Spring 1952

South Dakota Farm and Home Research

Agricultural Experiment Station

SOUTH DAKOTA

FARM and HOME Research

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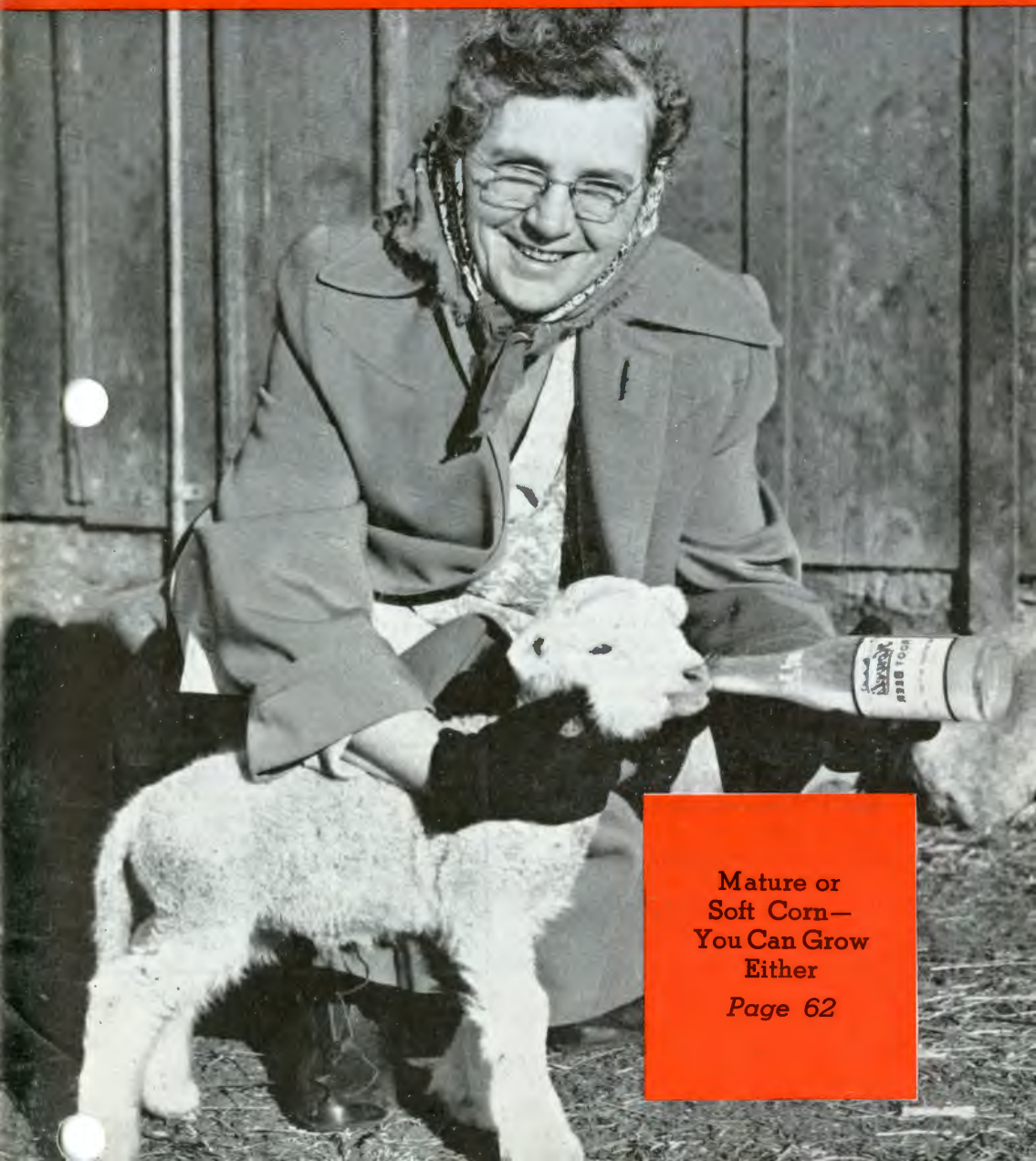

Mature or Soft Corn— You Can Grow Either

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Dear Folks:

You are cordially invited to attend the Field Days to be held by the Experiment Station. As nearly as can be determined the dates and places will be as follows:

Wednesday, May 7—Livestock Feeders Day at South Dakota State College

Wednesday, June 25—North Central Substation, Eureka

Tuesday, July 8—Range Field Station, Cottonwood

Thursday, July 10—Central Substation, Highmore

September (date to be selected)—Agronomy Field Day at South Dakota State College

At these events the progress and development of the research being carried on will be explained and discussed with those in attendance. For instance, the program for Livestock Feeders Day includes discussions on feeding grass-legume silage, feeding results with ear corn silage, an eight-year summary of progeny testing of beef cattle, trace minerals and urea supplements for cattle, creep feeding and antibiotics for swine. Furthermore, Dr. A. E. Darlow, Head of the Animal Husbandry Department at Oklahoma A. & M. College will be the guest speaker on the afternoon's program.

At the substations, the research work with crop varieties, crop breeding, crop rotations, pastures and grazing results, beef cattle production, wintering of cattle, poultry production, fruit production and shelterbelt plantings will be featured.

There will also be a Field Day scheduled at each of the two irrigation development farms, the one at Huron and the other at Redfield. Dates for these Field Days will be announced following the Livestock Feeders Day on May 7.

We hope that you can arrange to attend several of these events during the summer.

Cordially,

L. B. Johnson

Director

SOUTH DAKOTA FARM and HOME Research

A REPORT OF PROGRESS

Vol. III SPRING, 1952 No. 3

In This Issue

Our Cover

Mrs. Simon Rhoads, our cover girl for this issue, hopes that after such a winter our spring will be more lamb-like.

Mr. and Mrs. Rhoads live on a 880-acre farm six miles north of Huron, on State Highway 37. They raise Hereford cattle and Duroc hogs, and expect to have about 125 sheep this year.

Though sheep are quite a novelty to Mrs. Rhoads (she was formerly a teacher in Beadle County rural schools) she does enjoy them thoroughly.

Spring is Mrs. Rhoads favorite season. "Of course there is lots of work," she says, "but if one only looks for it, there is so much to enjoy, and beauty is everywhere."

Photo courtesy of Leo Stock, *The Daily Plainsman*.

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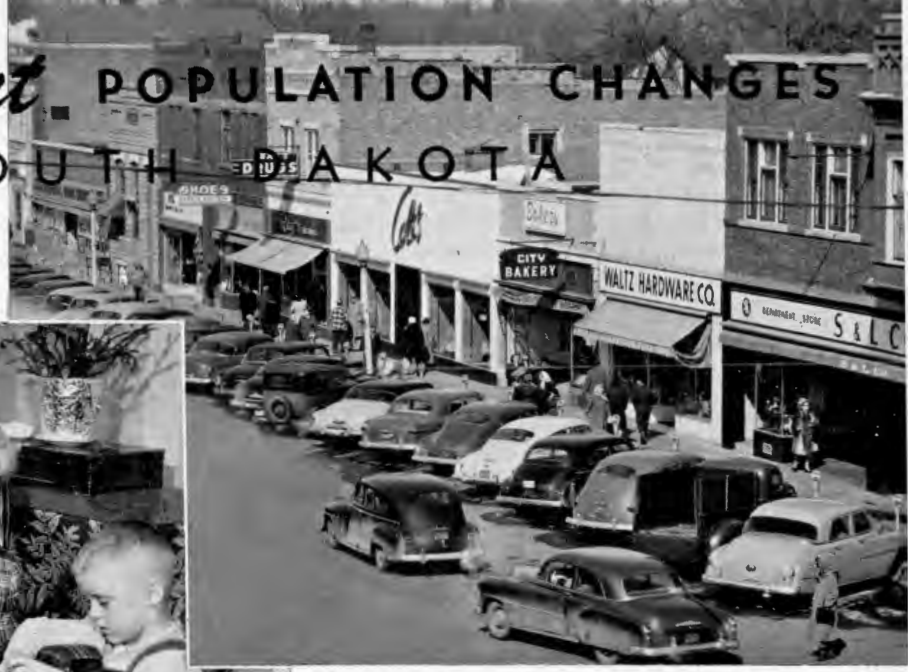
Recent POPULATION CHANGES IN SOUTH DAKOTA

By
JOHN P. JOHANSEN

Both pre-school children and elderly persons are increasing in numbers in South Dakota.



From 1940–50, there has been a pronounced shift of people from rural to urban centers.

MANY SMALL TOWNS and villages accepted with dismay and disbelief the 1950 census figures which showed that their population had decreased. Counting the new housing and new businesses, they had expected that they would hold their own.

Some population facts have specific legal significance. In South Dakota, cities and towns are classified by law according to the number of their inhabitants. Federal and state aid is allotted on a population basis. School officials are keenly interested in the new tide of youngsters in many urban communities and are also concerned about the continued decreases in rural areas. In fact, all types of business, professional and government services are dependent upon a fairly stable sustaining population.

It is far from sufficient, however, to know merely the number of individuals who live in a given area. Population changes are very complex. They affect not only the number of inhabitants of a given area but also their characteristics with regard to sex, age, nativity and race or other traits. Births increase and deaths decrease the total count. People move from one place to another. They change their marital status, their occupation, their residence. The passing of time in itself means that the people are older.

Net Migration of 79,000 Persons From the State

The simple question: "Did South Dakota gain or lose population from 1940 to 1950?" would have to be answered with two apparently contradictory statements (1) that the state had 9,779 more inhabitants on April 1, 1950 than it had 10 years before; and (2) that the state lost 79,000 persons by net migration during these 10 years (Table 1).

South Dakota did not hold its own from 1940 to 1950. It had a deficit of 79,000 persons because of greater migration from the state than to it. Many more than that number left the state but others came in their place so that the net movement balanced at that figure.

Natural increase is the excess of births over deaths. In 1948, it amounted to 10,599 persons. It was estimated to be 89,000 persons for the whole decade. Therefore, if no migration had taken place the state should have had 89,000 inhabitants more in 1950 than in 1940. The actual increase was only 9,779 persons. It follows that the state lost about 79.000 persons through migration.

