

ANNUAL NARRATIVE REPORT

OF

NAVAJO COUNTY, ARIZONA

December 1, 1949 - November 30, 1950

by

J. C. Armer
County Agricultural Agent

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The following itemization is an actual record of what took place during the year:

Farm Calls	769
Different farms visited	468
Office calls	677
Telephone calls	272
Days in office	131
Days in field	147
News articles	23
Individual letters written	423
Circular letters prepared	4
Circular letters mailed	693
Meetings held	56
Attendance.....	1,695
Auto miles travelled	8,733

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Navajo County, Arizona, 1950

HIGHLIGHTS

Agriculture in the County was crippled badly by drought, and adverse weather conditions in general. Prices received for produce were higher than last year, but the total production was below normal.

The range livestock has had the worst feed conditions reported since 1904. Precipitation was below normal throughout the year, with high continuous winds most of the season. Prices received for cattle were high, but all classes of livestock went to market considerably lighter than normal. About 80% of the livestock has been shipped out of the County to non-drought areas.

The Navajo County Dairy enterprises remained fairly constant through the year. Most efforts have been devoted to breeding programs, and the giving of more attention to replacement heifers.

The poultry industry had one of the most stabilizing seasons in the history of the industry. Many small flock owners quit the business, and the larger operators have expanded. Marketing and processing facilities have improved. Freezer storage for both eggs and poultry was established during the year.

Field crops had a poor year, with late spring and early fall frost. Most of the County was faced with a water shortage throughout the year. Production yields were below normal.

Truck crops were very disappointing this season, giving very meager returns. Cucumbers were a very poor crop, with low yields and a very short season. Truck gardens and sweet corn were fair, but yields were low.

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COOPERATIVE ORGANIZATIONS.

Cooperative Agriculture groups in the County are the Northern Arizona Cattle Growers Association, Joseph City Poultry Association, County Farm Bureau and the County Fair Commission.

The Cattle Growers Association, the largest agriculture group in the County, is made up of cattlemen in Navajo, Apache and Coconino Counties. This group is headed by Ernest Chilson, of the Bar T Bar ranches in Coconino County. Their problems are those connected with the progress and well-being of the range livestock producers. This organization serves the livestock interest on political questions, as well as giving aid to them through cooperative buying of insecticides, salt and feeds.

The Joseph City Poultry Association serves a small group in marketing and handling of poultry products. Although the Association was formed primarily as a marketing association, it also takes advantage of the purchase of carload lots of feed at wholesale prices.

The County Farm Bureau is going into its second year. To date it has not been too active on local agriculture problems, but has obtained several services for its members, such as car and health insurance, as well as gasoline service.

The County Fair Commission is appointed by the County Board of Supervisors to promote the County and State Fairs, and to conduct the necessary business for maintaining the Fair Grounds and buildings. John Miller, of Joseph City, is Secretary and Treasurer, and is by far the most enthusiastic and energetic member of the group. Others that have been active are Elias Smith, of Linden; Elwood Petersen, Snowflake, and Charles Turley, Woodruff.

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POULTRY:

The poultry industry in the County has gone through one of the greatest stabilizing growths in its history. In the past, most efforts have been devoted to production, with stress being made on laying-houses, flock management and feeding practices. During the 1948-1949 season there were three marketing associations formed-- the Joseph City cooperative, Snowflake and Shumway. The Joseph City cooperative has been quite progressive, and last year erected a building for handling eggs, such as grading, cartoning and group marketing. During this year, cold storage facilities were added to their assets, which is probably one of the most stabilizing effects that the industry will receive. These storage facilities have made it possible for them to store their eggs from surplus periods and sell them at the heavy demand periods. When their local producers were not able to meet the market demands, the Association has been able to buy Grade A eggs from Utah markets and fill the local demand without relinquishing any of their market rights to outside producers. These cold storage facilities have also made other phases of the poultry industry look feasible. In the past, fryers have been considered one of the evils of brooding new flocks. And the poultryman that broke even on fryers was considered lucky. The market is usually flooded during July and August, with little hope of sales on the local market. With the installation of the freezer storage facilities, the poultryman has been able to store the fryers, and let them go on the market when there is a demand for them. This has made it possible to stop the feed bill when the fryers were at market weight, and it also makes the needed housing available to the all important pullet.

The Snowflake Coop has made some nice progress in cooperative marketing, but in order to stabilize, they still need the storage facilities for eggs and fryers.

The Government announcement in January to change the egg support prices caused some concern among the poultrymen in the County. Egg prices did take some drops, but to this Agent the whole effect was toward the betterment of the industry. Small spring-time producers dropped out of the picture and the large operators tightened up their belts and started getting economy minded. Flock sizes were increased, with better housing and management practices.

More stress was put on feeding and disease control through sanitation and vaccination. Culling of non-producers became more evident, and the year ended with a more stable industry than they had in the past.

The majority of the fifty thousand laying hens in the County are leghorns. This year's trend was toward buying sexed chickens, in order to eliminate the responsibility of taking care of cockerels. As mentioned before, the cockerels have been hard to dispose of, and have often made it necessary to crowd pullets, until the space taken up by the cockerels was available.

This Agent feels that we shall see considerably more changes in the poultry industry here within the next few years. Flock sizes will undoubtedly increase in numbers in order to fill the economic capacity of the cold storage facilities. Some poultrymen will undoubtedly take advantage of the local fryer market. Cold storage facilities have made the business look attractive. The change toward this business will mean converting such flocks to the more desirable meat class of birds. Some poultrymen will strive to get a bird that will meet both egg and meat specifications. Plans now are to use the hybrid California Grey cockerels on white leghorn hens. This practice will probably help the bird size, but this Agent doubts very much if the offspring from such crosses will substitute for a meat class bird. There will be a few that will go into the risky business of producing straight fryer birds. Plans indicate that birds such as the white Plymouth Rock will be used. Such an operation, to be economical, will require that poultrymen expand their markets further than the local trade.

