Food production in Utah and throughout the nation must be still further increased to meet food demands for civilian population, military service, and lend lease shipments during this emergency. The need for increased production is not uniform for all crops and livestock products, but is largely for certain kinds classed as the more essential foods.

At the request of the United States Department of Agriculture a nationwide analysis was made by staff members of the Utah Agricultural Experiment Station, Extension Service of the Utah State Agricultural College, and the U. S. Bureau of Agricultural Economics cooperating with other federal and state agencies. The report of this study has been filed with the U. S. Food Administration for use in working out a national food program.

This appraisal of Utah's agriculture was made to determine what contributions the state can make toward increasing its food production during the war emergency. The staff members making this study were guided by (1) the need for increased production of essential foods, (2) the basic agricultural resources available in Utah, or the capacity of Utah farmers and the state's agricultural plant to produce to the maximum.

This analysis of productive capacity for Utah was made for two periods; first, an estimate of production for 1944 with certain limitations in respect to availability of farm labor, machinery, fertilizers, farm supplies and processing facilities; and second, the maximum production capacity for Utah for 1945 to 1947 without limitations of labor, supplies, and facilities. This analysis of maximum production was made on the assumption that food production would be classed essential for the prosecution of the war, or be put on the same basis as the production of war equipment and would be given similar support from the government in aiding an all-out program for increasing the food supply.

During the past two years the national food program has called for material increases in numbers of livestock and in the amount of livestock products. Although at the present time there are requests for increasing some livestock and livestock products, the emphasis now is for increasing crops that go directly into human consumption. The food program for the federal government calls for greatly increasing such products as dry beans, potatoes, tomatoes, leafy green vegetables, dairy and poultry products during 1944. The percentage increase in products for 1944 over 1943 ranges from 100 percent in the case of dry beans to a reduction for some crops and livestock.

The suggested agricultural program for Utah for 1944 to 1947 was based on these directives with certain assumptions and the possibility of adjusting the use of Utah's resources for an increased food supply. Changes in war situations, demands in amount and kinds of foods, or price relationships may alter the conditions to the extent that the proposed program as suggested in this report would not apply to the new situations and therefore, would need revising.

In working on this project a careful study was made of the requests for increased food production, Utah's agricultural resources, and the changes and adjustments in Utah's agriculture needed to obtain the increase in production as listed in this study. The variation in climate and the difficulties to be met in changing farm organizations as well as the practices necessary for the suggested agricultural program for this state have also been taken into consideration and carefully weighed in developing a wartime agricultural program for Utah.

During the war emergency substantial increases over the acreage and estimated production for 1943 were recommended. Crops listed for increased production in Utah include: sugar beets, dry beans, potatoes, processed and fresh vegetables, sugar beet and vegetable seeds, dry land wheat, alfalfa, and permanent and rotation pasture. The increase in production of crops is to be accomplished by increasing the acreage and by higher yields from better farming operations. The added acreage is to come from planting of dry farm wheat on land which has been held out of production through the Agricultural Adjustment Administration program and the planting of wheat on some new lands. The additional acreage of land under irrigation will come into production through the application of water from reservoirs now under construction or new ones that can be built within a year's time. A small acreage of land can be put under cultivation by drainage where there is an excess of water and a small amount of alkali.

In balancing the need for livestock and livestock products with the number of livestock and the feed supply it was found necessary to recommend that some adjustments in the program be made. This included an increase in the number of dairy cows and poultry with a slight reduction in numbers of beef (Continued on page 11)
THE AUTHORS

Dr. W. P. Thomas, head of the Department of Agricultural Economics, is general chairman of the state committee to study maximum wartime production goals for agriculture in Utah. The information contained in his article in this issue is general in nature, because the definite goals are not yet ready for publication. However, this article does point out in just which agricultural products production will need to be stepped up and those which will not be so important.

Dr. J. F. Edwards has charge of the cattle feeding investigations for the Station. He joined the staff a year ago, coming here from Texas A and M College. He is a native of Iowa and obtained his Ph.D. degree at the University of Illinois.

Dr. D. E. Madsen is head of the Department of Veterinary Science at the Station, and has charge of the Animal Disease Laboratory which conducts diagnoses and investigations of poultry and livestock diseases for farmers throughout the state.