But all of the surrounding states suffered a similar fate. North Dakota was one of the four states in the nation (along with Arkansas, Mississippi, and Oklahoma) which had an actual loss of population from 1940 to 1950. But what is perhaps even more arresting and thought-provoking is the fact that a net migration of 202,000 persons occurred from the wealthy agricultural and industrial state of Iowa.

Now the migration of youth in pursuit of opportunity is a time-honored American tradition. It has one distinct consequence: It leaves the old folks at home.

South Dakota's Population Is Aging Rapidly

Although it is only 63 years ago since South Dakota was admitted to the Union as a young, bouyant frontier state, it has now, because of the continued "export" of its youth, a larger proportion of aged in its population than has the nation as a whole. The comparative figures were 8.5 percent for South Dakota and 8.2 percent for the United States.

Table 1. Natural Increase of Population and Net Migration from 1940 to 1950 in South Dakota and Surrounding States

	Population		Increase-Decrease	Natural Increase	Net Migration	
	1940	1950	Number	Number	Number	% of 1940 Population
South Dakota	642,961	652,740	9,779	89,000	–79,000	12.3
North Dakota	641,935	619,636	–22,299	98,000	–121,000	18.8
Minnesota	2,792,300	2,982,483	190,183	361,000	–171,000	6.1
Iowa	2,538,268	2,621,073	82,805	284,000	–202,000	8.0
Nebraska	1,315,834	1,325,510	9,676	146,000	–136,000	10.3
Wyoming	250,742	290,529	39,787	41,000	–1,000	4.0
Montana	559,456	591,024	31,568	72,000	–40,000	7.1

Source of data: Bureau of the Census, *Current Population Reports*, SeriesP-25, No. 47, March 9, 1951; U. S. Department of Commerce, Release, December 16, 1951, "Interstate migration offsets gains by natural increases in many states."

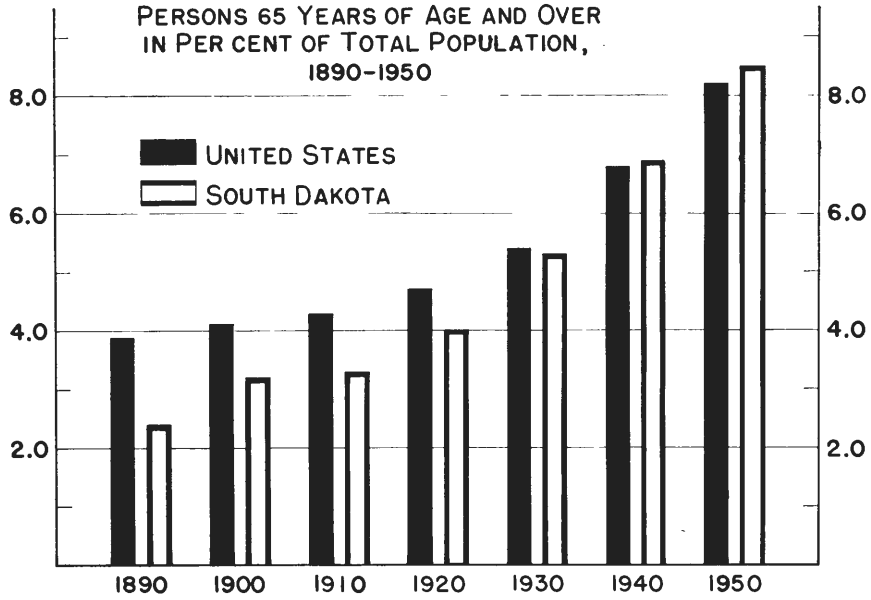


Fig. 1. South Dakota now has a larger proportion of aged in its population than the nation

This aging of the whole population is a gradual, unspectacular change which affects the whole economy and the social institutions of the state. The age of those at the helm colors the outlook and limits the energy and enterprise of business and industry. Larger numbers of farm operators and farm homemakers are of advanced years. Families are older and smaller. There are fewer children under 21 at home.

Robert Browning was an inveterate optimist when he said:

"Grow old along with me
The best is yet to be
The last for which the first was made."

Not many accumulate the means of carefree retirement in Florida or California. Old age brings in its wake a host of problems: chronic illness, frail health, mental infirmity, widowhood and bereavement, retirement, social insecurity, and general dependency upon others.

Fewer Youths From 15 to 24 Years of Age

Several important points are indicated by the data in Table 2. The state as a whole experienced great increases: (1) in children under 5 years (32.4 percent), and (2) in elderly and aged persons 65 years and over (24.4 percent). But most age groups from 5 to 55 years show decreases.

The census counted 18,382 fewer youths from 15 to 24 years of age, a decline of 15.4 percent. In this age group, however, the urban areas gained 22.1 percent; the rural-nonfarm lost 17.2 percent; and the rural-farm areas lost 33.4 percent. *One rural-farm youth is gone for every two who are now there.*

Table 2. Changes in the Principal Age Groups of the Population of South Dakota from 1940 to 1950

Population Element	Age Group	1940	1950	Increase or Decrease 1940 to 1950	
				Number	Percent
Children and youths	Under 5	57,863	76,632	18,769	32.4
	5 to 14	120,566	113,603	–6,963	–5.8
	15 to 24	119,584	101,202	–18,382	–15.4
Young adults	25 to 34	92,062	94,011	1,949	2.1
	35 to 44	81,227	80,668	–559	–0.7
Mature adults	45 to 54	75,220	70,906	–4,314	–5.7
	55 to 64	51,999	60,431	8,432	16.2
Elderly and aged	65 and over	44,440	55,287	10,847	24.4

Source of data: *1950 Census of Population, Preliminary Reports*, Series PC-12 No. 31, July 8, 1951.

Increases of Children Under 5 Years

In the age group of children under 5 there were some striking changes. In urban areas there was an increase of 97.1 percent; in the rural-nonfarm classification the increase was 29.7 percent; but in the rural-farm area, the increase was only 5.7 percent from 1940 to 1950.

This increase of children under 5 years is due to the extraordinary rise of the birth rate. In 1950, the provisional number of births was 18,532. This was the largest number on record but it may be exceeded in 1951. An even more important point is that the urban birth rate is higher now than the rural, the former being 28.4 and the latter 23.7 per 1,000 population according to estimates for 1948. The marked differences in rural and urban increases in preschool children also corroborate the conclusion that the rural-farm population is not reproducing itself as extensively as it did (Table 3).

These changes in the age structure of the population are of great significance for the social institutions of the state. A few of them may be pointed out. Cities have experienced a drastic housing problem. Elementary school buildings are crowded and new buildings are being planned in many urban districts. Homes for the aged are also

Table 3. Births, Deaths, and Natural Increase in South Dakota and Its Urban and Rural Areas in 1940, 1947, and 1948, with Rates per 1,000 Population

Area	1940	1947	1948	Rates per 1,000 Population* 1940	1947	1948
The State						
Births	12,054	16,539	16,405	18.7	25.4	25.2
Deaths	5,700	5,730	5,806	8.8	8.8	8.9
Natural Increase	6,354	10,809	10,599	9.9	16.6	16.3
Urban Area						
Births	3,427	5,411	5,853	21.5	27.0	28.4
Deaths	1,977	2,057	2,014	12.4	10.3	9.8
Natural Increase	1,450	3,354	3,839	9.1	16.7	18.6
Rural Area						
Births	8,627	11,128	10,552	17.8	24.7	23.7
Deaths	3,923	3,673	3,792	8.1	8.1	8.5
Natural Increase	4,704	7,455	6,760	9.7	16.6	15.2

*Mid-year population estimates obtained by straight-line interpolation.

sorely needed. As has been brought out, both pre-school children and elderly people are increasing in numbers while young and mature adults are decreasing. In other words, in South Dakota we have now, and can expect during the next two decades, a larger proportion of dependents in relation to supporters. Furthermore, these population trends are the result of long-operating forces which are regional and national in the scope of their influence. It is not reasonable to expect that they can be materially counteracted unless an extensive and effective program of resource development, such as that of the Missouri basin projects, can be brought about.

Migrants From State Mostly Youths and Young Married Adults

What evidence is there that it is youths and young adults who are leaving the state? Very detailed data for the 1950 census are not yet available. Nevertheless, it is possible to obtain an answer on the basis of the data in Table 2.

Instead of the comparison of age-groups which has just been made, a different method may be suggested. It involves, for example, comparing the group 5 to 14 years of age in 1940 with the ten-year-older group (15 to 24 years) in 1950. In this important instance there was a decrease of 19,364 persons. Taking the next older group, those who were 15 to 24 in 1940 and who would be 25 to 34 in 1950, there was a decrease of 25,573 persons. These decreases are to be attributed either to deaths or to migration out of the state. Since the death rate in these age groups is relatively small, it follows that the main cause is found in the greater migration from the state than into it.

Extensive Urban-Rural Shift of Population

The second main trend is the shift of population from rural areas to urban centers. The increase of urban population (all incorporated places having 2,500 inhabitants or more) from 1940 to 1950 was greater than that of any earlier decade in the history of the state. The urban population now accounts for 31.1

Table 4. Rural and Urban Residence of the Population of South Dakota from 1920 to 1950

Class	1920	1930	1940	1950
Total Population	636,547	692,849	642,941	652,740
Urban*	101,872	130,907	158,087	216,157
Rural	534,675	561,942	484,874	436,583
Rural-Nonfarm	172,789	172,511	178,204	183,088
Rural-Farm	361,886	389,431	306,670	253,495
Percent (Total)	100.0	100.0	100.0	100.0
Urban	16.0	18.9	24.6	31.1
Rural	84.0	81.1	75.4	66.9
Rural-Nonfarm	27.1	24.9	27.7	28.1
Rural-Farm	56.9	56.2	47.7	38.8

*Using here the old urban definition. Data from *United States Census of Population: 1950. South Dakota—Number of Inhabitants*, p. 41-8, and *Release*, July 8, 1951, Series PC-12, No. 31, Table 2. One urbanized area with 553 inhabitants was included in the rural-nonfarm classification for 1950.

