift & Co
Parsons	Farmers Union Coop Assn	Swift & Co
Parsons	Farmers Union Coop Assn	Armour & Co
Parsons	Farmers Union Coop Assn	Wilson & Co
Parsons	Farmers Union Coop Assn	American Agr Chemical Company
Parsons	Farmers Union Coop Assn	Cudahy Packing Company
Parsons	C S Bailey Feed Company	Meridian Fertilizer Factory
Parsons	Farmers Union Coop Assn	Interstate Fertilizer Company
Parsons	Farmers Union Coop Assn	Phosphated Manure Company
Piper	W R Young	Swift & Co
Piqua	Piqua Elevator Company	Swift & Co
Piqua	J G Wilson Lumber Company	Armour & Co
Pittsburg	Pittsburg Elevator Company	Swift & Co
Pittsburg	Pittsburg Modern Milling Company	Armour & Co
Pittsburg	Chelsea Grain Company	Armour & Co
Pittsburg	Kelso Grain Company	American Agr Chemical Company

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PLACE	DEALER	MANUFACTURER
Pittsburg	Pittsburg Modern Milling Company	Cudahy Packing Company
Pittsburg	Pittsburg Modern Milling Company	Meridian Fertilizer Factory
Pittsburg	Kelso Grain Company	Pelican Fertilizer Works
Pittsburg	H T Ream	Int istance Fertilizer Company
Pittsburg	Norman Baxter	Tupelo Fertilizer Factory
Pleasanton	Blaker Lumber and Grain Company	Swift & Co
Pomona	Wm Bower & Son	Swift & Co
Pontiac	Seigrist, Hudleson & Seigrist	Swift & Co
Powhattan	Powhattan Hardware Company	Swift & Co
Randolph	J M Rolfs	Cudahy Packing Company
Salina	Western Seed House	Swift & Co
Savonburg	Faimers Union Coop Assn	Swift & Co
Scammon	Jno J O'Malley	Tupelo Fertilizer Factory
Seranton	Farmers Union Coop Elevator Company	Armour & Co
Seneca	Keolzer Lumber Company	Swift & Co
Severy	W A Riggins	Cudahy Packing Company
Shaw	Robt W Griffen	Swift & Co
South Mound	Farmers Union Coop Assn	Swift & Co
Springhill	Walter Crawford	Wilson & Co
Stark	Farmers Union Coop Assn	Cudahy Packing Company
Stark	Farmers Union Coop Assn	Swift & Co
Star Valley	Farmers Union Coop Assn	Swift & Co
Stillwell	J W Jenkins	American Agr Chemical Company
Stillwell	L A Medaris	Swift & Co
St Francis	J E Uplinger	Cudahy Packing Company
St Marys	Byrnes & Co	Swift & Co
St Paul	Farmers Union Coop Assn	Swift & Co
Tonganoxie	Zellner Mercantile Company	Swift & Co
Toronto	Holderman & Willhite	American Agr Chemical Company
Udall	Harry L Shoemaker	Swift & Co
Uniontown	Goodlander & Konantz	Armour & Co
Uniontown	Uniontown Grain Company	Swift & Co
Valley Falls	Thos Hatfield	Swift & Co
Vermillion	F F Smith	Swift & Co
Walnut	Crawford County Farmers Union Coop Assn	Swift & Co
Wamego	Wamego Seed and Elevator Company	Swift & Co
Washington	C Roy Kiger	Swift & Co
Waterville	Waterville Lumber and Coal Company	Swift & Co
Weir	H W Sutton	American Agr Chemical Company
Weir	J W Davis	Virginia-Carolina Chemical Company
Weir	Weir Coop Assn	Tupelo Fertilizer Factory
Welda	Farmers Coop Company	American Agr Chemical Company
Welda	R D Brown	Swift & Co
Wellsville	C J Musick	Armour & Co
Wellsville	M C Everett	Swift & Co
Westphaha	C M Watson	American Agr Chemical Company
Westphaha	C S Kershner	Swift & Co
Wichita	E S Ruls	Cudahy Packing Company
Wichita	E F Berry	Cudahy Packing Company
Wichita	Wagstaff Mercantile Company	Swift & Co
Williamsburg	D Fogle Mercantile Company	Swift & Co
Williamstown	Woodson County Grain Company	Armour & Co
Winfield	Col Warren Russell	Swift & Co
Winfield	Geo B Moore Seed Company	Swift & Co
Yates Center	Farmers Coop Elevator Assn	Swift & Co
Yates Center	Woodson County Grain Company	Armour & Co