Disease incidence in the County flocks was infrequent for the year. Most poultrymen have adopted the practice of vaccinating their pullets against laryngo tracheitis and fowl pox. There has been no report of these diseases in the past two years. Newcastle Disease is still causing some concern, although there have been no identified cases during the past year. The poultrymen that were hit so hard with the disease during a past season vaccinated against the disease with the live virus using the wing webb system. There have been a few breakdowns reported in birds following vaccination, but no greater than would be expected.

Leucosis or range paralysis is still taking the heaviest toll of all the diseases present. It works so slowly that there is generally no great alarm felt by the poultryman, until he starts figuring up how many birds have been lost during the year. This Agent feels and recommends that strict sanitation be followed, and that the laying flock be replaced each year. The greatest losses seem to occur in

the birds that are in their second season of laying.

Unless there are some economic changes that have not been predicted, the poultry industry in the County will remain the basis of a living for many of our farmers, and will still be looked upon as one of the big agricultural industries of the County.

DAIRY:

The dairy industry has remained about the same as last year. There are some 25 commercial dairymen with around 500 cows. The milk from these cows is being processed and distributed by eight different plants.

Processing plants are still showing marked improvements and most of them are equipped with modern appliances. The big drawback in the processing plant operation is the large number of plants in relation to the number of cows, quantity of milk, and the number of people served. This office has urged combining a few of the plants, in order to cut down overhead expense. This idea was abandoned, as well as the idea for a dairy marketing association in the County. Surplus milk, occurring in a few of the dairies all during the present year, has caused some concern among those operating the plants. Milk that had to be shipped to other markets was received at lower grades, thus giving much less returns to the dairy producers.

The Taylor Cooperative Dairy, in order to get around the surplus milk problem and the high cost of running a processing plant, has tied in with the Carnation Milk Company in the Valley. The Company at Phoenix processes the milk and allows the Coop. to bring back the milk needed on their delivery routes. Just how this arrangement will work is a little hard to determine. Distance of travel is one of the largest drawbacks. At the same time, the surplus milk problem is solved by the arrangement, and it also does away with the necessity of the large investment in a modern processing plant.

The dairymen in the County have given a great deal of attention to better herd management. The most improvement comes in care of calves and replacement heifers.

The breeding program, as a whole, has shown some vast improvements, but still lacks a lot of filling the dairy barn with the high producing cows that are desired. Cow production has shown great improvement through the use of improved sires and heavy culling, but is still below average. Some dairymen have been quite conscientious in their breeding program and will undoubtedly reap their reward in the next few years.



Handy poultry laying house at John Gardner's farm in Woodruff.

FIELD CROPS:

Navajo County's field crop acreage is composed of around 7,000 acres of irrigated land and 1,500 acres of dry land. Major crops are corn, alfalfa and wheat. These crops are used largely to round out a program of different livestock enterprises.

This has been one of the most adverse years for farming as well as for all other types of agriculture. Winter moisture was low, causing a low storage of water in soils and irrigation reservoirs. Although weather conditions remained mild, the high winds and continued cold nights prevented crop growth. This type of weather held far into the growing season. Water supplies were not great enough to keep all crops irrigated as would be desired. Killing frost came as late as June 9, and as early as September 13 in the mid and higher elevations. The frost in June forced growth in alfalfa back to the crowns, and retarded corn to a great extent. Following the frost in September, the weather turned warm, and the crops not stopped by the frost did quite well until November 9.

Wheat crops, which are largely grown in the dry land areas, in the south and west portions of the County, were practically nil this year. Wheat crops started off with exceptionally good stands, but due to lack of moisture, failed to develop. With few exceptions, the best wheat yielded from 2 to 5 bushels. Most fields were not harvested. The wheat planted this fall has germinated very poorly and is again a very doubtful crop.

Corn crop yields in the dry land area were on a par with the wheat crops. The crops in the irrigated districts gave better yields, but were still below normal. Corn did not develop well during the early part of the season and went toward maturity with the mid-September frost. Most corn crops are harvested for ensilage, and this Agent would estimate that yields were off from 2 to 5 tons per acre. Average yields are around 12 to 15 tons, with this year's being around 10 tons.



Poor moisture conditions make poor wheat crops. Farm at Pinedale Ridge usually produces 16 bus. of hard wheat. They didn't get their seed back this year.

Alfalfa yields normally run around 4 tons per acre. This year's yields were off from $\frac{1}{2}$ to 1 ton per acre, even with the added growing season. There has been a lot of progress made in alfalfa production with economical use of phosphate fertilizers and seed inoculates.

This office did some work this year on variety tests. Buffalo, Ranger and common alfalfa were planted in June at Ben Rencher's farm at Snowflake. He had Ladak and Common in the second year. This office hopes to get some valuable information from these four varieties in regard to hay quality, stand longevity and winter tolerance. Field observation and hay weights indicate, in the two-year old stands, that the Ladak is more desirable than the Common. The hay quality was better, being leafier and fewer stemmed, as well as giving greater tonnage.

From conferences in the field with Charles Ellwood, Extension Agronomy Specialist, Dr. Wallace Fuller, Associate Bio-chemist from the University Experimental Staff, James E. Middleton, Extension Irrigation Specialist, and from the observations of this Agent and Soil Conservation Districts in the County, the farm land in this County appears to need greater attention to soils practices. It is generally agreed that most of the soils are quite deficient in organic matter, the basis of all fertility and ideal water penetration. More stress is being made on green manure and barnyard manures. Whenever the organic base is built up, commercial fertilizers can be used to make up the deficiency that still exists.



Hauling hay at Woodruff on November 3, 1950. An unusually warm fall made it possible for Mr. Kartchner to harvest hay 30 days past the usual season.

HORTICULTURE:

Horticulture in the County, as covered in this Report, will be home gardens, orchards, truck crops and floriculture. This field of work holds the interest of the largest number of people than any other phase of agriculture. Interest varies from soils, diseases, insects and varieties through irrigation recommendations.

Home gardens take in the largest acreage of any of the crops listed under horticulture. Gardens will vary in size from 100 sq. feet up to an acre. Nearly every home has a garden as a hobby or as a source of green vegetables on up to the source of a good portion of the home food supply. Diseases and insects invariably make growing of a home garden a task. Most insects are readily controlled, but those more persistent, such as the Mexican Bean Beetle, Squash Bug and Cucumber Beetle seem to have their feasts each year, with little being done about them. Control methods receive very little attention, and the insect is accepted as one of the necessary evils.