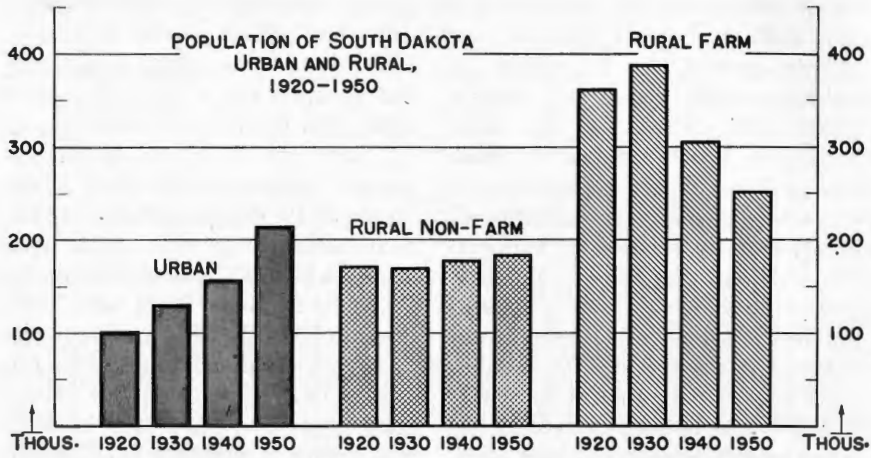


Fig. 2. Increase of urban population was greater (1940–50) than that of any earlier decade

percent of the state's total. In 1930, when the state reached its largest census total (692,849 inhabitants), the urban population was only 18.9 percent of the total (Table 4).

On the other hand, the rural-*farm* population has fallen off sharply from 389,431 in 1930 to 253,495 in 1950, or from 56.2 to 38.8 percent of the total population. The rural-*nonfarm* population (which is approximately the same as the population of incorporated and unincorporated places of less than 2,500 inhabitants) has remained fairly constant.

There are now 25 places in the urban classification with a total population of 216,157. Two cities experienced a very rapid growth. Rapid City grew by adding 11,466 to its total, or 82.8 percent. Sioux Falls added 11,864 to its total, or 29.1 percent. The main cities of the James River Valley—Aberdeen, Huron, and Mitchell—grew by more modest increases. Six places—Belle Fourche, Lemmon, Redfield, Spearfish, Webster, and Winner—had increases in population above the 2,500 mark which gave them rank as urban centers.

The rapid growth of cities, not only in the state, but in the nation and the world over, has many implications. At present, the world's population is growing faster than its food supply. Cities are great consumers of food, water, milk, fuel, light, sanitation, transportation, and many other basic necessities. Food and water are indispensable. Cities are possible because agriculture is capable of feeding them. But if agricultural production is unstable or precarious, the situation of the cities is vulnerable indeed. This is one aspect of the justification for a program designed to increase and stabilize South Dakota's agricultural production.

Farm Population Declines

The farm population has been declining over the last 25 years, but the decrease was especially pronounced

Continued on page 76

Antibiotics FOR PIGS OVER 125 POUNDS

By Richard F. Wilson

Benefits from feeding antibiotics and vitamin B_{12} to pigs during the suckling period and the growing-fattening period have been reported by many experiment stations. Such benefits include greater daily gain, less time from farrowing to market, greater appetites, less feed to produce a hundred pounds of gain, smoother hair coats, and reduced occurrences of scouring and similar intestinal disorders.

Because of the cost of these supplements, it seemed worth while to learn what would be the effects if feeding the supplements were to be discontinued after the pigs reached 125 pounds in weight.

An experiment was conducted at the Experiment Station at Brookings where vitamin B_{12} plus aureomycin, as well as terramycin were fed to pigs in the summer of 1951. This experiment brought out the above-mentioned favorable results when the feeding of antibiotics and

These pigs were fed vitamin B_{12} and antibiotics, in an experiment to find out what the effects would be if the supplements were discontinued after the pigs reached 125 pounds in weight.

vitamin B_{12} was continued until the pigs reached a desirable market weight (225 pounds). These pigs reached market more uniformly than those not receiving the supplement.

The pigs fed these supplements to 125 pounds only, did better than those pigs which did not receive the supplements at all during the trial, but not as well as those that received them through the entire feeding period. The feed cost per 100 pounds of gain was approximately the same for all lots fed the supplements, except for the lot that was fed terramycin all through the trial. For this lot, the cost was 10 cents less.

How the Experiment Was Set Up

Seventy-five pigs averaging about 50 pounds in weight were allotted into five comparable lots according to litter, sex, weight and breed. The four breeds represented were: Hampshire, Spotted Poland China, Duroc, and Poland China. They were fed and housed on concrete and had access to self-waterers. The pigs in Lot I (control lot) received the following basal feeds:

Shelled No. 2 yellow corn, self-fed

Protein supplemental mixture, self-fed, consisting of:

42 parts of soybean meal

30 parts of tankage (60 percent crude protein)

28 parts of ground, sun-cured alfalfa hay

Simple mineral mixture, self-fed, consisting of:

40 parts of ground feeding limestone

40 parts of steamed bonemeal

20 parts of common salt

For Lots II and III, three pounds of alfalfa hay in the protein supplement were replaced by three pounds of vitamin B_{12}-aureomycin supplement (Aurofac[1]). Lot II received this protein supplement until the pigs reached market weight, and Lot III, until the pigs reached about 125 pounds, after which they received the same feed as Lot I.

For Lots IV and V, one pound of

[1]Supplied by Lederle Laboratories, Pearl River, N. Y.

Table 1. Results From Beginning of Trial Until Pigs Reached Approximately 125 Pounds

Items Compared	Lot I Basal	Lot II Aureomycin Vitamin B_{12} to 225 lbs.	Lot III Aureomycin Vitamin B_{12} to 125 lbs.	Lot IV Terramycin to 225 lbs.	Lot V Terramycin to 125 lbs.
Number of pigs	15	15	15	15	15
Average number days on feed per pig	49	49	49	49	49
Average initial weight per pig, lbs.	49.7	49.5	50.5	50.1	50.5
Average final weight per pig, lbs.	116.1	136.7	134.5	136.9	132.7
Average total gain per pig, lbs.	66.4	87.2	84.0	86.8	82.2
Average daily gain per pig, lbs.	1.36	1.78	1.71	1.77	1.68
Feed Consumed Per Pig					
Average daily grain, lbs.	3.43	4.54	4.44	4.26	4.04
Average daily protein supplement, lbs.	.96	.92	.86	.92	.84
Feed Consumed Per 100 Lbs. of Gain					
Shelled Corn, lbs.	252.9	250.3	258.8	240.5	241.3
Protein supplement, lbs.	71.0	51.9	50.4	52.2	50.2
Vitamin B_{12} and Antibiotics Consumed Per Lb. of Total Feed					
Vitamin B_{12}, micrograms	----------	9.2	8.7	----------	----------
Aureomycin, milligrams	----------	9.2	8.7	----------	----------
Terramycin, milligrams	----------	----------	----------	8.9	8.6

Table 2. Results From Time Pigs Weighed Approximately 125 Pounds Until Market Weight

Items Compared	Lot I Basal	Lot II Aureomycin Vita-min B_{12} to 225 lbs.	Lot III Aureomycin Vita-min B_{12} to 125 lbs.	Lot IV Terramycin to 225 lbs.	Lot V Terramycin to 125 lbs.
Number of pigs	15	15	15	14	15
Average number days on feed per pig	61.9	45.0	48.1	45.0	53.0
Average initial weight per pig, lbs.	116.1	136.7	134.5	139.2	132.7
Average final weight per pig, lbs.	228.3	227.5	225.2	225.2	225.9
Average total gain per pig, lbs.	112.2	90.8	90.7	86.0	93.2
Average daily gain per pig, lbs.	1.81	2.02	1.89	1.89	1.76
Feed Consumed Per Pig					
Average daily grain, lbs.	6.35	6.84	6.56	7.08	6.34
Average daily protein supplement, lbs.	.78	.80	.80	1.03	.82
Feed Consumed Per 100 lbs. of Gain					
Shelled Corn, lbs	350.5	339.1	347.6	341.5	360.8
Protein supplement, lbs.	43.0	39.7	42.4	49.8	46.4
Vitamin B_{12} and Antibiotics Consumed Per Lb. of Total Feed					
Vitamin B_{12}, micrograms	----	5.6	----	----	----
Aureomycin, milligrams	----	5.6	----	----	----
Terramycin, milligrams	----	----	----	6.3	----

Table 3. Results of Feeding Antibiotics and Vitamin B_{12} to Pigs (All Feeding Periods)

Items Compared	Lot I Basal	Lot II Aureomycin Vita-min B_{12} to 225 lbs.	Lot III Aureomycin Vita-min B_{12} to 125 lbs.	Lot IV Terramycin to 225 lbs.	Lot V Terramycin to 125 lbs.
Number of pigs	15	15	15	14	15
Average number days on feed per pig	110.9	94.0	97.1	94.0	102.0
Average initial weight per pig, lbs.	49.7	49.5	50.5	51.7	50.5
Average final weight per pig, lbs.	228.3	227.5	225.2	225.2	225.9
Average total gain per pig, lbs.	178.7	178.0	174.7	173.5	175.4
Average daily gain per pig, lbs.	1.61	1.89	1.80	1.84	1.72
Feed Consumed Per Pig					
Average daily grain, lbs.	5.06	5.60	5.49	5.34	5.24
Average daily protein supplement, lbs.	.86	.86	.83	.94	.83
Average daily mineral, lbs.	.03	.04	.03	.03	.03
Average daily feed, lbs.	5.95	6.50	6.35	6.31	6.10
Feed Consumed Per 100 lbs. of Gain					
Shelled corn, lbs.	314.2	295.6	304.9	289.6	304.9
Protein supplement, lbs.	53.4	45.7	46.2	50.8	48.2
Mineral mixture, lbs.	2.1	1.9	1.9	1.8	1.8
Total, lbs.	369.7	343.2	353.0	342.2	354.9
Feed Cost Per 100 lbs. of Gain	$11.12	$10.88	$10.88	$10.77	$10.87
Vitamin B_{12} and Antibiotics Consumed Per Lb. of Total Feed					
Vitamin B_{12}, micrograms	----	7.2	----	----	----
Aureomycin, milligrams	----	7.2	----	----	----
Terramycin, milligrams	----	----	----	7.4	----

alfalfa hay in the protein supplement was replaced with one pound of a terramycin supplement (TM-5).[2] Lot IV received this protein supplement until the pigs reached market weight, and Lot V, until the pigs reached about 125 pounds, at which time these pigs were put on the same feeds as Lot I. The amounts of vitamin B_{12} and antibiotics actually consumed per pound of total feed during the two periods are shown in Tables 1, 2 and 3.