Dr. J. E. Geddes has been head of the Sociology Department at the College and is in charge of the rural sociology research for the Station since 1926. He has conducted a number of studies on village living in Utah.

Drs. D. S. Jennings and H. B. Peterson, and LeMoyne Wilson are members of the Department of Agronomy and Soils. Dr. Jennings is in charge of the soil survey work for the Station and is aided by Mr. Wilson. Dr. Peterson is one of the many Petersons connected with the College. He is a native of Utah, was born and raised in Provo, graduated from the Brigham Young University and took his doctor's degree from the University of Nebraska. He has been connected with the Utah Station for three years.

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CAUSES OF SERIOUS BEE LOSSES IN STATE BEING INVESTIGATED BY STATION

INVESTIGATIONS of bee losses are now being conducted by the Utah Agricultural Experiment Station, Department of Entomology, to attempt to determine the cause or causes of the serious adult bee losses that have been occurring in Utah during recent years. These losses have been so heavy that the existence of the industry is threatened.

At the present time, primary attention is being given to the possible relationship of agricultural sprays, dusts, poisonous plants, poison baits or industrial smoke as causes of unusual adult bee mortality. The U. S. Bureau of Entomology and Plant Quarantine, through Dr. A. P. Sturtevant and its Laramie, Wyoming, Bee Culture Field Laboratory, is cooperating by analyzing samples of dead bees for occurrence of poison or of little known diseases.

The primary purpose of the investigation is to develop methods which will eliminate or materially reduce adult bee losses, thus adding to the security of the men engaged in beekeeping and at the same time insuring more adequate pollination of fruits and other insect-pollinated plants, which would be highly beneficial to the state generally. One of the major contributing causes of the low set of fruit in some orchards in the state is the scarcity of bees.

This investigation was made possible by a special grant of the last Utah State Legislature. The success of the investigation to date has been aided by excellent cooperation from State Bee Inspector William L. Moran and a number of larger beekeepers who have reported unusual bee conditions, permitting Dr. G. F. Knowlton, the project leader, to study the unexplained bee loss conditions.

A number of bee yards have been examined this season in which large numbers of field force bees have died. In some cases 40 to 60 percent of the field workers were dead at a time this force should have been strong. Sometimes orchard spraying has occurred when the ground beneath the trees was covered with a dense stand of blossoming white clover, red clover, alfalfa and other blossoming plants which were at the time supplying an excellent flow of nectar to the bee yard. Cutting of such blossoming cover crops in orchards before spraying, or removal of the bees to a safe place for a week or so during such treatment may be necessary to prevent bee losses under such condition.

Preliminary studies suggest that many hives may be kept in healthier condition by adopting better management practices. Whether agricultural baits and sprays, carefully handled, are a serious menace to bees otherwise in good condition has not yet been demonstrated.

The finding of basic information of permanent value to the beekeeping industry of Utah is the primary objective of the present bee loss investigations.

Below: Cutting of blossoming alfalfa, sweet clover and weeds beneath orchard trees before sprays are applied removes a serious menace to honey bees

Above: Strong field forces of worker bees are essential to profitable honey production
RESULTS of calf fattening studies recently completed at the Branch Agricultural College were announced during “Livestock Day” held at Cedar City, July 7. Nearly one hundred livestock men, mostly from southern and central Utah, attended the event. In addition to receiving first-hand information concerning the results of the tests, an opportunity was afforded to inspect four lots of steer calves fed in the current trial ending June 29. This marked the completion of a series of two calf fattening trials conducted by the Utah Agricultural Experiment Station in cooperation with Safeway Stores, Inc., and the Branch Agricultural College.

The objectives of the study were to determine the advisability of supplementing a ground barley-alfalfa ration in the fattening of beef calves with: (a) beet molasses, (b) corn silage, or (c) corn silage and cottonseed cake. Forty head of heifer calves were fed during the first trial, February 1 to June 13, 1942. Forty-four head of steer calves, bred in Emery County, were fed during a second trial, December 1, 1942 to June 29, 1943. In each trial the calves were divided equally into four lots. Factors used in allotting the cattle included weight, grade, origin, and color.

