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FERTILITY EROSION OF SOIL*

Occurrence Reduced to the simplest terms, the fertility of soil is its natural capacity to produce plants in the presence of favorable light, temperature, and moisture conditions. This natural capacity has been derived from the decomposition of rocks, minerals, and organic matter, a process that over thousands of years has formed the layer of soil covering the earth. The decomposition of these materials has left as an intricate part of the soil the so-called nutrient elements of nitrogen, phosphorus, potassium, calcium, magnesium, and the minor or "trace" elements of sulphur, zinc, copper, baron, iron, manganese, and others. Most of these elements are needed in some amount for normal plant growth. The accompanying table shows the amounts of several of these elements present in two soil series found in Missouri and Nebraska.

PARTIAL COMPOSITION OF TOP ONE FOOT OF SOIL
(Pounds per acre)

	Shelby Silt Loam Prairie, Missouri	Rosebud Silt Loam Chestnut, Nebraska
Nitrogen	5,600	2,800
Phosphorus	11,600	48,000
Potassium	58,000	112,800
Calcium	34,800	70,000
Magnesium	36,800	46,400

SOURCE: U. S. Department of Agriculture, "Soils and Men," The Yearbook of Agriculture, 1938.

In addition, plants require the elements of hydrogen and oxygen, which they secure from water, and carbon, which they derive from carbon dioxide in the air. Obviously, this group of elements is not directly connected with soil fertility, except as water conservation practices in the arid regions increase the supply of soil water available to plants.

Erosion of soil fertility takes place whenever any action, either man-made or natural, causes a loss of the nutrient elements that are in reality a part of the soil itself. It is apparent, then, that such processes as water and wind erosion, which physically transport soil away from its resting place, are actions that also reduce the fertility of the soil. Equally as obvious is the fact that crops in the process of growth remove their requirement of nutrient elements from the soil, an action that over a period of time causes a sustained reduction in the supply of elements available to plants, unless new supplies are added by crop rotations or in the form of manure or other fertilizers. The accompanying table shows the estimated extent of annual losses of soil fertility from various causes in the United States. Significantly, these estimated annual losses, exclusive of organic matter, total about 136.5 million tons, while the amount of commercial fertilizer consumed in the United States during 1947 totaled about 15 million tons, only a part of which was nutrient elements in a form usable by plants.

The productive capacity of soils may also be reduced when water, in draining through the soil, dissolves some of the elements which then pass out of the soil in drainage water. This process is referred to as leaching. Other losses in fertility occur when pasture lands are grazed heavily with little regard for the carrying capacity of the soil and its grass covering. However, the heaviest and most widespread erosion of soil fertility has been and is yet taking place as a result of the physical loss of soil through water and wind erosion and the chemical depletion of the nutrient elements through careless and unsound cropping practices. Thus, the erosion of soil fertility is not confined to any one section of the District or nation; it is, rather, a general problem wherever water and wind erosion occur and wherever soil is used for crop and livestock production.

Fertility Losses From Water and Wind Water and wind erosion have been responsible for the physical loss of approximately one third of the nation's topsoil. This top layer of soil is the most fertile and productive of the entire soil covering of the earth. It contains the greatest

*This article is the fourth in a series on soil conservation and presents in some detail one important phase of that general subject. The first article, "Soil Conservation," was introductory in nature and appeared in the January 31, 1948, issue of the Monthly Review; the second article, "Wind Erosion of Soil," appeared in the May 31, 1948, issue; and the third article, "Water Erosion of Soil," appeared in the August 31, 1948, issue of the Monthly Review.

amounts of organic matter and available nutrient elements and generally the most desirable grouping of soil particles or soil structure for plant growth. Studies show that in some midwestern areas the loss of topsoil from water erosion has caused a decline of at least one fifth in soil fertility. In many sections of this region, water erosion and leaching have removed substantially more than one fifth of the supply of nutrient elements that are in a form usable by plants.

Frequently in these areas the soil structure has been so broken down by poor cultivation and cropping practices and the supply of nutrients so depleted by erosion that many cultivated fields have been abandoned as unprofitable for crop production, even at the recent levels of farm commodity prices. There is little "new" land remaining in the United States to be brought under cultivation as a replacement for that which is worn out and abandoned. With growing population, it has become more and more important that the fertility of "old" soils be rigidly maintained and protected from further losses.

area of the District that is subject to wind erosion, in general the deep, tillable soils in this region are yet relatively high in fertility. Here, water conservation is the primary objective of such soil conserving practices as terraces, contour cultivation, strip cropping, and fallowing, which in turn give more assurance of securing a crop cover for the land to protect it from wind erosion.