[2]Supplied by Chas. Pfizer and Co., Chicago, Illinois.

Definite Advantages Result

Until the pigs reached about 125 pounds in weight (Table 1) those fed the terramycin and those fed the aureomycin plus vitamin B_{12} made much faster gains, ate more, and required less feed to make their gains than did the control pigs (Lot I), although the control pigs made good daily gains (1.36 pounds per head per day).

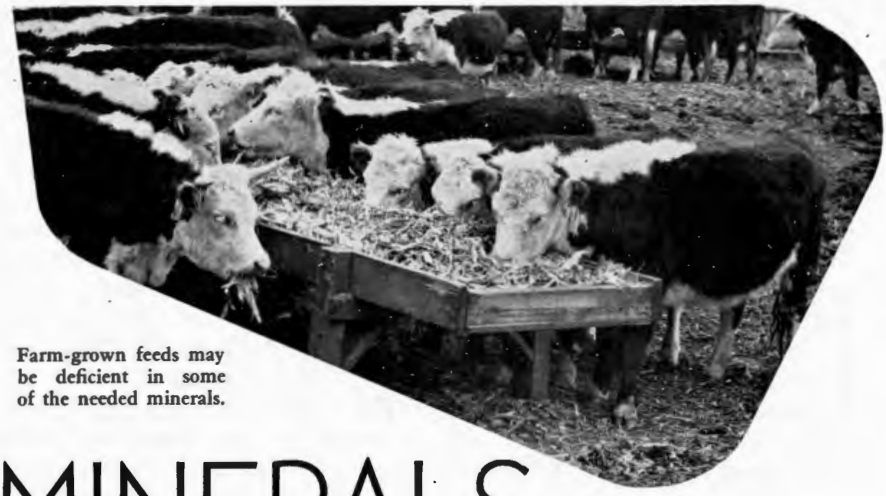
During the growing-fattening period, from 125 pounds to market weight (Table 2), the pigs in the control lot made faster daily gains than did the pigs which had received terramycin up to 125 pounds (Lot V), but less than those which had received the aureomycin and vitamin B_{12} to the same weight (Lot III). Appetites were somewhat greater in the lots which received the antibiotics during this period. Feed efficiency in the control lot tended to be comparable with the feed efficiency in the other lots, except for the lot which received the vitamin B_{12} and aureomycin to 225 pounds (Lot II). During this period one pig died in Lot IV of causes not due to the treatment in this trial.

The results for the entire feeding period are given in Table 3. Daily gains, feed eaten per pig per day, and feed required per 100 pounds of gain were all advantageous for those lots which received an antibiotic plus vitamin B_{12} or an antibiotic only, especially in those lots receiving these supplements during the entire feeding period.

From these results, it is obvious that the feeding of aureomycin and vitamin B_{12}, or of terramycin, produced very definite advantages as to feed efficiency and rate of gain. Although the differences in feed cost per 100 pounds of gain were not large, the feed cost was highest in the control lot and lowest in the lot which received terramycin throughout the test. Also, the pigs fed the antibiotics were more uniform than the controls. This was reflected in the number of days from the time the first pig in a lot reached 225 pounds until the last pig in the lot reached this weight. This period of time was less in the lots which received the antibiotics than in the control lot.

The control pigs were marketed during the first week in October (average marketing date, October 4). The average marketing date for Lot II was September 17, for Lot III, September 20, for Lot IV, September 17 and for Lot V, September 25. Though the control pigs were the last lot to reach market, they brought more per hundred weight on the Sioux Falls central market due to the rather unusual hog market price trend in the fall of 1951. However, when determining the value of feeding these supplements, certain other items of cost should be considered. These include the cost of the extra labor required by the control pigs to reach market weight, interest on investment, and risk.

In order to determine the effect of vitamin B_{12}, aureomycin and terramycin upon the carcass of swine, eight barrows from each lot were slaughtered at the conclusion of the test. These data are not summarized to date but will be reported later. (Project 213. Leader: R. F. Wilson, Animal Husbandry Dept.)



Farm-grown feeds may be deficient in some of the needed minerals.

MINERALS
IN SOUTH DAKOTA FEEDS

By GEORGE GASTLER and O. E. OLSON

THE ANIMAL BODY REQUIRES at least fourteen mineral elements for normal growth or function. Some are required in comparatively large amounts and may be referred to as the principal minerals. Others need to be present in such small amounts that they are called trace minerals. All fourteen minerals, listed below, are found in farm-grown feeds, but in some cases they are present in insufficient amounts to supply the needs of animals. When this is the case, the deficient mineral must be fed as a supplement to the normal ration.

Principal Minerals	Trace Minerals
Sodium	Iodine
Chlorine	Manganese
Calcium	Copper
Phosphorus	Iron
Sulfur	Zinc
Potassium	Cobalt
Magnesium	Fluorine

Not all of these minerals are reported on here because some of them (sulfur, potassium, magnesium, zinc and fluorine) are present in farm feeds at a level high enough so that deficiencies are not likely to occur in animals getting these feeds. On the other hand, sodium and chlorine are usually deficient, and allowing animals free access to salt, which contains these minerals, is a common and necessary practice.

Studies on South Dakota feeds must be made concerning the remaining two principal and five trace minerals to determine whether what is grown here can be expected to contain normal quantities of these minerals and what parts of the state are deficient in any of them. These studies have been under way for about three years now, and some of the results are reported here.

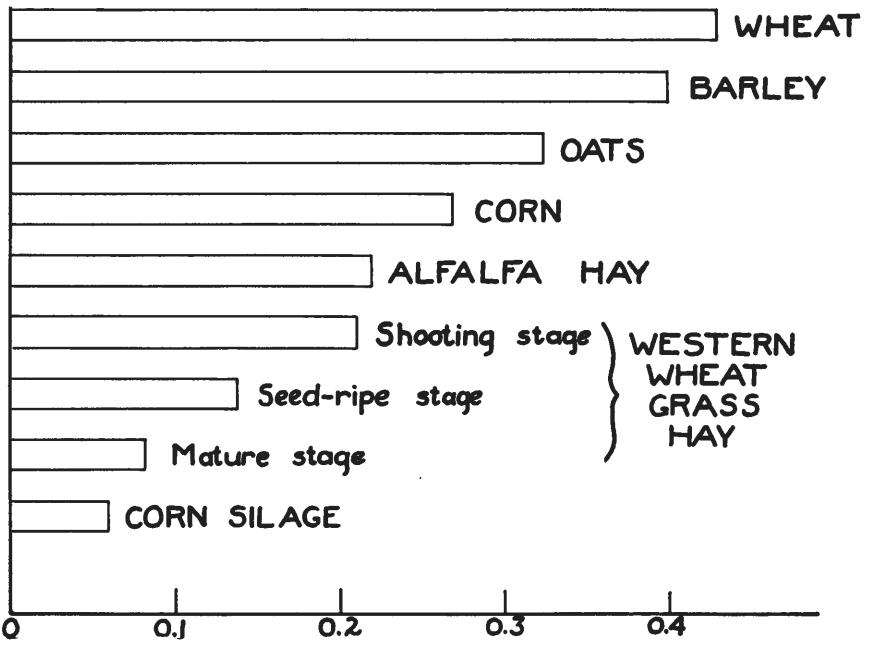


Fig. 1. The phosphorus content of some South Dakota feeds

Analyses Made of Principal Minerals in Farm Needs

Calcium is generally in good supply in South Dakota soils. This does not mean, of course, that all of the South Dakota feeds are good sources of this mineral. It does mean, though, that it can be fairly certain that the feeds grown in the state contain normal amounts of this nutrient. If the soils were deficient, then some feeds listed as good sources of calcium might fall into a "fair" or "poor" class. A number of calcium analyses have been made on feeds grown in this state and no cases of unusually low values have been found. The work will be continued, however, to insure that the more humid areas within the borders of the state are free from calcium deficiency. It should be remembered in connection with calcium that water, especially hard water, may contribute appreciable amounts of this element to the nutrition of animals.

Phosphorus presents quite a different picture. Of the essential minerals likely to be in short supply in farm-grown feeds, it appears to be the first to need study. It is well known that many South Dakota soils are deficient in phosphorus, and some of the neighboring states have reported soils deficient in this nutrient near the South Dakota borders. This, in addition to the excellent response of crops to phosphorus fertilization, points toward a rather serious deficiency.

Several factors act in determining the phosphorus content of feeds.

Fig. 1 illustrates how two of these, type of crop and maturity when harvested, are concerned. The values indicated are averages of several values obtained on feeds from various parts of the state. Cereal grains are normally fair to good sources of phosphorus. Hays, too, are fair sources of this nutrient when they are cut at the proper stage and handled properly, but the three values for western wheatgrass show that the phosphorus content falls to a low level when the wheatgrass is allowed to mature to the seedripe stage before harvesting. All hays follow this same general pattern, and those that are fairly good sources of this mineral when cut early are poor sources when cut late.

Rainfall, climate and variety of the crop will also cause variations from the average values for phosphorus content for a feed crop. However, soils low in available phosphorus may produce phosphorus deficient feed, even if all other factors influencing phosphorus content, such as rainfall, climate, and variety of crop, are at their best. In one area of the state where studies have been carried on for four years, it has been found that the average phosphorus content of bluegrass at eighteen different sites varied from 0.085 percent to 0.204 percent. The cause for this variation is due to differences in available phosphorus in the soils. Although this study was not the detailed type that would allow for accurate mapping of low-phosphorus areas, it has established a base for further work and demonstrates the need for continued study.

Trace Minerals Also Analyzed

Manganese determinations have been made on several feed samples from various locations in the state. In general, the values obtained were considerably lower than those published for grasses and grains from other states. There was considerable variation between samples from the various locations, indicating large differences in manganese availability in different soils. To date, however, no areas within the state are known where the manganese content of the feeds is so low as to cause deficiency symptoms in the animals.