Fruit was a complete loss this year. A series of late frosts got all varieties of fruit, except for a few isolated cases. Orchards do not receive nearly the attention they should, but there seems to be an increased interest in controlling insects, such as the codling moth, thrips and spiders. This Agent has distributed many bulletins on the control of these insects, as well as helping operations get started with spray applications. The orchards in the Lakeside area had received two applications of 50% wettable DDT to control the thrips and codling moths before the frost got the fruit crops. These two spray applications, although wasted, gives this Agent great encouragement. Spraying will again be stressed for this coming year.

With the aid of Harvey F. Tate, Extension Horticulturist, nine well attended pruning demonstrations were held. Those that turned out for the demonstrations were quite interested, and made holding such demonstrations very enjoyable. Three of these demonstrations were held at an Indian Extension Field Day at Oraibi. Mr. Tate gave some very interesting work that was most enthusiastically endorsed by the Indians and the Indian Service.

Truck crops, such as cucumbers, sweet corn, melons and potatoes had only a fair season. This class of agriculture makes up one of the best cash income returns that the farmers have in this County.

Cucumbers for pickling purposes make up the largest acreage of the truck crops. There are around 150 acres devoted to this crop, with individuals raising from 1 to 10 acres. These crops had a very adverse season, with dry, windy weather at planting time, and a killing frost on June 9. Production was never up to par, though the vines were good. This Agent and the Specialist consulted felt that there was too great a variation in the temperatures of the day and night. The days were very dry and hot, and the nights were quite cool. There were plenty of blossoms, but the little cucumbers did not set as they should have.

This Agent, through meetings and circular letters, had made some very definite recommendations on number of bee stands per acre, control of bacterial blight and fertilizer uses. The results were that there was twice the number of bees present in the fields, and bacterial blight made very little progress.

Insects were a problem for the first time this year. Aphids and cucumber beetles seem to thrive under very dry weather conditions. Usually a few plants are affected with aphids, but the damage is small and the insects disappear with the first summer rains. This year the rains were absent, and the aphids spread and did extensive damage. Cucumber beetles usually appear early in the season, but do very little damage. This year they started to work on the young cucumber plants, as they emerged from the ground, and did extensive damage also. These were easily controlled with calcium arsenite or cryolite dust.

Squash bugs are generally the scourge of the squash and pumpkin plants, but normally do not bother other crops. For some odd reason, these insects moved into a three-acre cucumber field owned by Charlie Harris at Snowflake. They did very little damage, but did lay eggs on the vines and remained in the patch for some ten days. Since the squash bug is quite difficult to control, there was some concern that they were going to develop a taste for the cucumber plants.

This Agent, in cooperation with Harvey F. Tate, Extension Horticulturist, and Dr. D. W. Pew, Supervisor of the University of Arizona Vegetable Research Farm at Tempe, ran fertilizer and variety tests in the County.

The largest of these tests was fertilizer applications on cucumber plantings at Ben Rencher's farm at Snowflake, and at Paul Rogers at Taylor. Although the cucumber season was cut short some 30 days by a killing frost on September 13, this office feels that some good information was gathered.



Extension Horticulturist, Harvey F. Tate, examining cucumber plants in fertilizer test field.

As well as applying fertilizer, the seed at Ben Rencher's farm was planted with Dr. Pew's seed-bed maker and seed drill. The cucumber plants were thinned to 12 to 15 inches. Mr. Rogers did not collect data from his field, so this work was lost, as nothing was gathered toward fertilizer indicators.

The following sheets, pages 14, 15, 16 and 17, outline and give the results of the test on Ben Rencher's farm.

CUCUMBER FERTILIZATION PLOT

BEN RENCHER

SNOWFLAKE

This fertilizer plot was set up to see which fertilizer, or combination of fertilizers, would give the largest economical return for pickling cucumbers. The plot of ground used was planted to corn in 1948; cucumbers in 1949. Both crops gave good yields.

100 pounds of 10-20 fertilizer per acre was applied to the land during the summer of 1949, with 100# of 43% phosphate applied again in the spring of 1950.

The following fertilizer placements were made, in the band row under the seed bed, with seeding following immediately. The fertilizer and seed placements were made on June 5, 1950. Treatments were made on a two-row basis, with two non-treated rows between each treatment.

The work was done in cooperation with Dr. W. D. Pew, from the Vegetable Research Farm at Tempe, and Harvey F. Tate, Extension Horticulturist from Tucson. Dr. Pew furnished the equipment for fertilizer placements and seed and seeder for planting.

The soil had the following fertility just prior to planting:

pH	8.5			
TSS	310	parts	per	million
PO ₄	13	"	"	"
N	12	"	"	"

The seed placements were made on June 5, 1950, in a dry seed bed. The seed had to be watered up, and then the hills were thinned after 3 weeks to about 12 to 15 inches apart in a 40" row, 360 feet long.

The season was very poor, with a killing frost on June 9th, and following this the nights remained cold and the days dry and hot. The fall killing frost came on September 13--this cutting the cucumber season short just about one month. Bacterial blight hit the field very severely in mid-August, killing out many of the top leaves. A water mixture of Bordeaux Solution was sprayed on the plants and they made a fairly good recovery.

The irrigation interval was 10 days. There was a very good cucumber vine coverage throughout the field. Treatment No. 6, 75# ammonium nitrate and 75# of 43% phosphate, which was used as treatments in rows 3 and 11, gave visibly heavy vine growth throughout the season.

Treatments used were as follows:

1. 150 pounds of 10-20
2. 150 pounds of 16-20
3. 75 pounds of ammonium nitrate
4. 75 pounds of 43% phosphate
5. check plot
6. 75 pounds of ammonium nitrate
75 pounds of 43% phosphate

Statistical data is on the following page. A similar test was placed on Paul Rogers' farm in Taylor on the same date, but Mr. Rogers failed to take the data as he had promised to do.