Rations fed in the first trial included: lot 1, ground barley and alfalfa; lot 2, ground barley, beet molasses and alfalfa; lot 3, ground barley, beet molasses, corn silage and alfalfa; and lot 4, ground barley, corn silage and alfalfa. Rations fed in lots 1, 2, and 4 during the first trial were again fed during the second trial. In addition, during the second study one lot of cattle received a ration consisting of ground barley, corn silage and alfalfa plus cottonseed cake fed at the rate of 10 percent of the concentrate mixture. In all cases the barley was coarsely ground and was fed in moderate amounts, varying from averages of 7 to 8½ pounds per head daily for different lots during periods of full-feeding. The maximum amount of barley fed at any time during the trials was 10 pounds per head daily.

Results of the entire study showed a definite advantage from the addition of corn silage to a ground barley-alfalfa ration. Although there was no significant difference in rate of gain between silage and non-silage lots, corn silage proved to be economical in terms of other feeds replaced in the ration. In addition, corn silage proved to be an important factor in reducing bloat. The opinion of many cattle feeders that a ground barley-alfalfa ration is likely to cause bloat was apparently true in this experiment. In the second trial one steer died of bloat and another had to be eliminated from the experiment because of chronic bloat. In both cases the steers were being fed ground barley and alfalfa. Veteran cattle feeders in attendance at Livestock Day pointed out that feeding beet pulp, mixing wheat with barley, or feeding some grass hay with the alfalfa had enabled them to reduce difficulty with bloat when ground barley and alfalfa had been fed.

The lot of calves fed ground barley, corn silage and alfalfa supplemented with cottonseed cake at the rate of 10 percent of the concentrate mixture, excelled other lots of calves in the second trial with respect to rate of gain, uniformity and quality of finish, market value and carcass qualities. Chemical analyses of the experimental feeds showed no lack in quantity of protein and phosphorus in any of the rations fed during the experiment. Therefore, the advantage gained by adding cottonseed cake was apparently because of the greater variety of feeds in the ration which possibly provided a more satisfactory balance of various nutrients. The steers fed the cottonseed cake maintained slightly better appetites, particularly during the latter part of the test.

Beet molasses (Steffens) fed up to 3 pounds per head daily along with ground barley and alfalfa did not prove to be profitable at feed prices which prevailed during the experiment. However, beet molasses did prove to be economical in the first trial when added to a ration consisting of ground barley, corn silage and alfalfa.

Limited feeding for the first 120 days of the second trial proved to be uneconomical. During this period the calves gained only an average of 1.6 pounds per head daily. When full-fed during the last 90 days of the experiment, they put on an average daily gain of 2.6 pounds per head and were equally as efficient with respect to pounds of feed required to put on a hundred pounds of gain, even though their maintenance requirements were essentially somewhat greater than during the earlier part of the feeding period because of advance in age and increase in weight.

The cattle fed during the current experiment averaged 845 pounds in weight when taken off test June 29. They dressed out an average yield of 58 percent. Of forty carcasses observed in the slaughter tests, 32 were graded good and 8 choice. Six of the choice carcasses came from the lot of cattle fed some cottonseed cake in addition to ground barley, corn silage and alfalfa. The dividing-line between the good and choice carcasses was based primarily on the difference in amount of marbling present. Nevertheless, those in charge of the slaughter of the steers and grading of the carcasses agreed that the finish was sufficient for young cattle and that it was particularly practical for war-time beef, since a greater amount of finish in many instances results in some waste.

Livestock men inspecting feeder calves at the end of the seven-month feeding trials

CATTLE FEEDING INVESTIGATIONS SHOW CORN SILAGE TO BE ECONOMICAL FEED IN FATTENING RATIONS

By IRVIN F. EDWARDS
Because of the importance of irrigation in Utah agriculture, research in irrigation science was initiated immediately after the establishment of the Utah Station. Among the problems investigated by the pioneer workers were: early vs. late irrigation; amounts of water required and relation to crop yield, percolation, and soil fertility; seepage waters and the underflow of rivers; time and frequency of irrigation; water-supply studies and canal capacities. Later, more intensive studies were conducted relating to soil and plant relationships which demonstrated the striking possibility of irrigation improvement. Particular attention was given to the influence of quantity of water on the quality of the crop grown, and it was found that conservative irrigation produces highest quality crops. It was also shown that excessive irrigation results in large losses through deep percolation. Methods of conserving water following irrigation, with special reference to cultivation and the prevention of evaporation losses, were given thorough and painstaking experimental study.