Copper is considered deficient in the ration at a level of about 4 parts per million (ppm). Sixteen samples of hay from four different areas in the state believed possibly deficient in copper were examined for their content of this mineral. Eight of the samples contained 4 ppm or less of copper, but none were lower than 3.3 ppm. However, the generally low content of this nutrient makes a deficiency appear highly probable. Further studies on this element are planned for the coming growing season.

Cobalt was determined on the same samples used in the study on copper. This mineral appears to become limiting at levels of 0.04 to 0.07 ppm in the ration. None of the hays fell below 0.04 ppm, but eight of them fell within the range indicated as limiting. As in the case of copper, deficiencies appear probable and the work must be extended.

Iron analyses have been made on a large number of samples from var-

Continued on page 67

YOU CAN GROW MATURE CORN!

EASTERN PART OF THE STATE

For the eastern part of this state, mature corn can be grown most years by:

1. *Using earlier hybrids*
2. *Planting earlier hybrids thicker, about 4 plants per hill*
3. *Planting only when the ground is warm, or about May 10 to May 20*

CENTRAL PART OF THE STATE

In the central part of this state, more mature corn was produced by using earlier hybrids and planting them during the first three weeks in May at the rate of two or three plants per hill. The use of late hybrids often results in great losses in production and income, causes storage, feeding and spoilage problems and delays corn picking until cold and snowy weather

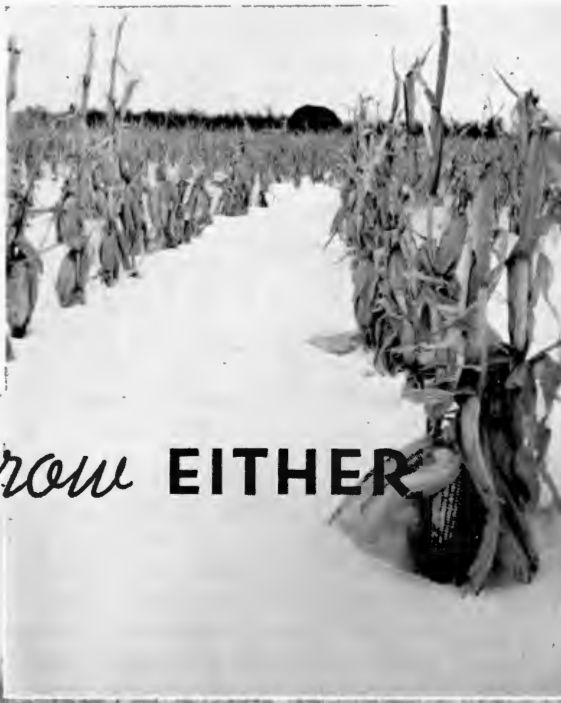
MATURE OR SOFT CORN

You Can Grow EITHER

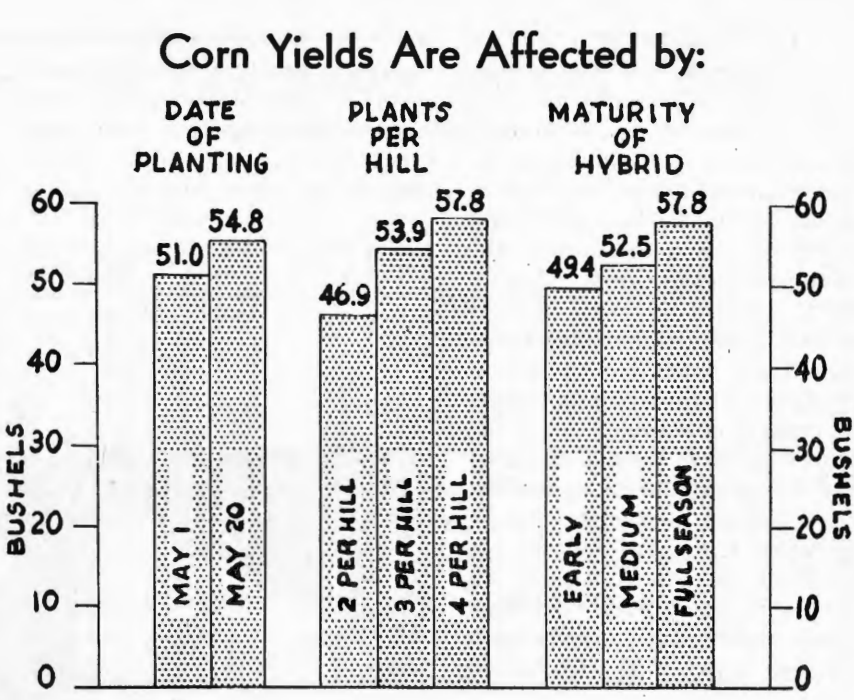
A. N. HUME

IN FIVE of the past ten years considerable soft and immature corn has been produced in South Dakota. This not only has caused many problems, such as late harvesting, storage, drying, feeding, and spoilage, but has also greatly reduced the wealth and income from some 4,000,000 acres of our most productive land. This great loss is especially significant since it happened in years favorable for crop production.

In order to determine some of the factors that affect yield and maturity of corn, experiments were started in 1945 at Brookings and at Highmore. For these experiments three kinds of corn were used: An early corn, a corn with a medium growth period, and a full-season (not a late corn). With each hybrid the corn was planted thick and thinned as nearly as possible to two, three and four plants per hill. Hills were 42 inches apart in each direction. Also, each set (three hybrids, each at two, three, and four plants



Most farmers would prefer to harvest their corn early like the farmer is doing below. Planting late hybrids often delays the corn picking until the weather is cold and snowy.



per hill) was planted on about May 1, and again on about May 20, at Brookings and at Highmore.

Each year, then, corn was grown in 18 different ways or combinations in the eastern as well as in the central section of this state. Except for the 1951 cool season, the growing conditions at these locations were quite favorable during the seven years of this study. A satisfactory stand and a crop worth harvesting was produced each year. The corn was harvested soon after a freezing frost (September 16 to October 19), and before it had a chance to lose much moisture, because other experiments also had to be harvested during the fall period. However, moisture samples were taken on each plot harvested and all yields corrected and adjusted to a uniform moisture basis. Yields are reported in bushels per acre with 15 percent moisture.

The corn in these experiments was grown on good soil that was fertilized and manured. Fertility, therefore, was not a limiting factor as the soil contained more plant food than was used by the various treatments. The average yields of corn (15 percent moisture) at the Station at Brookings are shown graphically under the heading "Corn yields are affected by:"

Plant May 10 to May 20 in Eastern Part of State

Note that in the eastern part of this state, corn planted about May 20, yielded more than that planted May 1. This is true not only as an average but also for each of the

seven years under test. The higher yields obtained on May 20 were due to the early- and medium-season hybrids, since the full-season hybrid produced about one bushel more per acre when planted on May 1. The results indicate, therefore, that in the eastern part of this state the ground should be warm before planting corn, so that the seedlings can continue to grow and their vigor not be delayed by colder weather. With early- or medium-season hybrids, lower yields can be expected if corn is planted too early. With full-season hybrids, early planting increased the yield by about one bushel over the later planting.

At Highmore, or in the central part of this state, the date of planting had little effect on the yield of corn. Results from seven years' trials show an average yield of 22.9 bushels when planted on May 1 and 23.4 bushels for the May 20 planting.

Greater Yields From 4 Plants Per Hill

The number of plants per hill greatly affected the yield of the early-, medium-, or full-season hybrids in the eastern part of the state. The average yields for all hybrids planted at the two dates were 46.9 bushels for two plants, 53.9 bushels for three plants and 57.8 bushels for four plants per hill. In the central part of the state, the number of plants per hill had little influence on corn yields. The yields were 22.9, 23.9 and 22.7 bushels per acre for two, three and four plants per hill, respectively, at Highmore.

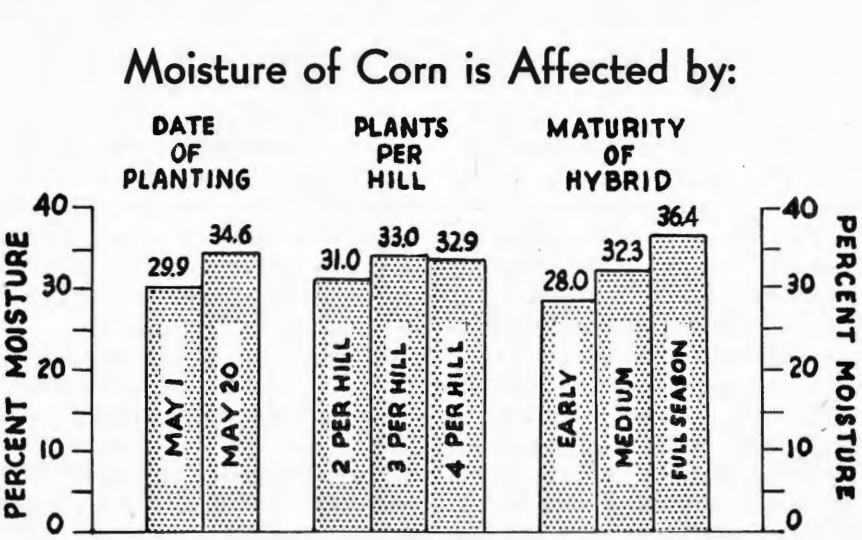
At the main station at Brookings, when all treatments are averaged, the early hybrids did not produce as much corn as the medium- or full-season hybrids. It must be remembered, however, that this experiment was conducted on good fertile soil and fertility was not a limiting factor as it often is on many farms. Soils low in fertility delay maturity, reduce yield and increase the moisture content of the corn.

At Highmore, during this 7-year period, yield of corn was not affected by maturity of the hybrids used. The early hybrid produced 23.5 bushels, medium 23.0 bushels and full-season hybrid 23.0 bushels per acre.

Highest yielding hybrids are desirable, but moisture content or maturity is also very important and must be considered in choosing the proper corn. Soft and immature corn results in additional bulk, spoilage, storage, drying and feeding problems, as well as harvesting during cold and snowy weather. The moisture content of corn trials obtained at Brookings are shown in the graph. As mentioned earlier, the moisture percentages reported are higher, since this test had to be harvested soon after frost and before it had a chance to lose the normal moisture content.