Date	Phosphate	16-20	Nitrate Phosphate	10-20	Nitrogen	Check
	Round 1	2	3	4	5	6
8/12	55#	62	64	48	44	64
8/14	47	35	48	35	42	61
8/18	27	35	40	25	29	31
8/22	40	21	33	29	21	33
8/28	49	30	31	55	40	37
8/30	40	53	66	41	38	36
9/1	40	58	38	52	47	54
*9/11	68	56	74	62	68	58
9/13	24	27	48	28	25	32
Total lbs. Picked	390	377	442	375	354	406
Average lbs per picking	43.3	41.9	49	41.6	39.3	45
Total lbs per acre	7059	6823.7	8000.2	6787.5	6407.4	7348.6
Increase yield in lbs per acre			651.6			
Decrease	299.6	524.9		561.1	941.2	Check

*Failed to get data for picking on 9/6

**4 day picking

Date	10-20	Check	Nitrogen	Phosphate	Nitrate	16-20
Round	7	8	9	10	Phosphate 11	12
8/12	75	74	72	53	54	65
8/14	51	78	41	50	53	51
8/18	27	28	26	35	25	27
8/22	34	36	35	27	28	30
8/28	39	52	41	48	47	49
8/30	26	25	36	50	30	39
9/1	30	27	50	30	40	36
*9/11	72	58	66	80	77	70
**9/13	27	25	31	26	54	27
Total lbs. picked	383	403	398	399	408	394
Aver. lbs per pick- ing	42.5	44.8	44.2	44.3	45.3	43.8
Total lbs per acre	6932.3	7294.3	7203.8	7221.9	7384.8	7131.4
Increase yield in lbs. per acre					90.5	
De- crease	362	Check	90.5	72.4		163.9

* Failed to get data for picking on 9/6

**4 day picking

Variety tests were run on tomatoes, sweet corn and string beans. The varieties tried out were as follows: Tomatoes: Pennheart, J. Moran, Big Boy hybrid, Clinton hybrid, Ventura hybrid, Burpee hybrid and Fordhook hybrid. This test on tomatoes was for early maturing market tomatoes. Sweet corn: Flagship, Golden Cross Sweet Bantam and Iowana. The corn tests were carried on primarily for a sweet corn most resistant to worm injury. String Beans: Top crop beans were tried with Kentucky Wonder pole beans, as well as several varieties of local bush beans. Cooperators in this work were: M. D. Bushman, Snowflake; John L. Bushman, Joseph City; and Cephas Perkins, Holbrook.

In the tomato variety test at M. D. Bushman's, the Fordhook hybrid gave an earlier maturing, more desirable market tomato than the J. Moran and Pennheart. The J. Moran was a very large, well-shaped tomato, of good quality, but was a little late in maturing. For some reason the Pennheart's were small and not very desirable.

The tomato variety test at John L. Bushman's farm in Joseph City received severe hail injury during July and the vines did not recover enough to give any satisfactory results.

In the sweet corn variety test at M. D. Bushman's in Snowflake, the Golden Cross Sweet Bantam was quite superior to the Flagship corn. The Flagship for some reason did not pollinate, and gave a very poor corn return. From observation, this Agent concluded that the pollen on this variety of corn fell about 10 days before the silk appeared. This could easily have been a weather condition that would not occur again.

This same variety of corn planted at the Cephas Perkins' farm, along with Golden Cross Sweet Bantam and Iowana, gave a more desirable ear of corn. The ears were fuller, with less worm injury. Quality tests were not made.

The Top-crop beans, planted at M. D. Bushman's in Snowflake, proved to be more desirable than the Kentucky Wonder pole beans, as well as other types of bush beans. The bean crop was heavier and was of equal, if not better, quality. The Top-crop beans planted on the Cephas Perkins' ranch did not survive the alkali that appeared with warm weather.

This Agent feels that there was considerable progress made with the fertilizer and variety tests, although the results were not always suitable. There will be more work on these projects next year.

Last, but not least on the horticulture list, is floriculture. Flowers, lawns and landscaping, hold an interest with nearly all types of people in the County. Information requested varies from "What shall I plant?" to diseases, as well as fertilizer and soil recommendations. This Agent has worked quite closely with the Holbrook Garden Club, and with Dr. J. N. Heywood, of Snowflake, the head of the LDS landscaping committee. The results are quite pleasing, as the Agent sees the increase in the number of flowers about the homes, new lawns and numerous civic cleanup and beautifying projects.

The flower department of the Navajo County Fair has grown to be the largest item in the whole Fair, and interest indicates that it will continue to grow.

IRRIGATION AND SOILS:

Irrigation and soils are still largely a question of good farming practices and the wise use of water. A great many improvements have been made on irrigation canals and reservoirs, through the Soil Conservation Service and Production and Marketing Association. These improvements were sorely needed, and are a large asset to the farmer, but they do not solve the problems of proper land tillage and wise water use.

Most soils in the County are quite deficient in organic matter, and if more time were devoted to returning to the fields this all important constituent of soil, it would solve the greater portion of all the problems that come under the head of irrigation and soils.

With low winter precipitation and small spring run-offs, the water shortages so widely publicized in the State, were brought home to the local farmers. The irrigation reservoirs in the Show Low district were filled, but those in the other districts went into the irrigation season quite short of water. Controversies arose during the year as to water rights for different streams. These water rights were desired to bring in large acreages of new ground. This new ground is a good idea, but this year's water supplies were insufficient to supply the proper needs of land already under cultivation.

Wiser use of water is one of the "musts" of the irrigation companies in this County. The soil conservation districts are promoting water turns on call, in order to make the farmer water conscious, and in hope that he will make more efficient use of water. The present system of water

distribution is not satisfactory. Water turns either come too far apart, early in the season, or too close in the middle of the season. Some crops need frequent irrigation, but do not require full heads of water; while other crops need water about once a month. In all probability, the call system of water would solve many of these problems.