Probably the greatest single contribution of these intensive irrigation studies was the establishment of relationships between the amount of water applied and the crop yield. These relationships are now commonly represented graphically by a curve known as the yield-water curve.

A later development has been hydrological research in which studies have been made regarding the relationship between precipitation on mountain areas and the yield of river systems. Water-supply forecasts for important Utah streams are now made each year on the basis of cooperative snow-survey measurements. These forecasts enable irrigation companies to plan their seasonal water use and give the farmers a sound basis for selecting and planting crops in harmony with available water supplies.

Detailed surveys of the irrigation resources in Duchesne, Morgan, Summit, Salt Lake, Utah and Washington Counties have been made recently. Irrigated lands have been mapped, and water sources, amounts delivered, and water needs have been carefully studied. These studies provide a sound basis for essential irrigation adjustments, such as use of limited water supplies on the best lands, elimination of needless duplication of canal systems, efficient adjudication of water rights, consolidation of related irrigation companies, and development of supplemental water supplies.

Other recent investigations in irrigation are concerned with water-application efficiencies and with the conservation of water through the lining of canals where there is excessive seepage. Results of this work have been reported in earlier issues of this publication.

The Department of Physics, since its creation in 1914, has cooperated with the Irrigation Department in the solution of problems of soil-water relations. Through the application of the Darcy velocity law, the manner in which water moves into drains, into well networks, and into the water table from water-bearing strata has been demonstrated. These demonstrations have completely changed the general concepts of soil-water-plant relationships.

Some of the applications of this work are: (1) a number of small wells connected to a common center will decrease the loss of energy as a result of friction in the water-bearing gravel and thereby increase efficiency in the use of power for pumping over one larger central well. (2) Water-logged land overlying an artesian aquifer cannot be drained economically by tile drains because the drains, to be effective, would have to be placed too close together or too deep. (3) The spacing of drainage tiles is independent of the texture of the soils when the water logging is caused by artesian water. That is, drains should have the same separation in clay soil as in sandy soil, if the soils overlie similar artesian basins.

At present, the problem of soil erosion by irrigation water is being studied by both the Irrigation and the Physics Departments. These studies have shown that the rate at which the soil material wears away and moves into the turbulent stream depends directly upon such factors as the size of stream, the slope of the eroding surface, the silt content and state of turbulence of the stream, upon the contour of the surface, and upon the macroscopic structure of the soil lying immediately beneath the surface. These facts have been set down in the form of differential equations, and the values of the various characteristics of the equations determined by laboratory experiments.

George D. Clyde, dean of the Department of Irrigation and Drainage, is one of the first men in the United States to study the influence of precipitation on mountain areas to the availability of water for irrigation. Dean Clyde has been associated with the Station since 1909, and has written a number of papers and articles for technical journals.

Dr. Orson W. Israelsen, professor of irrigation and drainage, has been on the Station staff since 1916. He is author of one of the best known texts on irrigation practices, and has written numerous technical and popular articles on phases of irrigation practice in the west. He represents the Utah Station as collaborator with the U. S. Regional Salinity Laboratory at Riverside, California.

Dr. Willard Gardner, head of the Physics Department, is internationally known for his outstanding work in soil physics. His picture hangs with five others in the Rothamsted Agricultural Experiment Station in England, representing the men who have done most toward the advancement of agricultural science. Dr. Gardner is a native Utahn and has been a member of the Station staff since 1918.