Moisture Content Affected by Planting Date, Rate, and Maturity

It will be noted that the corn planted May 1 possessed less moisture than that planted May 20. The same was true at Highmore, since the average moisture content of corn planted on May 1 was 28.0 percent and on May 20, 31.5 percent. The number of plants per hill also



had some effect on the moisture content. For eastern South Dakota, corn with two plants per hill possessed about 2 percent less moisture than that having three and four plants per hill. At Highmore, corn with four plants per hill contained about 3 percent more moisture than that planted thinner.

As would be expected, the earlier hybrids contained less moisture than the later hybrids. At Brookings, the early-, medium- and full-season hybrids contained an average of 28.0, 32.3 and 36.4 percent moisture, respectively. At the Highmore substation, the average moisture percentages were 25.9 for early, 27.9 for medium and 30.9 for full-season hybrids.

Averages as reported above, and which include different maturity hybrids grown under varied conditions, show only general trends and reflect the kind of corn crops produced in this area during the past seven years. To improve on our methods and grow mature corn most years, rather than only 50 percent of the time, it is necessary to examine more closely each of the 18 different combinations in this experiment. A study of three of the various combinations of growing corn (Table 1) shows the following:

Grow Mature Corn

These three ways of growing corn illustrate that either mature corn was grown in eastern South Dakota every year (Method No. 3), or soft

Table 1. Three Methods of Growing Corn, Brookings, S. D., 1945—1951

Method Used	Yield (Bu.)	Moisture (%)	Remarks
No. 3. Early hybrid, 4 plants/hill, May 1	52	26	Fair yield, mature corn every year.
No. 6. Early hybrid, 4 plants/hill, May 20	58	32	High yield, mature corn 6 years in 7.
No. 17. Full season, 3 plants/hill, May 20	58	40	High yield, soft corn 4 years in 7.

corn was produced four years out of the past seven (Method No. 17). The average yields obtained, however, were lower when sound mature corn was produced every year than when other methods were used. For eastern South Dakota the results indicate that more mature corn and high yield can be obtained in most years by adopting the practices used in Method No. 6. For the eastern part of this state that would mean:

1. Growing earlier hybrids
2. Planting thicker, or about 4 plants per hill
3. Planting after the ground is warm, or about May 10 to 20.

Under conditions of less rainfall, such as exist in the central part of this state, corn yields are limited more by rainfall than by such factors as plants per hill or maturity of hybrids. The results from the study at Highmore indicate that more mature corn can be obtained by using earlier hybrids and planting them during the first three weeks in May at a rate of two or three plants per hill.

The use of full-season or late corn hybrids can result in great losses in production and income. This was especially true in 1951 and is illustrated in Table 2.

Table 2 indicates that in 1951 the early hybrid not only produced 10 bushels more of corn, but also the corn was of higher quality and contained 10 percent less moisture. The plots at Brookings were harvested on October 19, 1951. (Project 4. Leader: A. N. Hume, Agronomy Dept.)

Table 2. Unadapted Hybrids Reduce Wealth and Income, Brookings, S. D., 1951

Method Used	Yield (Bu.)	Moisture (%)	Remarks
No. 6. Early hybrid, 4 plants/hill, May 20	46	36	Fair yield of *soft* corn.
No. 18. Full season, 4 plants/hill, May 20	36	46	Poor yield of *immature* corn.

Minerals in South Dakota Feeds

Continued from page 61

ious parts of the state. Deficiencies in this element apparently do not exist. More complete information is needed, however, as to how much iron the various crops grown here may contain in order to help the animal nutritionist in determining whether or not supplementation of the ration with this element is necessary.

Iodine deficiencies have been reported in the state, but, to date, no chemical determinations on feeds have been made. The failure of present analytical methods to prove trustworthy is a problem in the study of this element. Studies on methods must be completed before the work on iodine can be extended to the field. (Project 180. Leaders: George Gastler and O. E. Olson, Station Chemistry Dept.)

Can *Chemicals* Weed Your Garden?

By Solomon Cook

Yes, if you're careful!

Garden yields will be increased by efficient weed control, and the use of chemicals, a fairly new development, has proved satisfactory for a number of crops. The main advantage of this method of weed control is its labor-saving feature. Never the less, *it is not a substitute, but a supplement to standard weeding practices* which will reduce hand-weeding and cultivation.

Points To Be Kept in Mind

1. Herbicides (weed killers), when not applied with great care can kill the crop as well as the weeds. Therefore, the following precautions should be observed:

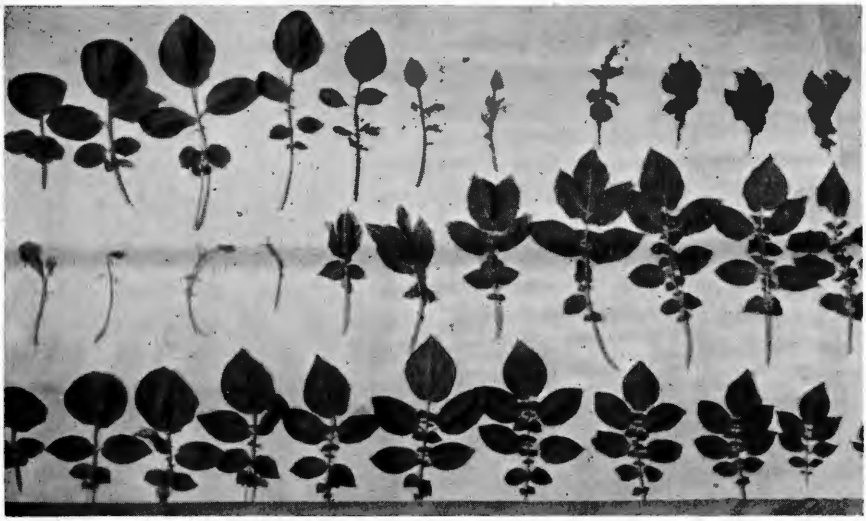
(a) Only the amount recommended on the container or given in this article should be used. Amounts recommended here may vary from those given on the container, since they are worked out for the specific conditions in the state and are, therefore, more effective for South Dakota gardens.

(b) Vapors from standard ester formulations of 2,4-D may be carried a considerable distance by air movements. Wind direction and velocity have to be watched to avoid damage to sensitive trees, flowers, hedges, or crops.

(c) When a chemical in form of a dust is used, measuring the powder and filling the sprayer should be done away from the vegetable garden. Wind may carry the dust and injure other crops.

(d) A sprayer that has been used for herbicides should not be used for insecticides or fungicides until it has been cleaned thoroughly. (Household ammonia is a good cleaning agent.) If 2,4-D is used, a special sprayer reserved for only this chemical is recommended. Residues left, even after thorough washing, might cause great harm to sensitive crops such as tomatoes and grapes.

Weeding gardens can be backbreaking work



Leaves of potato plants treated with 2,4-D, showing response at different stages of application. Cultural control is preferred, but spraying with chemicals may be desirable in wet weather.

2. Only one spraying is needed with chemicals.

3. It should be kept in mind that spraying is only successful when the weeds are small, that is, not taller than one to two inches. Also, under dry conditions, weeds are tougher and harder to kill.

4. Some chemicals when sprayed retain their ability to destroy plants for a very long time. In that case they might harm the crop, even if used in a pre-emergence treatment (before the crop has come up), because they would still be active by the time the crop came up. Therefore, it is of the greatest importance that only the chemical recommended for a given crop is used.

Experiments with chemicals, such as 2,4-D, TCA, Dinitro and Stoddard Solvent, were made on a number of crops at the Experiment Station at Brookings during the last year.

Spraying With 2,4-D

Since pure 2,4-D is not soluble in water, many formulations have been manufactured by different companies. Most of these formulations can be classified as amines, esters and sodium salts. The sodium salt of 2,4-D, a powder form, is convenient to handle and is easy to measure accurately by weight. Low-volume sprays of less than 20 gallons per acre have not been generally successful with this powder because it clogs the small nozzles. This salt is not appreciably volatile (does not evaporate easily) and thus causes injury only when brought into direct contact with the plant.

Several amine salts of 2,4-D are available on the market. If a low-volume sprayer is used, this is the type of 2,4-D to use.

The ester forms of 2,4-D are more effective than either the amine or sodium salts. They will cause more

Crop	What to Use	When to Use	How Much	Remarks
ASPARAGUS	2,4-D	On established beds before cutting season in spring, following discing; or immediately following last cutting.	1 to 2 lbs. per acre or ½ to ⅞ tsp. per qt. of water for 100 sq. ft.	Where broadleaved weeds are more troublesome than grasses. Curling may result when applied directly on spears. When "leafed out," apply directly at base of stalks.
BEANS	Dinitro	Pre-emergence: within 2 days after planting snap beans; within 5 days after planting lima beans.	6 to 8 lbs. per acre or ⅜ to ½ oz. per qt. of water per 100 sq. ft.	Will control most annual weeds.* Will not kill perennial weeds.
BEETS	TCA	At least 2 days before beets emerge .	8–10 lbs. per acre or 9 to 12 tsp. per qt. of water per 100 sq. ft.	Where annual grasses are a problem.
CARROTS CELERY DILL PARSNIPS PARSLEY	Stoddard Solvent (undiluted) on crop in field.	Before weeds are over 2 inches high.	80–100 gals. per acre or 1½ to 1⅞ pts. per 100 sq. ft.	Good control of annual weeds. Carrots should not be sprayed after tap root is more than ¼-in. in diameter. Celery should be sprayed only in seed bed.
ONIONS	Stoddard Solvent (undiluted)	Pre-emergence	40–80 gals. per acre or ¾ to 1½ pts. per 100 sq. ft.	For weeds that emerge before onions, pre-emergency spray gives good results.
PEAS	Dinitro	Peas should be 4–8 in. tall. Must not be wet with dew or rain.	Follow manufacturer's directions.	Excellent control of wild mustard and broadleaved weeds. Will not kill most perennial weeds and grasses.
POTATOES	Dinitro	Pre-emergence	6–8 lbs. per acre or ⅜ to ½ oz./qt. of water per 100 sq. ft.	Cultural weed control preferred. Chemical sprays during wet weather may be desirable.
	2,4-D	Pre-emergence	1 to 2 lbs. per acre or ½ to ⅞ tsp./qt. of water/100 sq. ft.	Post emergence sprays with 2,4-D *not recommended*. Alters growth of tops and tubers.
RASP-BERRIES	2,4-D	Early in spring, when weeds are not over 1 in. tall.	½ to 1 lb. per acre or ¼ to ½ tsp./qt. of water/100 sq. ft.	Where broadleaved weeds are a problem.
STRAW-BERRIES	2,4-D	On first-year berry beds and in non-fruiting older plantings.	1 lb. per acre or ½ tsp./qt. of water/100 sq. ft.	Newly set plants should not be sprayed until well established. Should *not* be used on flowering or fruiting strawberries.
SWEET CORN†	2,4-D	Pre-emergence: 5 to 7 days after planting	1 to 2 lbs. per acre	Controls annual grasses and some broadleaved weeds. Pre-emergence spraying *not* recommended on sandy soils.
		Post emergence (very early)		May be superior to pre-emergence spraying.