James E. Middleton, Extension Irrigation Specialist, has spent several days with this Agent, going over irrigation problems in the County. At present, our program for next year's work will be to encourage the farmer to use his soil as a reservoir for water storage. That is, to use irrigation waters on the land in the late fall and early spring, when the demands for water are not so great. Then, during the growing season, to apply the amount of water that the crop will need during the irrigation interval, so as to cut down excessive deep percolation, and heavy losses from tail waters. Heavy soaking of lands on each irrigation turn has often made soils undesirably saturated for plant growth. This saturation situation has been particularly true in the cucumber fields. Heavy irrigations at 10 day intervals have left deep soils saturated, while increased intervals would probably let the top two feet of soil deplete its water supply to the point of being quite harmful to plants.

This office has worked with the Soil Conservation Service quite closely in soils and irrigation. The Snowflake district held a very interesting Field Day at the Cornelius Neff farm, east of Shumway, on water penetration, and proper irrigation streams to prevent tail water losses. Such work as this, even in a more simplified form, should be of great aid to farmers as a whole.

Mr. Middleton has used the soil probe quite effectively to demonstrate depth of penetration to the farmer. Along with this, the soil tube and irrigation syphons were quite effectively demonstrated.



Extension Service Irrigation Specialist, James E. Middleton, helping at S.C.S. Irrigation trials at C.F. Neff's farm at Shumway.

Returning organic materials to the soils is largely a problem of using the barnyard manure on hand, or of creating organic matter in the way of green manure crops. Many clover crops have been recommended, in grain crops, or to be planted in furrows on row crops at the time of the last cultivation. If crops such as these are plowed under, and are not grazed off by old bossy, there will be a great improvement in soil texture, water penetration and a much greater response from any commercial fertilizers used.

In the dry land farming area, soil ripping at 18" intervals have given some amazing results. Along with this, crops of sweet clover or Colorado field peas used as green manure crops, have given very satisfactory results, even during this very dry year.

WEED CONTROL:

Weed control is still one of the number one problems of the County. Very little work has been done on the control of ditch bank and aquatic weeds, but this type of work will have to follow closely the irrigation canal improvements that are taking place in this County.

Very good control work has been done on aquatic weeds on the diversion ditches of Clear Creek that furnish water for the Bushman Acres. Benachlors and aromatic solvents have both been used on this project.

This office, in cooperation with John Gardner of Woodruff, did some work on control of pond scum and submersed weeds on farm fish ponds. Sodium arsenite solution at the rate of 1 part per million was used with very good results. Two applications at ten-day intervals were used. A good kill on pond scum and average kill on the heavier submersed weeds were secured without damage to the blue gill or bass in the pond.

This Agent feels that there should be a great deal more of this work done on irrigation canals, side ditches and farm reservoirs.

Field weeds, such as mouse ear, bindweed, Russian Knapweed and camelthorn are still quite bothersome, but can be controlled with the use of good cultivation practices in combination with the different forms of 2,4-D.

This Agent put in a demonstration plot on the control of ditch bank weeds on the farms of Malcolm DeWitt, Holbrook, and John L. Bushman, Joseph City. The salt, amines and ester forms of 2,4-D and sodium amate were used. The amine and

ester forms of 2,4-D used according to manufacturers' directions gave very good control of bindweed with one application. Russian Knapweed was slowed down in growth by the 2,4-D's, but made growth before the season ended. The sodium amate did an excellent job on the knapweed, but was not very effective on the bindweed.

The new TCA 90 grass killer was tried on grass burs and salt grass. The grass burs were in an established field of alfalfa. The treatment was more drastic on the alfalfa than on the grass. Further work is needed on this before recommendations can be made. The TCA treatment on salt grass was very effective, and can be recommended for areas not in crops.

Weed control in the County is largely a matter of encouraging the farmers to use the materials that are available, and letting them know that these materials are not a substitute for good cultivation and farming practices.

LIVESTOCK:

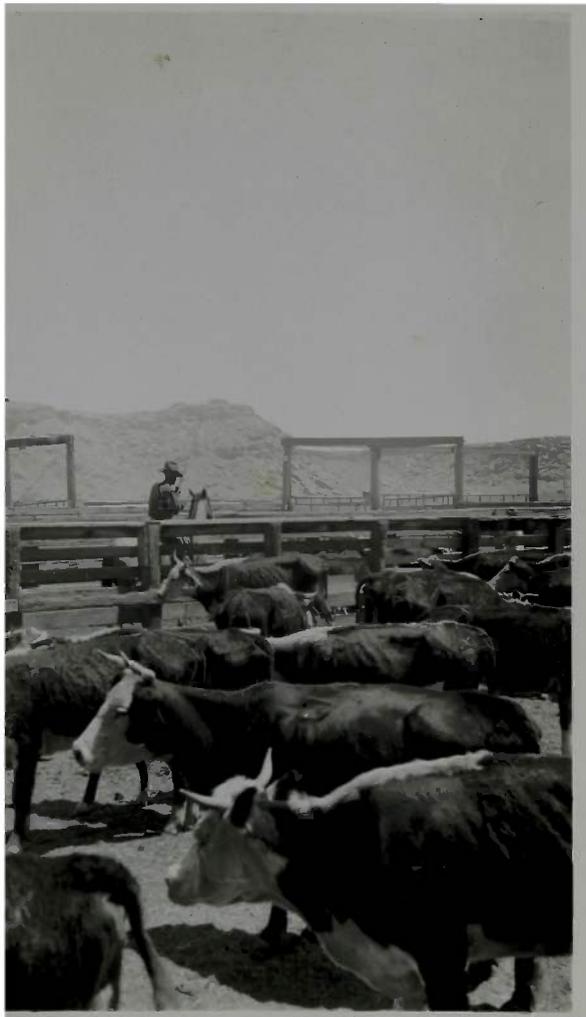
The livestock industry is the largest agricultural enterprise of the County. There are some 20,000 head of cattle, made up of small and large herds. Larger herds are run entirely on range land, while some of the smaller ones are run in conjunction with the farms.

This year has been one of the most difficult range livestock situations on record since 1904. The many range and water improvements prevented the heavy death losses that occurred at that time. The winter was mild and brought very little moisture, and this situation continued throughout the year. Hard and steady winds came up in February, and continued well up into the summer, and thus depleted much of the surface moisture that had been stored. Water supplies were used up and the old surplus feed, the result of good range management, was gradually depleted. Hopes for feed-making rains continued up through August, and then stockmen began to look for feed to see their cattle through.