FERTILIZER CONTROL IN 1920

FINANCIAL STATEMENT—FERTILIZER FEES

(July 1, 1919, to June 30, 1920)

1919

RECEIPTS

	Balance on hand July 1, 1919	\$5,040 40
July 1	Swift & Co, reg fee	25 00
July 1	Armour & Co, tax tags	200 00
July 15	Virginia-Carolina Chemical Company, tax tags	375 00
July 16	Thomas Ruddy Company, tax tags	8 50
July 21	Wilson & Co, reg fees	25 00
Aug 2	Thomas Ruddy Company, reg fees	50 00
Aug 2	Emporia Elevator and Feeding Company, analysis	25 00
Aug 2	Meridian Fertilizer Company, tax tags	150 00
Aug 9	Armour & Co, tax tags	200 00
Aug 9	American Agr Chemical Company, tax tags	250 00
Aug 13	Virginia-Carolina Chemical Company, reg fees	50 00
Aug 27	Morris & Co, reg fee	25 00
Aug 29	Cochrane Packing Company, tax tags	25 00
Aug 31	Swift & Co, tax tags	398 84
Sept 2	Armour & Co, tax tags	100 00
Sept 3	Armour & Co, tax tags	100 00
Sept 3	American Agr Chemical Company, tax tags	250 00
Sept 3	P C Floyd, tax tags	50 00
Sept 3	N E Hendrichson, tax tags	50 00
Sept 3	Thomas Ruddy Company, tax tags	246 69
Sept 3	Cudany Packing Company, tax tags	500 00
Sept 3	Meridian Fertilizer Company, reg fees	50 00
Sept 3	P C Floyd, tax tags	25 88
Sept 6	P C Floyd, tax tags	17 65
Sept 22	Swift & Co, tax tags	1,250 00
Oct 13	Cochrane Packing Company, tax tags	25 00
Oct 18	Thomas Ruddy Company, tax tags	575 00
Nov 1	Morris & Co, tax tags	100 00
Nov 15	Swift & Co, reg fee	25 00
Dec 15	Thomas Ruddy Company, tax tags	50 00

1920

Jan 4	Fertile Chemical Company, reg fee	25 00
Jan 21	Armour & Co, reg fees	200 00
Feb 21	Armour & Co, tax tags	200 00
Feb 23	Meridian Fertilizer Company, tax tags	75 00
Feb 26	Intestate Fertilizer Company, reg fee	25 00
Mar 18	Agronomy Department, K S A C, sale of sacks	50 00
Mar 23	Swift & Co, tax tags	1,500 00
April 10	Arkansas Fertilizer Company, reg fees	125 00
April 20	American Agr Chemical Company, reg fees	75 00
April 30	Jacob Dold Packing Company, reg fee and tax tags	50 00

Total receipts

\$12,586 96

1919

DISBURSEMENTS

July 15	Eedall & McCarty, folders	\$3 80
July 18	Building and repair, work in C 15	33 09
July 25	Ramey Brothers, screen doors	3 95
July 30	Payroll, employees	80 00
July 30	Payroll, student help	203 57
July 30	Express	3 59
Aug 1	C O Swanson, traveling expenses	85 90
Aug 10	Shafers Grocery, mason jabs	10 80
Aug 31	Payroll, employees	266 00
Sept 5	W L Latshaw, traveling expenses	43 35
Sept 7	B R Hull, screen door bumper and spring	40
Sept 15	Payroll, employees	160 00
Sept 17	S Wander & Sons, chemicals	59 40
Sept 21	L E Knott Apparatus Company, rubber tubing	6 85
Sept 25	International Instrument Company, bottles	11 31
Sept 30	Payroll, student help	273 70
Oct 2	Standard Colorimeter Company, apparatus	25 86
Oct 5	Milling Department, fertilizer tax tags	194 00
Oct 15	Manhattan Gas Company, gas	54 84
Oct 20	Printing Department, paper	2 00
Oct 30	Payroll, employees	80 00
Oct 30	Payroll, student help	258 08
Nov 9	General Repair, oil	1 75
Nov 20	Central Scientific Company, rubber goods	11 20
Nov 21	J Bishop & Co Platinum Works, reworking crucible	38 37
Nov 30	Payroll, employees	80 00