Dr. Cyril W. Lauritzen is a representative of the Soil Conservation Service and federal collaborator with the Utah Station on the camp since 1941. His research includes the investigation of basic factors governing soil erosion as affected by irrigation methods and practices, the investigation of the nature, extent, and methods of reducing seepage losses from canals; and the rehabilitation and restoration to rigtable of abandoned cultivated land.
MASTITIS IN DAIRY HERDS CAN BE CONTROLLED

Prevention of the Disease More Effective Than Treatment

By D. E. MADSEN

At the present time mastitis is believed to cause more economic loss to dairymen than any other one disease. The loss is not usually sustained through death of the animal, but rather through reduced milk flow and lowered quality of milk. Certain types of mastitis such as that produced by the septic sore throat organism is a serious health hazard to man. Fortunately, this type of mastitis is rare. The mastitis problem, therefore, is largely an economic one.

The term mastitis refers to an inflammation of the mammary gland tissue. Mechanical injuries or chilling of the udder may produce inflammation but over 95 percent of the cases are produced by bacteria. Sometimes injuries such as bruises to the teat precede the disease. Milk from an infected cow contains millions of the causative germs. The germs are tracked about the barn from milk spilled or leaked on the floor and when they make contact with the teats of other cows, they may enter the teat canal and produce disease. The germs may also spread from cow to cow by hands of the milker, by milking machines, and by flies. The continued use of teat tubes (dilators) is almost certain to introduce bacteria.

Symptoms of Mastitis

For convenience in describing symptoms and prescribing treatment, it is common to divide mastitis into acute and chronic types. There are, of course, various gradations between these two types. Acute mastitis is readily recognized by the swollen, hard, hot and painful udder. The tenderness causes the cow to move only with reluctance. Milk secretion is partially or entirely suspended. The milk secreted may be straw colored and watery or it may contain yellowish clots. Occasionally the secretion is tinged with blood. It is not uncommon to find general systemic disturbances such as impaired appetite, general depression and fever.

Chronic mastitis is not so easily recognized. At certain periods the chronic form may flare up to the degree that it is not uncommon to find general systemic disturbances such as impaired appetite, general depression and fever.

Control of Mastitis

Control of mastitis is based largely on the thesis that if cows are known which are potential spreaders of the disease, they can be handled in such a manner that flagrant spread of the disease is not likely to occur. To date, control has been more satisfactory than treatment.

Firm fibrous tissue has replaced a portion of the glandular tissue as a result of chronic mastitis

The left quarter has shrunken and dried up as a result of acute mastitis

Even though the streptococci are destroyed by treatment, the fibrous scars of the former infection remain in the udder and production is permanently interfered with in various degrees, depending upon the changes produced. When mastitis is prevalent in a herd it is advisable to check all cows at two- to four-week intervals to determine the progress of the disease. In some herds strip-cup tests are made daily to detect the presence of flakes in the milk. A more certain procedure would be to have milk samples tested at a laboratory. Those cows showing the highest degree of infection should either be sold or placed on the end of the milking line where they will be milked last. Those cows which show the disease to be less pronounced are placed next in line, and finally the cows and then heifers with healthy udders. In all operations such as wiping the udders and milking, the task should begin with the heifers (usually mastitis free) and end with the worst infected animals. If cows are purchased, their mastitis status should be ascertained before placing in the milking line. As soon as any animal gives indication of mastitis, it should immediately be stabled with the infected group. The milker must be constantly on the alert for any changes suggesting mastitis. The use of chlorine solution, 300 parts per million, for wiping teats and for dipping milking machine teat cups is a helpful sanitary precaution. The cups should be always rinsed in clear water to wash off the milk before being dipped in the chlorine solution. The stable should be kept clean and sanitary.

(Continued on page 11)
A Utah Postwar Problem: Village and Small City Planning

By JOSEPH A. GEDDES

An expanding interest in village and small city planning in Utah is a hopeful development of recent years. Much of this interest has found expression in beautification. Other aspects of city planning are but beginning to come into the focus of attention. Experience has been sufficient, however, to cause some to realize that good plans are never completed. They grow through many years. Once accepted in basic outline they not only direct social energy but influence character growth and good citizenship.

Although the great majority of the small cities and towns of Utah have not yet developed genuine far reaching plans that have been accepted by the people, good beginnings have been made in park and cemetery improvements, in building avenues of trees, in sidewalk improvements. It is the purpose of the writer to show that far reaching and well worked out plans for communities which will take 25, 50, or 100 years to bring fully into being would be a great help to those who now would like to contribute towards the well functioning city which the great grandchildren of present day parents will inhabit and enjoy. A plan is a necessary instrument for children to inherit and modify if the pooling of the efforts of generation upon generation is to accelerate progress and lead toward greater forms of cooperation.