In the early part of September, large numbers of cattle started moving to ranges in New Mexico, Texas and California. By November, around 80% of the cattle had been shipped out of the County. All the cattle from most of the ranges in the lower elevations had been shipped, while about 50% of those in the higher elevations of the County were sent to market or better pastures. This large movement of our largest agriculture industry will undoubtedly have a weakening effect on the County's economy. If conditions improve and ranges become usable, probably 50% or more of these cattle will be moved back next summer or fall.



Drought conditions have raised havoc with ranges in the County. This range usually has good alkali sacaton and grama grass. It is now an invitation to a dust bowl.



Drought makes poor cows, even in mid August. C. F. Jeffers cutting cows in carload lots prior to shipping them to New Mexico ranges.

Good range management, through surplus grass, good water distribution and supplementary feeds, was the big thing that allowed the cattle to remain on the local ranges as long as they did, with a very small death loss. In fact, most of the cattle held their own, and were in fair shape when they were shipped out. The ranges that were over-grazed had the death losses, and their owners could readily see the advantages of good range practices.

Supplemental feeds were really put into practice through the past year. Feeding practices and methods were as varied as the people, but the whole process boiled down to giving the cattle a protein feed to go with the dry forage. This Agent, and the many ranchers that used the protein supplement, are satisfied that in order to get the most benefit from such feed that it is necessary to have some forage and plenty of water.

Some of the protein supplement is fed as straight cottonseed meal in order to regulate the amount of feed intake. Others add carbohydrates, vitamins and minerals to the mixes, in order to give their livestock the best advantage possible.

This office feels that the mixtures have proven their worth and are the best feeds to use, especially on ranges that have very little or no brush feeds. The Spurlock-Wetzler ranches, feeding primarily calves and feeder cattle, have had excellent results with a mixture of 150 pounds of cottonseed meal, 75 pounds ground barley, 75 pounds citrus meal, 30 pounds dehydrated alfalfa meal and 18 pounds bone meal. The amount of salt used in such a mixture depends on the age and class of stock, and the salt nature of the grass and water on the range. This feed was varied from 2 parts of meal to one part of salt up to $\frac{1}{4}$ to 1. The owners tried to hold the cattle to 2 to 3 pounds daily of the mixture. This Agent feels that the alfalfa meal and bone meal are very essential for a good mixture, and would be quite advisable to use on nearly any range in the County.

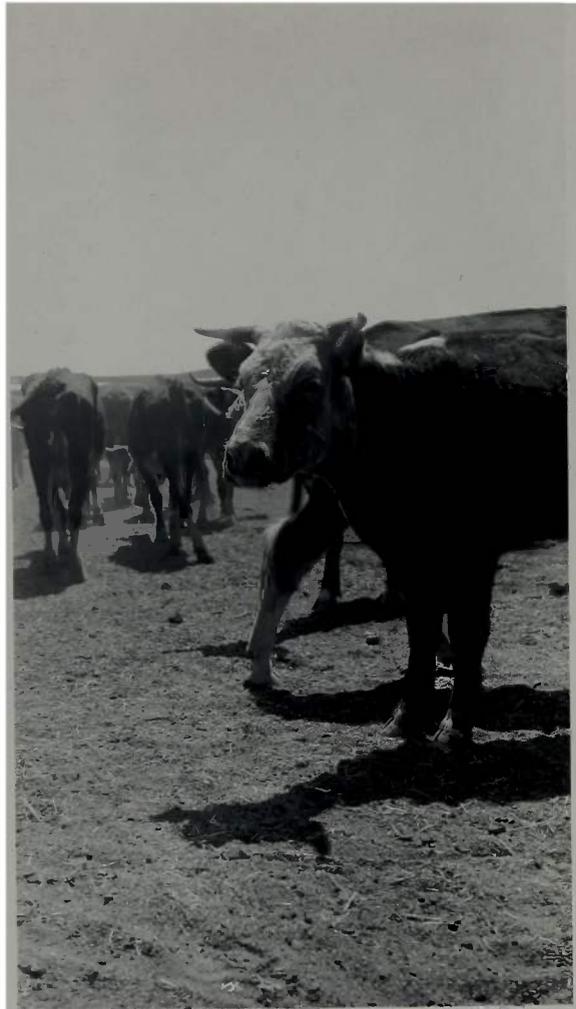
Methods of feeding vary a great deal, but most stockmen are employing the covered types of self-feeders. These types seem most advisable, since they do not need the constant attention that the open feeders do, and the feed losses are considerably less. High winds blow away some feed, but the problem is partially solved by turning the end of the feeder in the direction of the prevailing wind. It also helps to make the feed hoppers in partitions of about $\frac{1}{4}$ feet long. These partitions seem to prevent the wind from eddying and stop the whirlwind effect.

* Along with winter supplemental feeding, the majority of the stockmen keep bone meal alone, or with salt, before the

cattle at all times. This is an excellent practice, since it supplies the livestock with the phosphate that they need, and to a large extent, prevents the very bothersome, and sometimes costly, habit of bone chewing.

Fly and lice control has been adopted as one of the necessary and paying practices that the stockmen can put into use. The majority of the range livestock receive some form of insect control during the year, using the same methods they used last year. This was the formula recommended by this office through Dr. J. N. Roney, Extension Entomologist. This mixture is as follows: 4 pounds of 6% Gamma Benzene Hexachloride, 8 pounds of 50% wetttable DDT and 6 pounds of bentonite of sulphur to 100 gallons of water. This material serves well for fly and lice control. If lice only are to be controlled, use only the Benzene Hexachloride. This is applied with an agitator type spray machine, with around one gallon of the mixture per animal. One application generally cleans up lice from 4 to 6 months. This office encourages applications in the fall of the year to prevent the lice build-up during the winter months. The lice control is very important, since our most prevalent type is the blue-nose sucking louse that will keep animals unthrifty, and often cause them to die.

Cattle grub control work has not been accepted as yet in the County. Most stockmen object to handling and wetting livestock during the winter months, when it is necessary to do the grub control work.



Dejected cow, covered with blue nose lice. By including insect control in livestock problems and programs this unnecessary loss of flesh is prevented.