In the eastern third of the District, where rainfall exceeds 30 inches annually, such devices as terraces and contour farming are employed to reduce the amount and velocity of water runoff, thereby minimizing water erosion and its resultant fertility losses. Throughout this region the action of water, both from the standpoint of erosion and leaching, has removed alarming amounts of nitrogen, phosphorus, and calcium from the productive top layer of soil. Notable deficiencies of available phosphorus exist in soils of southeastern Nebraska, eastern Kansas, and eastern and central Oklahoma. In central Nebraska some additional nitrogen is often required for a potato crop even when it is seeded following a legume.

PLANT NUTRIENTS ANNUALLY LOST FROM SOILS OF THE UNITED STATES
(Thousands of tons)

Source of Loss	Nitrogen	Phosphorus	Potassium	Calcium	Magnesium	Sulphur	Organic Matter
Crops (harvested)	4,600	700	3,200	1,000	500	500	92,000
Grazing (pastures)	3,000	500	3,700	1,000	500	400	60,000
Leaching (crop land)	4,000	—	6,600	26,600	6,000	7,400	80,000
(pastures)	1,000	—	1,700	7,000	1,600	1,900	20,000
Erosion (crop land)	2,500	900	15,000	13,000	6,000	800	50,000
(pastures)	1,000	400	6,000	5,000	2,200	300	20,000
Total	16,100	2,500	36,200	53,600	16,800	11,300	322,000

SOURCE: U. S. Department of Agriculture, "Soils and Men," the Yearbook of Agriculture, 1938.

Preventing or minimizing fertility erosion of soil through water and wind erosion is principally a soil management problem that varies with each farm unit. Generally, the type of soil, slope of fields, cropping systems, methods of cultivation, amount of rainfall, and danger of soil blowing must all be considered in designing a farming program that will be profitable to the owner yet hold the soil in its resting place. Thus, whenever a sound soil management program has been devised with these considerations, water and wind erosion of the soil is at a minimum, as is also the loss of soil fertility from these causes. Regardless of whether the land is in the wheat areas of the District or in the more general farming areas of the eastern part of the District, any one soil conservation practice, or combination of practices, that halts or minimizes the physical loss of soil also conserves soil fertility. Some of the practical means of preventing the physical loss of soil have been discussed in previous issues of the Monthly Review.

It should be noted that, although the maintenance of soil fertility is important in the western plains The soils in southeastern Kansas and eastern and central Oklahoma have been severely leached of calcium and consequently soil acidity has become a major soil problem on many farms in this region.

It is in these more humid areas where the erosion of soil fertility is becoming a pressing problem and where corrective measures need to be applied immediately. The needed measures involve not only the checking of water erosion and the better drainage of soils to prevent leaching, but they also require the more widespread use of soil building practices, such as crop rotations, green manure crops, and the judicious use of barnyard manure and commercial fertilizers.

Fertility Losses Through Crops As shown in the accompanying table, crops and livestock are composed, in part, of the nutrient elements found in the soil. The crops draw the elements directly from the soil in their growing processes. When used as animal feeds, grains, grasses, and other feeds pass these elements on to livestock where

AMOUNTS OF VARIOUS NUTRIENT ELEMENTS CONTAINED IN CROPS AND LIVESTOCK

Crop and Animal	Nitrogen	Phosphorus	Potassium	Calcium
		(Pounds)		
Wheat, 25 bu.	30.0	3.7	6.6	0.5
Corn, 50 bu.	50.0	9.5	9.0	0.5
Sorghum, 40 bu.	37.5	12.0	6.5	1.1
Alfalfa hay, 4 tons	200.0	18.0	96.0	145.0
Fat cattle, 1,000 lbs.	25.0	7.0	1.0	11.8
Fat hogs, 1,000 lbs.	18.0	3.0	1.0	4.5

SOURCE: Kansas State College Bulletin No. 260, "Soil Fertility," 1932.

they are utilized in the formation of bone, muscle, and fat. Thus, whenever crops and livestock are sold from the farm, substantial quantities of nitrogen, phosphorus, potassium, and calcium are, in effect, sold out of the soil. Considered in this sense, it is obvious that if these supplies of soil nutrients are not replaced from time to time, the productive capacity or fertility of the soil will eventually be exhausted. This is exactly the end to which some formerly productive crop lands have come, notably those in agricultural areas that specialize in the production of grains and hay for sale off the farm.