*Common annual weeds are: Frenchweed, mustard, ragweed, pigweed, purslane, lamb's quarters, pigeon grass (foxtail), barnyard grass, etc. Some perennial weeds are: dandelion, field bindweed, milkweed, Canada thistle and quackgrass.
†See section on sweet corn in this article for more detailed information.

injury to more species of plants and therefore they are more hazardous to use. Great care should be exercised when applying this form of 2,4-D.

2,4-D, in all its forms, is toxic to most annual broadleaved plants and retains its toxic activity in the soil for 3 to 6 weeks. Even if it is used in a pre-emergence treatment, some injury to the crop can be expected. Where a range in the rate of application of 2,4-D is given in the table, the lower rate applies to the esters and the higher rate to the amine or sodium salt formulations. Since water is used only as a carrier, any amount from a quart to a gallon may be used—according to how much water is needed to cover the crop. However, the 2,4-D used must be accurately measured in the amount stated.

When to spray 2,4-D. Best results are obtained when 2,4-D is sprayed during warm and sunny days in the forenoon. During this time and under those conditions, more of the chemical is absorbed.

Spraying With TCA

TCA is an effective herbicide for grasses, particularly perennial weed grasses, quackgrass and Kentucky bluegrass. Areas under irrigation, where the main weeds are annual grasses, will profit greatly by this weed killer. TCA like 2,4-D stays toxic in the soil for some time, though not as long as 2,4-D.

Spraying With Dinitro

Dinitro is effective in the control of most annual weeds. It stains protein materials, hair, silk, wool and leather and the stains are difficult to remove. Dinitro is soluble in oil and only after an emulsifying agent has been added, can the oil be mixed with water.

Spraying With Stoddard Solvent

Stoddard Solvent will, in most cases, kill all weeds except perennials, ragweed, and related plants. It should be applied as soon as most weeds have emerged, but before any are over two inches high.

Stoddard Solvent, which is a dry cleaning fluid, should be used undiluted. The time of spraying is very important, because it can impart an oily flavor to the vegetable if sprayed at too late a date. Also, it should not be sprayed during very hot, dry and windy weather.

When Spraying Sweet Corn

Spraying sweet corn should be done as early as possible to control weeds. Spraying with 2,4-D can be used to reduce the number of cultivations needed by controlling some weeds. It should not be expected to replace cultivation.

Isopropyl and butyl ester formulations are less hazardous to corn than amine or sodium salt formulations. Dry weather after pre-emergence treatments may make them ineffective, and excessive rain may create a hazard to corn.

If the corn is higher than the weeds, a rate of 1/4 to 1/2 pound per acre is satisfactory. The spray must reach the top of the weeds to be effective. Some injury is to be expected at any time, and high temperature at time of treatment increases corn injury. (Project 118. Leader: Solomon Cook, Horticulture Dept.)

LAND FOR RESERVOIRS

Report of Subcommittee[1]

THE CREATION of a large reservoir has serious and definite impacts on any community where it is established. Any development that takes thousands of acres of good land permanently out of production, that removes property from the tax roll and makes it necessary for families to move and establish new homes elsewhere will have such impacts.

An estimated 467,000 acres of land are earmarked for reservoir use in South Dakota. Of this total 98,000 acres are cropland, 66,000 dry hayland, 180,000 pasture and 124,000 timber and rough grazing. Since landowners were dissatisfied with the methods used in acquiring land for the reservoirs, a committee[2] was set up to study the problem and to help work out better techniques.

The two federal agencies involved in building dams in the Missouri Basin Development are the Corps of Engineers and the Bureau of Reclamation. At the present time, the Corps of Engineers has three dams under construction—Fort Randall, Oahe and Cold Brook; the Bureau of Reclamation has completed Deerfield, Angostura and Shadehill.

Two areas were selected for study by the committee: Fort Randall on the Missouri River, under supervision of the Corps of Engineers, and Shadehill, on the Grand River under supervision of the Bureau of Reclamation. Not only are these areas being handled by two different agencies, but they also represent different stages of program development. The ideas presented in the committee report were formulated by interviewing farmers and others in the reservoir area, as well as personnel charged with the responsibility of carrying out the land acquisition program. Summarizing the experiences of those interviewed, the problems found in the Fort Randall Area were the following.

What Farmers At Fort Randall Thought

The right of the government to take land for a public purpose was not clearly understood by the people of the area. Problems have arisen in the Fort Randall Reservoir as a result of the use of this right by the

[1]This is a summary of a more complete mimeographed report: *Some Local Impacts of Reservoirs in South Dakota*, copies of which may be obtained from this Station.

[2]Subcommittee of the South Dakota Coordinating Committee for Missouri Basin Development. Members of this subcommittee are: Clarence Shanley, Extension Service, (Chairman); Ralph Johnston, Bureau of Reclamation; Jack Gardner, Corps of Engineers, U. S. Army; Russell Berry, Department of Agricultural Economics, S.D.S.C., Experiment Station; Kris Kristjanson, S.D.S.C. Experiment Station and Bureau of Agricultural Economics. Howard Hill and Phillip Mickelson of the Department of Agricultural Economics, S.D.S.C., participated actively in the planning and execution of this study.

Corps of Engineers. The complaints centered around appraisal procedure, land values, cost of moving, severance damages and flowage easements. The present policy of the Corps of Engineers does not permit the negotiators to show the appraisal breakdown which was used to determine the final figure. Farmers and ranchers state that they are not accustomed to secretive dealings.

They wished to know how the appraisal figure was arrived at, showing what amounts were allowed for improvements, wells, cropland, severance damages and other values. In arriving at a fair value for land, the Corps of Engineers has placed considerable emphasis on prices paid for land in recent sales in the same area. Landowners believed that recent land sales included the less productive land in the area. Also some sales may have been made because of peculiar circumstances. The owner might have been forced to sell because of poor health, the need to settle an estate or other reasons. Though the Corps of Engineers states that they try to segregate the circumstances under which sales are made, only two of the 46 farmers interviewed said that they would be able to buy comparable property with the money offered by the government. The rise in land values from the time of the

Some Local Reactions

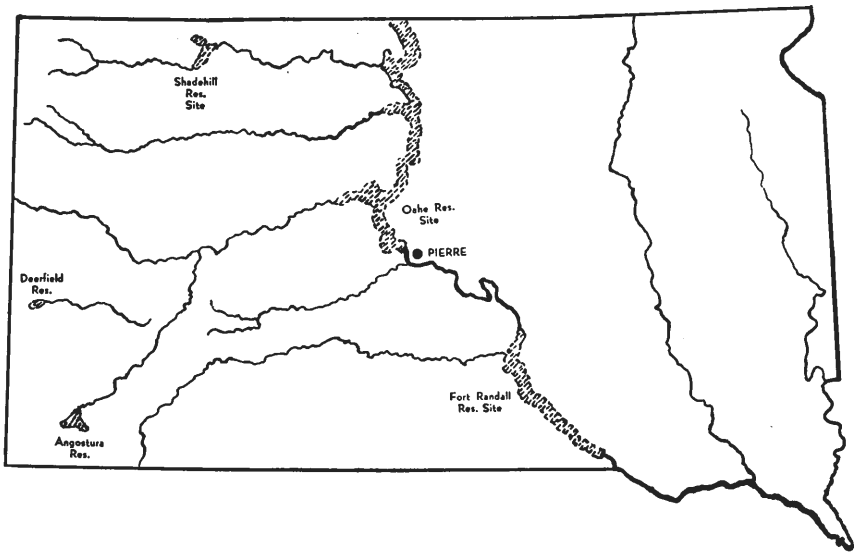


Fig. 1. Location of some of the reservoir areas in South Dakota. The Corps of Engineers has three dams under construction—Fort Randall, Oahe and Cold Brook (not shown); the Bureau of Reclamation has completed Deerfield, Angostura and Shadehill under the Missouri Basin program.

appraisal makes this still more difficult.

A time lag of 6 months to a year between appraisal and the time an owner finds a farm could be important. The prices of farm real estate in South Dakota increased approximately 17 percent from July 1950 to July 1951. During the same period, average land prices in the United States increased about 17 percent.

It appears desirable to find some method by which a price could be determined that would be considered fair, and thus avoid court cases.

Many of the landowners interviewed suggested that an appraisal board would be better able to arrive at a fair market value. This board could consist of a representative of the Corps of Engineers, a man selected by the landowners and a third man, familiar with land values but not directly representing either the Corps of Engineers or the landowners. It was suggested that the third man could be appointed by county commissioners from the counties involved, or perhaps be appointed by the Governor of the State. The representative of the Corps of Engineers could be paid by them, the representative of the landowners could be paid by the landowners on the basis of the amount of land to be taken, and the third man could be paid by the state or counties involved.

Another alternative would be to have the board appointed by the Federal courts.

In several cases the farmers said they would rather grant flowage easements for land which would not be permanently inundated, than sell their farm. At the present time there appears to be no policy for establishing values for flowage easements.

What Shadehill Landowners Thought

The strongest point of discontent among displaced landowners in the Shadehill area was a feeling that the dam was not needed. This seemed to result from the fact that there was no provision for participation by local people in the planning of the project. Also, appraisal procedures were criticized, not because of the price offered, as prices were generally satisfactory, but because the breakdown of the appraisal was not shown. Payment seems to have been slow. The period from the time of agreement of sale until payment was made, ranged from nine months to well over a year. As a result, some people had to borrow money to buy another place and to cover expenses such as moving costs. Complaints about moving costs and decreased value of the remainder of the unit, after a part of it had been bought by the agency were also encountered. According to law, the government cannot now pay moving costs.