Range improvements have been quite numerous throughout the County. The Production Marketing Association encourages and helps with payments on such projects as spreader dams, stock tanks and cedar control.

Deep pit earthen tanks with desilting basins are the main type of tanks being built. The tanks are deep, with a relatively small surface exposed for evaporation, and once such tanks are filled, they will remain as permanent watering places from 1 to $1\frac{1}{2}$ years.

Many diseases that keep making their way into the herds rightfully cause some concern among livestock owners. The major disease problems are calf pneumonia, pink-eye, cancer eye and "lumpy jaw". The most drastic of these is calf pneumonia, which occurs quite commonly in weaner calves. It occurs on the locally raised calves as well as in those shipped in. The disease seemed to be on the decrease at the end of 1949 and the early months of 1950. Some stockmen had been vaccinating calves with haemorrhagic septicemia bacteria and felt that they were getting good results. The disease is appearing again this fall in spite of the vaccination. The best preventive measures seem to be to feed the calves well, and not keep them in close quarters. The very sick animals, that would normally die, give good response and recovery when treated with combinations of penicillin and sulpha drugs.

This Agent feels that the dust around stockyards, corrals and working places, in a large degree, irritates the animals' respiratory system, and is probably in a large degree the weakening element that brings on the disease. Once the disease is in a herd, it is quite infectious and spreads very fast.

Pink-eye in calves and grown stock is the most aggravating of all the diseases. There seem to be a great many infections that take a great deal of experimentation for the most effective treatment for each individual herd. The greatest ill effect seems to be blindness, and in older animals, the eye injuries eventually turn into cancer eye.

Prevention again is the most effective means of control. Calves that have not been exposed to excessive dust and dirt, and those fed rations containing Vitamin A (dehydrated alfalfa meal) seem to have less trouble than others. Whenever eyes are infected and have to be treated, the ranchers here have had good results with liquid sulpha drugs with coloring in them. The sulpha's seem to cure the bacterial infections, and the coloring around the eye cuts down sunlight absorption.

Cancer eye and lumpy jaw seem to develop regardless of the practices. Where cases have developed to any great degree, this Agent advises ranchers to get a Veterinarian to remove the eyes, and then fatten the animal for market. About the same holds true for lumpy jaw. Treatments with sodium iodide arrest most cases in the early stages, but the infection seems always to re-occur. This Agent feels that, in either case, the rancher is wise to get rid of the affected animals before the disease develops to the point of decreasing the market value.

The range livestock owners, in an effort to procure more moisture for their ranges, ventured into rain-making during the summermonths. They formed an association called the Northern Arizona Range Improvement Association, and contracted with a rain-maker at \$4.00 per section, to produce rain for three months. After the rain-maker had worked for better than a month, and the drought continued, the Association cancelled the contract.

The range livestock outlook for the County is not very promising at this time. What the situation will be through the latter part of 1951 depends entirely on the weather. This Agent feels that at best, with even a wet winter and spring, it will be August and September before cattle can return to their home ranges. Heavy culling has prevailed, and it will be two or three years before the situation is normal again.

COMMUNITY INSECT CONTROL:

Community insect control programs are still making headway in the County, although there are a great many difficulties encountered.

Snowflake, Holbrook and Winslow again this year carried out programs to control flies and mosquitoes. The programs and practices vary to some extent. The program in Winslow is still being carried out by the Kiwanis Club as one of its civic programs. They use the residual spray in combination with a space spray laid down with a fog machine.

Holbrook and Snowflake both used just the residual spray, with results on a par with that of the Winslow area.

The success of any fly and mosquito control program is controlled by the interest that the people of the community have in its clean-up programs. Proper disposal of garbage, manures and other breeding places are the

first essentials of an essential campaign. Dry weather made mosquito breeding places less bothersome this year in all areas than they have been during the past two years. Keeping stagnant ponds and breeding pools oiled still seems the most important step in the control of mosquitoes. Low places along the highway and around the town of Holbrook, without proper drainage, always serve as constant breeding places for mosquitoes during the summer rainy seasons. In order to make sure that these pools of water were oiled, Mr. Wilford Brinkerhoff, of Holbrook, secured numerous 20-gallon oil barrels and buried them in the ground in the low places where the water collects. He left the barrels about 3 inches above the top of the ground and filled them with light oil. As the pools fill with water, the oil in the barrels is displaced by the heavier water, and thus oils the water as the ponds fill. This method did not receive a thorough test, due to the unusually dry weather, but should work well, and is a good idea as a labor saver. It will also make sure that stagnant pools of water are oiled.

Flies are still giving the program-planners considerable trouble, since they seem to find ways not to be so easily killed. The first year of our fly control program found DDT the recommended insecticide. It did a wonderful job on the first couple of applications, and then it didn't seem to have the killing power that it had had in the past sprayings. Benzene Hexachloride was introduced and really did a marvellous job all through last year. It was used in the program starting this year, but control was not good, so a combination of DDT and Benzene Hexachloride was used quite successfully. Proper application with recommended strength is a necessity for good control. Haphazard jobs are often the cause of poor control, but where the job is done right, the control is often still not effective. This office feels definitely that the house flies have built an immunity to both the insecticides used. The Agents' hopes is that some of the new insecticides that are being tried will prove as effective as the Benzene Hexachloride was in its first year. Fly control will undoubtedly continue in the County, but materials that give good control make the people happier with this office and with those who sponsor such a program.

NAVAJO COUNTY FAIR:

The Navajo County Fair, sponsored by the County Fair Commission and the Holbrook Junior Chamber of Commerce, was held on September 14, 15 and 16. The County Fair was affected by the adverse weather conditions that affected all phases of agriculture in the County. This year 215

persons exhibited around 1800 articles. This was considerably less than last year. This decrease was expected, since frost killed the fruit and the drought destroyed the crops in the dry farming areas. The produce that was exhibited was of high quality, with the County winners going to the State Fair and making a good showing there.

Flowers and truck crop produce made up the larger portion of the Fair exhibits. This Agent feels that the flowers exhibited in the Navajo County Fair would be winners at any flower show.