Experiments show that the productive capacity of soil decreases with continuous use when all the crops in a standard crop rotation are removed from the land and no fertilizers added. Under these conditions the yield of corn has declined from 1 to 2 per cent per acre annually, principally because of reduced supplies of organic material and nitrogen. Since organic material contains most of the soil nitrogen, the two are generally considered together. Organic material and nitrogen have been removed from much land in the Tenth District at an accelerated rate in recent years because of the marked increase in cash crop farming to meet war and relief demands for food.

Crop rotations have long been employed to maintain and build soil fertility, particularly nitrogen supplies. A good rotation in most areas of the eastern half of the District should usually include a legume crop, such as alfalfa, sweet clover, soybeans, or lespedeza. Legume plants are capable of fixing or obtaining nitrogen from the air by virtue of the bacteria that live in nodules on their roots. Soybeans and field beans may not actually add nitrogen to the soil, as it appears that the beans themselves utilize most of the nitrogen secured from the air. Most other legumes, however, leave large quantities of nitrogen in the soil for the use of subsequent crops in a rotation. In the accompanying table, the influence of alfalfa on the yields of crops in a rotation is compared with yields when continuous cropping is practiced.

EFFECT OF CROP ROTATION ON YIELD

Crop	Crop Yields Per Acre: Continuous Cropping	Rotation of Alfalfa, Corn, and Wheat	Increase with Rotation
Corn	19.4 bu.	33.6 bu.	14.2 bu.
Wheat	15.3 bu.	21.1 bu.	5.8 bu.
Alfalfa	2,683 lbs.	4,793 lbs.	2,110 lbs.

SOURCE: Kansas State College Bulletin No. 260, "Soil Fertility," 1932.

The use of green-manure crops is also a method of building the supply of organic material in the soil and increasing the amount of nitrogen available to plants. Green-manure crops are common farm crops, such as sweet clover, cowpeas, soybeans, vetch, and rye, that are grown and plowed under for the purpose of incorporating additional organic matter and nitrogen into the soil. Green manuring has several disadvantages as a practical means of maintaining soil fertility in most states in the District. In this general region, green manuring is beneficial only in the more humid areas, it frequently will not fit into a desirable crop rotation, and often the farmer cannot afford to lose the use of part of his land for a full season for the growing of a crop to be plowed under. Some of these shortcomings have been overcome by double cropping sweet clover and a small grain. Both crops are seeded together in the spring, and the small grain matures and is harvested, leaving the clover to attain more growth in the fall and early the following spring. The sweet clover is then plowed under just prior to planting a summer crop such as corn or sorghum.

There are no soil building crops that add to the soil any appreciable amount of elements such as phosphorus, potassium, and calcium. A field or farm that has been or is being depleted of these elements must, in addition to being protected from water or wind erosion and farmed in a good crop rotation, receive new fertility supplies from other sources. Generally, farm and commercial fertilizers are the only practical sources of such new fertility supplies.

Fertilizers Barnyard manure is probably the best known yet least well utilized source of soil fertility. When properly stored and handled, it almost always contains appreciable amounts of organic matter, nitrogen, phosphorus, and potash, four of the soil constituents most likely to be deficient in soils of the eastern portion of the District. The content of barnyard manure varies, however, with the amount and kind of feed that livestock receive, the age and type of livestock, and the kind of straw bedding used in the husbandry program. For these reasons manure will frequently be somewhat deficient in phosphorus. This fault may be remedied by applying superphosphate or rock phosphate to the land at different times in rotation with manure applications. The phosphorus supplement can also be mixed with each load of manure before spreading it over a field.

Commercial fertilizers have now been developed to the extent that almost any serious, but not complete,

deficiency of essential nutrient elements in the soil can be readily corrected by the application of the appropriate type of fertilizer. Thus, where a soil is low in nitrogen and a crop rotation, including a legume, does not correct the deficiency, the use of some nitrogenous fertilizer, such as nitrate of soda, ammonium nitrate, or sodium nitrate, might be recommended. If the land needs available phosphorus, a phosphatic fertilizer such as superphosphate or rock phosphate might be applied. Land that requires additional potassium can be treated with potassium sulphate or potassium chloride, which are commonly used carriers of potash. Where a field is acid or low in calcium content, an application of crushed limestone may be advisable, particularly if a legume crop is to be planted. In the event that a soil is low in more than one nutrient element, a mixed fertilizer containing two or more nutrient elements can be applied in correcting these deficiencies. Different crops respond differently to fertilizer treatments of their seedbed. However, the accompanying table shows the increase in the per acre yield of alfalfa in several eastern Kansas counties secured by applications of phosphorus to soils generally known to be deficient in that element.