Nov 30	Payroll, officers	\$800 00
Nov 30	Payroll, student help	337 00
Dec 1	C O Swanson, traveling expenses	73 62
Dec 1	Du Common Brothers, chemicals	2 00
Dec 15	McLaren Drug Company, bees wax	3 25
Dec 17	Manhattan Gas Company, gas	83 52
Dec 17	W L Latschaw, traveling expenses	74 28
Dec 19	J T Baker Chemical Company, chemicals	4 75
Dec 19	J T Baker Chemical Company, chemicals	2 80
Dec 20	Emmer & Amend, apparatus	7 81
Dec 20	International Instrument Company, bottles	19 00
Dec 24	Palace Drug Store, denatured alcohol	1 00
Dec 24	Wilkens-Anderson Company, apparatus	12 00
Dec 25	A E Langworthy, traveling expenses	1 85
Dec 25	Palace Drug Store, denatured alcohol	1 00
Dec 30	Payroll, officers	300 00
Dec 30	Payroll, employees	80 00
Dec 30	Payroll, student help	337 53

1920

Jan 1	Central Scientific Company, apparatus	37 50
Jan 1	Hammond Lumber Company, lumber	35 60
Jan 5	Emmer & Amend, chemicals	1 25
Jan 5	English Tool and Supply Company, belting	11 03
Jan 6	Emmer & Amend, chemicals	10 08
Jan 10	Grasselli Chemical Company, acids	20 60
Jan 13	Oxygen Gas Company, hydrogen	3 04
Jan 18	Shafers Grocery, supplies	36
Jan 25	Manhattan Gas Company, gas	57 86
Jan 25	Spot Cash, Jars	5 04
Jan 30	Payroll, officers	525 00
Jan 30	Payroll, employees	80 00
Jan 30	Payroll, student help	289 49
Feb 4	Emmer & Amend, porcelain ware	27 96
Feb 10	Manhattan Gas Company, gas	77 79
Feb 11	Shops, K S A C, sinks	35 49
Feb 11	Building and Repair, repair work	22 52
Feb 18	Building and Repair, repair work	23 35
Feb 30	Payroll, officers	300 00
Feb 30	Payroll, employees	80 00
Feb 30	Payroll, student help	324 84
Mar 5	Bemis Bag Company, bags	81 60
Mar 7	Oxygen Gas Company, hydrogen	2 00
Mar 7	Building and Repair, repairing lights	11 63
Mar 8	Building and Repair, building shelves	12 65
Mar 8	Building and Repair, sinks	20 81
Mar 10	Printing Department, K S A C, printing blanks	8 00
Mar 12	Central Scientific Company, apparatus	3 80
Mar 15	Central Scientific Company, apparatus	10 60
Mar 16	Central Scientific Company, apparatus	3 12
Mar 16	Central Scientific Company, apparatus	3 00
Mar 20	Emmer & Amend, apparatus	4 28
Mar 25	Palace Drug Store, supplies	1 50
Mar 30	Payroll, student help	221 88
Mar 30	Payroll, employees	80 00
Mar 30	Payroll, officers	750 00
April 1	Ecdall & McCarty, bookcases	47 16
April 9	Emmer & Amend, apparatus	17 06
April 9	Emmer & Amend, chemicals	8 19
April 15	Grasselli Chemical Company, acids	47 20
April 19	Building and Repair, repairs	32 79
April 20	Journal of American Agricultural Chemists, subscription	5 00
April 20	Manhattan Gas Company, gas	84 00
April 25	C O Swanson, traveling expenses	79 50
April 25	Williams & Wilkins, bulletins	29 85
April 30	Payroll, employees	80 00
April 30	Payroll, officers	525 00
April 30	Payroll, student help	250 64
April 30	J T Baker Chemical Company, chemicals	3 00
May 2	Keuffel & Esser Co, repairing slide rule	2 12
May 10	Peet Brothers Manufacturing Company, soap chips	38 81
May 15	Dennison Manufacturing Company, fertilizer tags	196 00
May 15	Oxygen Gas Company, hydrogen	2 00
May 21	Shops, miscellaneous work	3 08
May 21	Building and Repair, repair work	2 00
May 24	Printing Department, printing	27 80
May 25	Central Scientific Company, apparatus	89 08
May 30	Payroll, employees	50 00
May 30	Payroll, officers	525 00
June 15	Central Scientific Company, apparatus	54 52

FERTILIZER CONTROL IN 1920

June 18	Manhattan Gas Company, gas	\$57 00
June 21	Building and Repair, repair work	33 99
June 25	Eimer & Amend, apparatus	15 90
June 30.	Payroll, employees	80 00
June 30	Payroll, officers	633 38
June 30	Payroll, student help	219 55
	Total disbursements	<u>\$10,074 91</u>
	Balance on hand June 30, 1920	<u>2,512 05</u>
	Grand total	<u>\$12,586 96</u>

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