The Junior Chamber of Commerce sponsored a rodeo and horse racing. These attractions make possible a large attendance at the Fair and round out a complete day for the visitors.

The Extension Office, as in the past, plays a major role in conducting the County Fair. A great deal of the planning, arranging of exhibits and the exhibit building, classifying exhibits and preparing for the judging falls to the County Agricultural Agent, Home Demonstration Agent and the different Specialists who help out.

MISCELLANEOUS:

This Agent spent several days working with other groups.

The Agent and Harvey F. Tate, Extension Horticulturist, spent one day with the Hopi Indians at their Field Day, giving information on fruit trees and livestock. The meeting was well attended, with 283 very eager Indians. In all probability, Extension Service will again be asked to attend this Annual event in 1951, and to furnish a major part of the subject matter information.

This Agent had the honor of a visit from two of the Agriculture Turkish Trainees, who remained in the County for the period of a week. Emin Ali Yucer and Salahattin Ecikoglu spent this time in the County going over the agricultural methods here, as well as the office program for Extension teaching. Both men were quite interested in the irrigation projects of the County, as well as the small farms and cropping systems.

Safety and Fire Prevention are phases of work on which this office spends some time, trying to make the agricultural people more conscious of the losses that occur from fire and accidents. The Agent sent out a circular letter to 525 cooperators, pointing out the losses that occur and the things that might be done to cut the losses down. Farm accidents were still numerous, and

major fires increased considerably over last year. Careless handling of fires around farm buildings was the largest cause of fires.



Howard Baker, right, Assistant Director, Agricultural Extension Service, and County Agent Armer, show the two Turkish Trainees the irrigation diversion dam at the junction of Silver Creek and the Little Colorado River. This dam diverts the water for 400 acres of farm lands at Woodruff, Arizona.



100 tons of alfalfa hay were reduced to ashes within a few hours. Fire prevention is always profitable.

4-H CLUB WORK:

Agriculture 4-H Clubs remained about constant from last year. There were 4 clubs organized, with a total of 42 enrolled, as compared with the 1949 enrollments of 48 in 4 clubs. Completions in the County ran around 50% for both years.

Woodruff has approximately 20 rural youth, with 8 of the group enrolled in 4-H Club work, under the direction of Mrs. Minnie Bowler. The 4-H Club group there normally takes in the younger boys, below High School age. The recreational facilities available in the community are those furnished by the school and Mormon Church.

Woodruff agriculture is based largely on small farms in combination with a few head of livestock. Farm returns on the average have been small. The greater majority of the farmers in the community have part-time or full-time jobs outside of the community in other types of industry.

The community is made up of Latter Day Saints Church people. There is one grade school, which also serves as a church, a movie house and a general recreation center.

Joseph City, as Woodruff, is a Latter Day Saints community, with most of the activities centered around the church. This year there were 12 boys enrolled in that community, which makes up about half of the rural group eligible for 4-H Club work. The same group that is enrolled in 4-H Club work is the group that is most active in Boy Scout work. The recreation in the community is furnished by the church and school, and consists largely of sports and weekly movies. The agriculture there is more prosperous than in Woodruff, and is of a more varied nature. Most of it is based on range livestock, poultry and dairy work.

The Agent finds it quite difficult to get good club work in the small Latter Day Saints' communities, since the church carries out a full program for all the youth connected with the church. It is difficult to set up a program that does not in some way conflict with the church program, or other activities that take place in the community.

The other two clubs organized in the County were on the Hopi Indian Reservation--one at Oraibi and one at Polacca. The club work was formed under the direction of Lin V. Maxwell, then Farm Agent for the Hopi Indians. He was quite enthusiastic over club work, and these clubs turned out some excellent work, with the large amount of time that he

devoted to it. Mr. Maxwell was transferred early in the club year, and the interest in club work seemed to leave with him.

The range livestock club at Polacca was one of the most promising of the clubs on the reservation, under the leadership of William Whipple and the splendid help of Mr. Maxwell. Both men were transferred and the club turned in a 100% incomplete year.

The Poultry Club at Oraibi, under the direction of Fielding Nechoitewa, had difficulty securing poultry for the projects, and completed in proportion to the ability of the club members to buy the poultry for their projects.

All activity is furnished by the Day Schools while they are in session. Church activity is based on the tribal customs of the three mesas, under the direction of the Chiefs.

B. This year's club work for the County was composed of 4 community clubs, with four adult leaders and 42 club members. One Achievement Day was held, with 4-H Club Fair in combination with the County Fair.

Organization of clubs is carried on through churches, schools and community centers. That on the Indian Reservation was done by the Indian Service Extension Agent, with this office giving information and help when it was needed.

First contacts were made with the youths interested in club work, and this information was given to the parents by the youths, with the aid of the different 4-H Club bulletins and circulars made up by the State Office.

Leadership for 4-H Clubs is one of the biggest problems that faces this Agent. It is quite difficult to get capable, voluntary leaders to carry a club group through the year. Community activities are generally so numerous that the Agent finds it difficult to get the youth and the leaders to devote the time that is necessary for meetings and club activities outside of project work.

D. (1) Oraibi	8 enrollments	3 completions
Polacca	11 enrollments	0 completions
Woodruff	8 enrollments	7 completions
Joseph City	12 enrollments	9 completions

(2) Enrollments and completions by projects:

Range livestock	11 enrollments	0 completions
Beef	10 enrollments	8 completions
Poultry	11 enrollments	5 completions
Gardens	8 enrollments	7 completions
Rabbits	1 enrollment	1 completion

J. C. Armer
County Agricultural Agent
Navajo County, 1950

OUTLOOK

The 1951 outlook for the County is dependent a great deal on the turn of the weather. If it remains dry for another year, agricultural prospects will be poor, as range resources are depleted now and irrigation reservoirs are dry.

Industries outside of agriculture have increased with the present European situation. There will undoubtedly be a greater number of people leave the farm work to engage in these industries, since cash returns are usually greater there.

This office should receive an increasing amount of calls for information on irrigation, soils, fertilizers and crop varieties. The present programs, as worked out with the several Specialists, call for work in all of these fields.

J. C. Armer
County Agricultural Agent
Navajo County, 1950