EFFECT OF PHOSPHORUS ON ALFALFA YIELDS IN KANSAS

	Alfalfa Yields per Acre		
County	No Phosphate	Super-phosphate	Increase with Phosphorus
Allen	5,200 lbs.	7,480 lbs.	2,280 lbs.
Labette	3,961 lbs.	6,009 lbs.	2,048 lbs.
Cherokee	4,520 lbs.	5,500 lbs.	980 lbs.

SOURCE: Kansas State College Bulletin No. 260, "Soil Fertility," 1932.

The use of commercial fertilizers is not, however, a short-cut solution to the problem of erosion of soil fertility. Rather, their use is one step in what should be a sound and well balanced farming system. For all practical purposes, the value of one treatment of the soil with a commercial fertilizer may all be lost in the space of one year if the soil is not protected from water and wind erosion and from excessive leaching and is not tilled correctly to maintain soil structure. Furthermore, nothing will be gained by using a fertilizer containing an element or elements with which the soil is already well supplied. Thus, a fertilizing program for a farm unit should usually be preceded by soil tests to determine precisely what the soil fertility needs are, and a study should be made of the farming system followed to determine precisely how the fertilizing program is to be fitted in as an integral part of that farming system. For example, a sound fertilizing program for a strictly cash crop farm would differ considerably from one that would be desirable for a primarily livestock unit.

The prairie soils of the western half of the District are yet fairly high in fertility, although their content of organic matter has been steadily declining over the past fifty years. The result has been a lowering of the supply of nitrogen produced by the soil microorganisms which fix nitrogen from the air. Once the cultivated soils of this region are allowed to lose most of their organic matter and nitrogen, the cost of supplying nitrogen artificially through commercial fertilizers might prove extremely costly, particularly since an extensive type of farming predominates.

It is possible here only to summarize the soil fertility needs of the lands in the eastern part of the District. Generally, many of the soils in this region have suffered from losses of nitrogen, phosphorus, and calcium, particularly phosphorus in a form available to plants. Consequently, these are the nutrient elements most likely to be deficient and limiting crop yields in the area. Commercial fertilizers have been rather widely used in this part of the District to correct soil fertility deficiencies. However, many farm operators are still reluctant to make year to year investments in needed fertilizers, even though they are, in effect, investments in the future productive capacity of the land.

BUSINESS AND AGRICULTURAL CONDITIONS

MEMBER BANK CREDIT

Loan volume of District member banks expanded by 13 million dollars, or about 1 per cent, during December, as reserve city bank loans increased by 4 million dollars and country bank loans by 9 million. Monthly reports on loans of District country member banks have been available for only two years, but the aggregate loan volume of those banks has shown an increase every month during that 24-month period. For December, no data are available for the country banks as to changes in the various types of loans. District city banks showed increases in all major loan categories except loans to banks, which showed a sizable decrease. "Commercial, industrial, and agricultural" loans and consumer loans accounted for most of the expansion in loan volume.

Government security holdings of District country member banks showed no net change during the month, while reserve city bank holdings of Government obligations declined by 23 million dollars. Among the city banks, a relatively large decrease in bills and a small decrease in bonds were partially offset by increases in certificates of indebtedness and notes. The net decline in bills represented prin-

SELECTED ITEMS OF CONDITION OF TENTH DISTRICT MEMBER BANKS
(In millions of dollars)

	All Member Banks			Reserve City Banks			Country Banks		
	Dec. 29 1948	Nov. 24 1948	Dec. 31 1947	Dec. 29 1948	Nov. 24 1948	Dec. 31 1947	Dec. 29 1948	Nov. 24 1948	Dec. 31 1947
Loans and investments	4,273	4,279	4,262	2,281	2,299	2,279	1,992	1,980	1,983
Loans and discounts	1,504	1,491	1,260	848	844	762	656	647	499
U. S. Government obligations	2,384	2,407	2,633	1,240	1,263	1,331	1,144	1,144	1,302
Other securities	385	381	369	193	192	186	192	189	182
Reserve with F. R. Bank	929	954	867	557	577	536	372	377	331
Balances with banks in U. S.	635	615	702	281	256	321	354	359	381
Cash items in process of collection	259	295	297	242	276	275	17	19	22
Gross demand deposits	5,181	5,196	5,227	2,857	2,881	2,915	2,324	2,315	2,312
Deposits of banks	851	847	940	784	782	864	67	65	76
Other demand deposits	4,330	4,349	4,287	2,073	2,099	2,051	2,257	2,250	2,236
Time deposits	666	670	672	356	358	361	310	312	310
Total deposits	5,847	5,866	5,898	3,213	3,239	3,276	2,634	2,627	2,622
Borrowings	8	28	1	7	25	*	1	3	1