This Is What They Suggested

The people interviewed in the two areas studied had the following suggestions for possible improvement in the land purchase procedures:

(1) All information in the appraisal report should be made known to the landowner upon request. The landowners want to know how much is allowed for buildings, cropland, pasture, sever-

ance damages etc. Inspection of the appraisal reports indicated that they contained such information, but it was not made available to the farmers. (Experience in Nebraska indicates that land acquisition can be improved by making appraisal information available to the landowners.)

(2) Land appraisals should be made by a three-man board representing the agency acquiring the land, the landowners and the general public.

(3) The cost of comparable property should be used as the guiding principle in determining fair land value. Emphasis should be placed on determining whether the price offered the landowners allows them to buy other property having the same earning power as the land taken.

(4) When bottomland which provides winter feed, water, and shelter for cattle is required for the reservoir, leaving only hill pasture which cannot be operated as an economic unit, the purchase of the entire farm should be considered.

(5) Consideration should be given to paying moving costs and loss of income as a result of disrupting the farm as a going concern.

(6) Flowage easements should be considered when the land is not expected to be flooded very often.

(7) Payments should be made as soon as possible after the land is sold to the government. (At the present stage of land purchase in the Fort Randall area, indications are there is no dissatisfaction in this respect. In the Shadehill area under the Bureau of Reclamation considerable dissatisfaction in this respect still exists.)

(8) When the reservoir separates two parcels of land which were formerly operated as one unit, the government should offer to buy the isolated tracts.

Other Questions Need Clarification

People in the reservoir areas are also concerned with other questions such as income tax rules when land is sold under threat of condemnation. There is a need for clarification and discussion of these rules when the land acquisition begins.

There is also a need to give further consideration to the responsibility of the federal government to local units of government where large areas of land are taken off the tax roll. At present, there is no uniform procedure followed by federal agencies in making payments in lieu of taxes. The Corps of Engineers pays 75 percent of its rental returns to the counties for school and road purposes. The Bureau of Reclamation pays no rental money to the counties. The Bureau can make payments to schools to help provide educational facilities for children of construction workers. The U. S. Commissioner of Education is also authorized to make some adjustments for loss of revenue to school districts. There is need for further study of the responsibility of the federal government to local units of government when the right of eminent domain is exercised on a large scale. (Project 198. Leaders: Russell Berry, Agricultural Economics Dept.; Kris Kristjanson, Agricultural Economics Dept.; Experiment Station and B.A.E.)

between 1935 and 1945. The population was reduced by 104,305 persons or 29.1 percent of the count in 1935. This is certainly a pronounced reduction, a severe thinning out of farm settlement.

Because of the return of veterans to farm homes since 1945, it might be expected that the farm population would show some recovery of its numbers. This has not occurred, however. The rural-farm population in 1950 was reported as 253,495—which is nearly the same as in 1945 (253,899 persons).

Many reasons may be cited to account for the decrease in farm population. Briefly they are: (1) The reduced number of farms: 72,454 in 1940 compared with 66,452 in 1950; (2) larger and more mechanized farms; (3) older and smaller farm families; (4) increased financial requirements necessary for young people to get started in farming; (5) better opportunities in cities; (6) the dominance of urban conditions and standards of life.

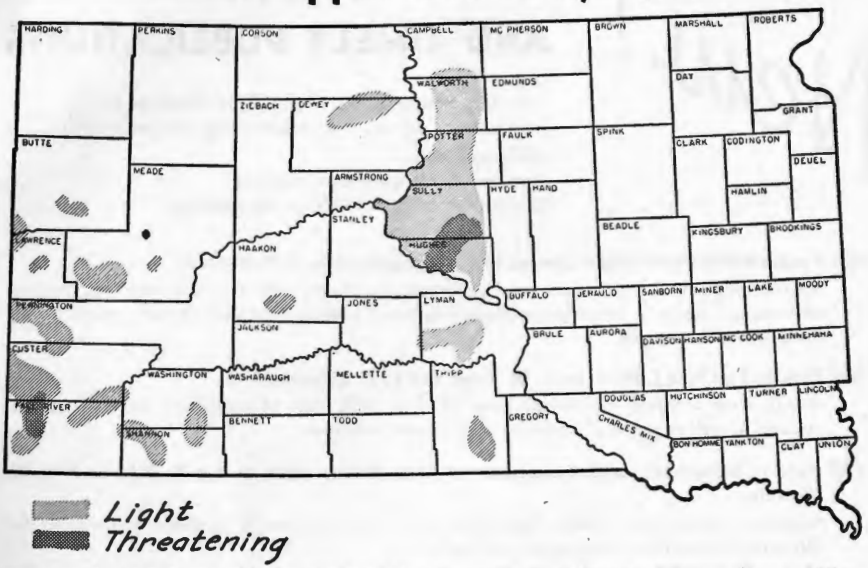
In view of these trends and conditions, it is apparently going to be difficult to establish more farm families on the land in South Dakota. Nevertheless, it has been proved feasible in irrigation areas.

To Sum It Up

During the past decade, South Dakota did not gain population to the extent that would be expected as a result of the large annual excess of births over deaths. The reason is that it sustained a large net out-migration. Those who leave the state are preponderantly single youths, and young married adults and their children. For this reason (and several others), the population of the state is aging more rapidly than the nation as a whole. Both the state and the nation have had a large increase of the elderly and the aged. But South Dakota had both *increases* of children under 5 and of those above 55 and *decreases* of young and mature adults; which means a growing proportion of dependents in relation to supporters. The two other main trends are the pronounced shift of population to urban centers and the large decrease in the farm population.

An extensive program of resources development is needed to provide opportunities for the youths of the state, to increase and stabilize agricultural production, and to make a more satisfying way of life possible. The future of South Dakota—the future of its agriculture, industries, population and culture—is to a large extent going to be influenced by the projects of the Missouri basin. These are now being planned and constructed by the U. S. Corps of Engineers, the Bureau of Reclamation, the United States Department of Agriculture, and other federal and state agencies. Their significance may be envisioned under four main heads—irrigation, electrification, conservation and recreation. As these projects advance from blueprint to reality, they hold promises of opportunity for the youth of the state. (Project 222. Research conducted by the South Dakota Experiment Station in cooperation with Bureau of Reclamation.)

Grasshopper Outlook, 1952



The situation can change with the weather. Map prepared by U. S. Bureau of Entomology and Plant Quarantine, Div. of Grasshopper Control, in cooperation with the State College Extension Service.

By H. C. Severin

Only two small areas were found in South Dakota in which the grasshopper situation is threatening. The light areas of the map total more than 80 percent of the state and in these areas the grasshopper situation in 1952 should be primarily negligible. However there may occur local areas where grasshoppers will probably become a problem, such as in alfalfa fields.

The forecast is made with the supposition that South Dakota will experience average weather conditions during the spring and early summer. If, however, the spring and early summer should be unusually hot and dry, the situation may become changed.

Unshaded areas on the map are expected, under average weather conditions, to develop 0 to 3 grasshoppers per square yard throughout cultivated fields. No general damage is expected.

Areas on the map that are crosshatched and labeled "light" are expected to develop 3 to 7 grasshoppers per square yard in the fields. Some damage may result to crops under these conditions, but the damage is not expected to be serious unless the weather turns hot and dry.

Sections that are crosshatched and are labeled "threatening" are expected to develop 7 to 14 grasshoppers per square yard throughout grain fields. Early spring damage may be expected in these areas and the damage may become more severe as the growing season advances unless control practices are used. If the weather becomes hot and dry the damage will increase.

New!

AND TIMELY PUBLICATIONS

You may obtain copies of these publications from your county agent, or by addressing a request to the Bulletin Room, Agricultural Experiment Station, South Dakota State College, Brookings

C89 Fungicides for Potato Blight Control, by C. M. Nagel and L. T. Richardson.

Sixteen fungicides were tested over a period of years from 1945 to 1950, with the object of developing a potato spray program adapted to South Dakota conditions. Results and yields are discussed in the circular.

C91 Tomato Leaf Spot Control, by C. M. Nagel and L. T. Richardson.

Results from a 6-year experiment from 1944 to 1950 with 16 fungicides are given in this circular, as well as practical information on control measures.

C92 Fertility Maintenance and Management of South Dakota Soils, by Leo F. Puhr and W. W. Worzella.

Suggested rotations for South Dakota, as well as recommended fertilizer applications for different crops in the various regions of the state.

C93 South Dakota Corn Performance Tests, 1951, by G. E. Nachtigal and D. B. Shank.

Corn yield trials in eight agricultural areas, with entries selected from the most widely used varieties. Tables include date of planting and harvesting, performance score, yield per acre and moisture content. Averages for two, three, four and five years are included whenever information was available.

C94 Chemical Control of Weeds in South Dakota, by Lyle Derscheid and L. M. Stahler.

Recommended chemicals and their effect on the important crops. Control measures, with special attention to noxious weeds, are given, with instructions as to amount of spray to use and the method of application.

B414 Egg Marketing Losses in South Dakota, by Ernest Feder and William Kohlmeyer.

Information on quality of eggs, deterioration at egg buying stations, egg handling methods and their effect on quality is given in this bulletin. A discussion of the economic aspects of quality is included.

B415 Wearing Quality of Reused Wool, A Study of the Physical Characteristics of New and Worn Flannels Containing New and Reused Wool, by Lillian O. Lund, Ethel L. Phelps, and Helen Ward Norton.

A technical discussion of the influence of dyeing, dry cleaning, wear, and exposure to light on the wearing quality of reused wool.

B416 Marketing Lambs, A Comparison of Liveweight Method and Carcass Weight and Grade Method, by Ottar Nervik and David G. Paterson.

This is a preliminary study of marketing lambs by carcass weight and grade instead of by live weight. The main emphasis is on how adequately sale by live weight reflects to producers the value of the lambs.

B417 Sorghum as a Feed for Lambs, by R. M. Jordan, W. H. Burkitt and J. W. Wilson.

Results of five years of feeding sorghum to lambs as compared to feeding corn, both in the dry lot and by lambing-off sorghum of various varieties.