*Less than $500,000.

cipally the liquidation of such holdings by Oklahoma City and Tulsa banks. A decline in bonds and an increase in certificates might be expected as a result of the United States Treasury's calling of the 2 per cent December 1948-50 bonds and the offering of 1¼ per cent one-year certificates of indebtedness in exchange. However, the decrease in bond holdings was smaller than the amount of the called issue held by the city banks, indicating that the banks made some net purchases of bonds during the month. The increase in the city banks' Treasury note holdings also represented net purchases.

Deposits of District member banks declined by 19 million dollars during December. Country bank deposits expanded by 7 million dollars, principally as a result of an increase in demand deposits other than interbank, while city bank deposits declined by 26 million dollars, principally as a result of a decrease in demand deposits other than interbank.

BANK DEBITS

	Dec. 1948	Year 1948	Change from '47 Dec.	Change from '47 Year
	(Thousand dollars)		(Per cent)	
COLORADO				
Colo. Springs	44,238	485,954	+3	+14
Denver	540,859	5,971,569	+2	+10
Gr. Junction	15,108	155,372	+8	+8
Greeley	19,487	257,623	−15	+13
Pueblo	43,612	477,470	+6	+11
KANSAS				
Atchison	15,628	187,386	+45	+11
Emporia	10,767	122,497	−2	+7
Hutchinson	47,375	540,306	+8	+10
Independence	7,899	81,439	+3	+2
Kansas City	73,901	771,142	+13	+11
Lawrence	11,658	124,118	+1	+11
Parsons	8,462	97,007	+5	+10
Pittsburg	14,001	140,209	+8	+12
Salina	37,456	467,311	+2	0
Topeka	91,297	1,033,097	+4	+8
Wichita	235,738	2,667,865	+11	+13
MISSOURI				
Joplin	31,070	322,918	+5	+6
Kansas City	1,222,727	12,980,697	+5	+12
St. Joseph	116,101	1,202,635	−1	+6
NEBRASKA				
Fremont	18,319	197,190	+15	+21
Grand Island	21,730	259,741	+5	+10
Hastings	14,310	174,422	−4	+4
Lincoln	83,475	931,394	+7	+12
Omaha	536,306	5,800,340	+1	+2
NEW MEXICO				
Albuquerque	84,023	885,472	+21	+18
OKLAHOMA				
Bartlesville	138,717	1,324,557	+53	+69
Enid	41,198	489,450	−8	0
Guthrie	4,478	51,472	+11	+14
Muskogee	31,893	292,705	+2	+11
Okla. City	337,087	3,667,707	+11	+15
Okmulgee	7,821	81,457	−5	+9
Ponca City	20,292	229,456	−28	−8
Tulsa	571,472	6,193,637	+30	+39
WYOMING				
Casper	33,235	324,442	+36	+32
Cheyenne	30,632	338,289	+17	+13
District, 35 cities	4,562,372	49,328,346	+9	+14
U. S., 333 cities	122,277,000	1,249,569,000	+3	+11

DEPARTMENT STORE TRADE

Dollar volume of sales at reporting department stores in this District in December was little changed from that a year earlier, in contrast with a gain of 6 per cent for the year as a whole. Since November sales had been 2 per cent under the preceding year, total dollar sales for November and December combined were slightly below the previous year, and it is apparent that Christmas trade in 1948 did not quite equal the record volume of 1947. In some lines, such as furniture and major household appliances, the physical volume of sales, as well as the dollar volume, probably was considerably smaller than a year earlier. However, in some other lines, such as apparel, there are indications that unit sales were appreciably higher despite declines or only negligible increases in dollar volume, as supplies of lower- and medium-priced apparel were much more plentiful late in 1948 than they had been in 1947.

Sales increased much more than is usual from November to December, reflecting extensive store-wide promotions of merchandise, a further shift in consumer spending back to the prewar pattern of the greatest concentration of Christmas buying in December, and a somewhat less than usual decline in sales immediately following Christmas. As a consequence, the seasonally adjusted index of daily average sales rose from 319 per cent of the 1935-39 average in November to 331 per cent in December, although it

failed to regain the record level of 343 per cent last October. In the middle of January, 1949, dollar volume was adversely affected by extremely bad weather, and sales for the first three weeks of January showed a decrease of about 4 per cent from a year ago.

Department store inventories declined less than is usual during December, and the seasonally adjusted index of stocks increased from 305 per cent of the 1935-39 average at the end of November to 320 per cent at the end of December. This was the highest level in eight months but was still considerably below the peak of 353 per cent for March, 1948. Stocks of merchandise on hand at the end of December were 8 per cent larger in value than a year earlier. The volume of merchandise on order, however, was 41 per cent smaller than a year earlier, as unfavorable sales trends in November and December caused stores to cut back outstanding orders rather sharply.

Department store sales and stocks in leading cities:

	Sales		Stocks
	Dec. '48 comp. to Dec. '47	Year '48 comp. to Year '47	Dec. 31, '48 comp. to Dec. 31, '47
	(Per cent increase or decrease)		
Denver	−1	+3	+17
Pueblo	−4	+9	+7
Hutchinson	+12	+8	+11
Topeka	+4	+8	0
Wichita	+11	+10	+7
Joplin	−6	+4	0
Kansas City	−2	+5	−3
St. Joseph	−6	−3	*
Lincoln	+1	+7	*
Omaha	+3	+5	+19
Oklahoma City	0	+6	+22
Tulsa	−7	+12	*
Other cities	0	+5	+3
District	0	+6	+8

*Not shown separately but included in District total.

INDUSTRIAL PRODUCTION

Meat Packing The numbers of cattle, calves, hogs, and sheep purchased by packers in 1948 at principal markets of the District were down 24, 23, 11, and 3 per cent, respectively, from purchases in 1947. The explanation for this decline lies in the fact that in 1948 there were fewer of all types of livestock for sale than in 1947, with the result that receipts of all types of livestock at public markets in 1948 were lower than in 1947. Normally, cattle and lamb receipts decline in November and December, while hog marketings increase. Cattle and calf slaughter in these two months of 1948, however, was apparently reduced more than usual by a sharp decline in market receipts. The extremely bad weather in late November and throughout December prevented normal finishing and marketing of cattle and lambs by producers, thus reducing the number of animals available for purchase by slaughterers at public markets and country points. Cattle and sheep receipts at District markets in December were down over one fourth from November.

Flour Milling At mid-January, flour mills in the Southwest were operating at almost 90 per cent of capacity, about the same level as in December, 1948. Many mills, including those at Wichita, Kansas, and Omaha, Nebraska, were operated only five days a week in the first half of January. However, backlogs of orders were sufficient in most areas to maintain running time through the remainder of January and all of February, particularly at mills having export orders on hand. Army orders at scattered points in the Southwest also were an important factor in determining operating time.

Flour sales were reported as only moderately active in early January, being stimulated to some extent by discounts offered on purchases for immediate delivery. However, sales generally were in small lots. It has become increasingly evident that most large flour users intend to keep inventories at a low level until more is known of the prospects for the 1949 wheat crop. Some indication of the extent of this practice is offered by the purchasing schedule of one large bakery chain in the territory. This concern normally makes advance purchases to cover its flour needs for 120 days ahead. Recently its purchases have been made to cover flour requirements for only two weeks in advance.

Petroleum For the first time since the war, winter oil demands have failed to come up to expectations, and it is now predicted that crude production can be reduced slightly from the current record levels. Forecasting agencies still expect an increased demand in 1949 but generally agree that, since there is no need to increase inventories of crude and refined products further at the present time, crude production can be curtailed early in the year. Forecasts of 1949 demand vary somewhat. The Bureau of Mines and the Interstate Oil Compact Commission expect an increase of about 6 per cent in domestic demand for all oils. The Independent Petroleum Association has predicted a higher rise of almost 9 per cent in domestic demand during the coming year.

Bureau of Mines' estimates show United States crude oil production to have reached 2,013,040,000 barrels in 1948, the highest output in history. Total wells drilled numbered 39,778 as compared with 33,122 during 1947. According to the American Petroleum Institute, approximately 500 new fields were opened up, including particularly encouraging discoveries in the Rocky Mountain areas of Wyoming, Montana, Colorado, and Utah and in central California and west Texas.

Wyoming, center of the Rocky Mountain oil boom, led the region in exploration activities. Sixteen new fields and seventeen new producing sands in older fields were opened during 1948. Total crude oil production reached a record high slightly more than 55 million barrels, 25 per cent above 1947 production. Development of wells in proven fields in the state accounted for initial production of 86,800 barrels daily, and new wildcat completions brought in an additional 23,300 barrels a day.

Colorado production increased by 12,000 barrels daily in 1948 with completion of the pipeline from Rangely Field to Salt Lake City. The Rangely Field now produces about 55,000 barrels daily to hold its position as the largest field in the Rocky Mountain region. Colorado will probably see increased wildcat activity in 1949, stimulated by the discovery near Cortez in the southwestern part of the state late in November.

According to a report of the Oil Conservation Commission, New Mexico's oil production rose from approximately 120,000 barrels daily in 1947 to 143,000 in 1948. Drilling activity accounted for about 20,000 barrels of the total increase of 23,000 barrels daily. There were 606 new wells completed in New Mexico during 1948, adding an estimated 35 million barrels to known reserves.

Employment Total civilian employment in the United States declined to 59½ million in December, 500,000 below the November level. Early winter curtailment of farm operations accounted for the decline, as agricultural employment dropped to 7½ million, about 600,000 lower than in November. Nonagricultural employment failed to show a rise, remaining at a level of 52 million. A preholiday rise in employment in trade establishments was apparently counterbalanced by reductions in other industries, according to the Census Bureau. Claims for unemployment compensation have been increasing steadily every week since October. Although this means the number of jobless is climbing, it is far from alarming to the Bureau of Employment Security, which pointed out in a recent report that the total number of unemployed is only two million while there are nearly 60 million civilians gainfully at work.

Employment trends in the Tenth District were similar to those in the nation. Colorado unemployment increased sharply after Christmas and was expected by the State Department of Employment Security to continue to grow during January. Unemployment, which was approaching 16,000, was largely seasonal, although it was influenced by some factors not present last year. The department predicted a bright employment outlook for 1949 but pointed out that recovery from the winter slump may be a little slower this year because of industrial readjustments taking place. In Denver, the influx of population which has increased the size of the metropolitan area labor force by 35 per cent since 1940 is tapering off, according to the State Employment Service. The Denver labor force was at an average level of about 187,500 in 1948, slightly below the figure for 1947, and it is expected that the total number of jobs available in 1949 will run 3,000 below the past year. This condition has led the Employment Service to predict that some workers now in the Denver labor market may leave the area.

Total employment has shown a slight seasonal decline in Oklahoma, but the employment situation remains exceedingly favorable. The State Employment Service reports that employment in Tulsa during the period from November 15 to December 15 was marked by an increase in the labor force to the 100,000 mark and by a slight gain in unemployment. A labor force of 100,000 is a peacetime record for the Tulsa area, and unemployment at a level of 1.55 per cent of the total local nonfarm labor force is a new low for the city.

In the Kansas City, Kansas, area, seasonal movements were responsible for most of the changes in the labor market and total employment during December. The number of wage and salary workers in nonagricultural establishments decreased 5 per cent to a level of 56,200 in December, while unemployment increased 33 per cent to a level of 4,000. Wichita, on the other hand, experienced a further increase in nonagricultural employment to a level of 68,620 in December. This was nearly 2 per cent over November, 15 per cent above December, 1947, and the highest total employment since V-J Day.

Crops An estimated 61.4 million acres were sown to winter wheat throughout the United States in the fall of 1948. This was about 6 per cent more than that seeded in the fall of 1947 and was over one fourth greater than the 10-year average from 1936 to 1945. Over one half of the country's winter wheat acreage is in states comprising the Tenth District. Wheat growers in these states seeded almost 34 million acres of land to winter wheat in the fall of 1948, about 6 per cent more than that planted in the fall of 1947 and almost one third greater than the 10-year average for the region. Kansas and Colorado had the greatest increases in winter wheat acreage, while the acreage seeded last fall in Wyoming and New Mexico was somewhat lower than in the fall of 1947.

Soil moisture conditions in the winter wheat areas of the District were improved in December and early January by general snows and rains. The intense cold

that accompanied the severe snow storms in this region was generally followed by short periods of relatively mild weather, each time melting some of the snow covering. Although the snow was blown from many wheat fields in Nebraska and in northwestern Kansas, there were no reports that extensive winter killing of the crop had occurred. Of somewhat more concern in Kansas, Colorado, and Oklahoma was the possible adverse effect of alternate periods of freezing and thawing. Such diverse temperatures frequently cause the ground to heave, often damaging the tender wheat plant roots.

Department of Agriculture winter wheat estimates:

	Fall Seeded Acreage			Production		
	1948	1947	Aver. '36-'45	Est. 1949	Final 1948	Aver. '37-'46
	(Thousand acres)			(Thousand bushels)		
Colo.	3,134	2,702	1,358	45,443	50,988	20,220
Kans.	15,805	14,634	13,605	237,075	231,368	167,718
Mo.	2,010	1,914	1,822	34,170	39,270	23,576
Nebr.	4,507	4,419	3,685	81,126	81,938	53,442
N. Mex.	531	597	406	2,920	3,231	2,951
Okla.	7,552	7,332	5,335	90,624	98,962	63,680
Wyo.	266	271	158	4,522	4,800	2,376
7 States	33,805	31,869	26,369	495,880	510,557	333,963
U. S.	61,370	58,161	47,684	964,808	990,098	688,606

On the basis of stocks of wheat on farms January 1, 1949, the Department of Agriculture has made new estimates of the disposition of wheat thus far in the crop year 1948-1949 and of total stocks of wheat on hand January 1, 1949. These estimates indicate that the amount of wheat used in the first half of the crop year was about 521 million bushels and the amount remaining for use in the subsequent six months was about 752 million bushels. This latter figure is approximately 150 million bushels greater than the average January 1 stocks in the years 1942 to 1947. In light of the announced program of Government export purchases for the first six months of 1949, it is expected that the June 30, 1949, carry-over of wheat will be about 300 million bushels, the largest for any year since 1944.

Livestock The number of cattle on feed January 1, 1949, in the entire country was almost 20 per cent larger than on that date in 1948, when the small corn crop of 1947 discouraged extensive cattle feeding. Cattle on feed in states of the Tenth District on January 1 this year numbered 1.3 million head. This number was 22 per cent above the number on feed in these states January 1, 1948, and was 8.5 per cent larger than on January 1, 1947. Cattle feeding in District states is generally on a larger scale this winter than in any year since 1945. Rather large increases in feeding operations over last winter took place in Nebraska, Missouri, and Kansas, while increases in Oklahoma and New Mexico were only moderate. Decreases from last winter's level of feeding operations were indicated in Wyoming where drouth conditions have caused a short supply of hay and other feeds and in Colorado where the number of cattle on feed had been at a very high level on January 1, 1948.

Reliable estimates of the death losses of cattle and lambs throughout December and early January in the blizzard stricken areas of Wyoming, Nebraska, Colorado, and Kansas were not available late in January. In this region there are approximately 3 million cattle and 1½ million sheep and lambs, many of which were isolated from accessible feed by deep snow and drifts. It was reported that, when appraised, death losses will be found to be heavy. The use of ranges and pastures in this general region was quite limited throughout late December and the first three weeks of January. Consequently, extensive supplemental feeding of hay, roughage, grain, and concentrates was necessary. Dropping feed from airplanes to isolated cattle herds and sheep bands was a common practice in range areas. The volume of supplemental feeding required was making heavy inroads on local feed supplies, and concern was expressed regarding possible feed shortages in many localities this spring.

The 1948 fall pig crop in the United States was estimated to be about 34 million head, or 8 per cent larger than the fall crop in 1947. There were about 51.3 million pigs saved from the 1948 spring pig crop. Thus, the total crop for the year came to 85.3 million head, an increase of about 1 million over 1947 production. This increase in the total crop of 1948 over the preceding year was a result of the larger fall crop in 1948 than in 1947, since the spring crop of 1948 was 3 per cent smaller than in 1947. Obviously, the principal factor in bringing about a larger 1948 fall crop was the large corn crop harvested in late 1948. Because it was evident that feed supplies were to be plentiful throughout the winter of 1948-49, farmers were less inclined to sell bred sows and gilts than is usual when only average or below average feed supplies are in the offing.

Based on December 1, 1948, intentions of farmers to breed sows for farrowing in the spring of 1949, it appears that slightly over 9 million sows will produce litters this spring. If these intentions materialize, and only the average number of pigs is saved per litter, a spring pig crop of about 56.5 million head is indicated. A crop of this size would be 10 per cent larger than the spring crop of 1948 but would fall short of the production goal of 60 million head set by the Department of Agriculture. However, if the late winter and early spring weather is relatively mild and dry, the number of pigs saved per litter might be above average, and the spring pig crop would likely be somewhat larger than the 56.5 million head estimated on the basis of saving only an average number of pigs.