The people of Utah are not novices in community planning. They at least have a great heritage spaced 2 or 3 generations back, for Utah was once the leader among the states in city and village planning. The early plans go back to Kirtland in 1833 and Nauvoo in 1839. These plans are important to the people of Utah today, because they constitute the basic schemes on which were modeled the great majority of the cities and villages of Utah. A sketch of the plan for Independence, Missouri, may be seen in figure 1. It was carefully planned to meet the conditions which existed in 1833 and gives evidence of planning:

1. Against over-crowding; a home was planned for each family. There were to be 20 lots to each 10 acre block and 8 rod wide streets.
2. For superior building materials. Brick and stone were to be used for all homes.
3. For adequate space for public buildings near the center of the mile square division.
4. For cleanliness at a time when sewerage systems and garbage removal were not deemed practicable by restricting pens, barns, etc., to a designated area outside the residential portion of the city.
5. For central, convenient location of public buildings. Only a few homes would be more than a half mile from the community centers.
6. Against over-encroachment of routine and mechanization by providing each city family with one-half acre for gardens. A one-half acre of truck garden and orchard is enough to keep a city family healthy and cooperative.
7. Against rural isolation by having the farm family live in the city.

The Nauvoo modification more suitable for smaller communities was based on 5 acre blocks with 6 rod streets, 4 lots contained one and one-fourth acres each and replaced the one-half acre lots deemed sufficient for city inhabitants.

It is well to remember that the basic plan drawn up for Independence, Missouri, was modified when the people built Nauvoo and again in Utah when Salt Lake City was settled. Modifications were made growing out of the experience of the people and the divergent conditions encountered. This is what city planning must always do. Actually it is a process never, when rightly considered, a completed thing.

The L.D.S. Church withdrew from the field of community planning in the eighties, a field in which it had previously made definite contributions to good living. During a period of 60 years, Utah towns and villages have become vastly different from each other. Into the fabric of each community, as it now is, has gone a measure of collective cooperative energy directed to community improvements. The Church is responsi

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Fig. 1. Sketch of the original plan for the City of Zion, from the original drawing in the office of the Church Historian of the Church of Jesus Christ of Latter-day Saints, at Salt Lake City. Area covered, one square mile.

Fig. 2. (left) Present location of homes and streets in Lewiston. The small squares are village blocks. The large squares are mile square sections. Each dot is a house. In this community the majority of the people live on their farms facing the roads which border each square mile. The incorporated limits cover an area roughly five miles square. (right) A possible re-arrangement of roads looking to the possession by all farm families of the fuller living enjoyed by edge-of-village families. These roads would be primary roads subject to as much physical improvement and beautification as the growing cultural needs of the people living along them would require: oiled roads, sidewalks, sewerage lines, conduits for electric power and telephones, with shade trees and here and there a small park where roads turn. The roads to Preston, Cornish and the outer portion of the road to Trenton are superimposed on present roads.
Living close together has been a stimulant for the compactly settled villages. Certainly today many towns and villages are in an excellent position to obtain the services of experts in village planning, who, after a study of the physical conditions and the desires of the people, could begin to lay the outlines of plans for the future.

Questions beyond beautification soon arise. For instance: Are streets and roads where they should be? More and more people are asking: Must we drive around each square mile because our surveyors operate on the township basis? Some one in early days cut across the old church farm between Wellsville and Logan almost on a beeline, ignoring all the section lines. Who does not bless this unknown man’s memory today? The automobile has brought many people living farther out in neighborhoods into a larger natural community. These people do not want to drive around all the old square mile roads of horse and buggy days.

With the permission of the people of Lewiston, who have made great headway in recent decades in the unification of their community, the author presents a rough conception of some possible improvements to their road system as related to land holdings which at first glance may appear revolutionary to them, and even grotesque, but which if it were made a part of a long time town plan, might in a few decades help to solve many difficult and costly problems. The present road system of Lewiston is shown in figure 2 extending around each square mile section, the dots representing farm homes. Two diagonal roads are suggested in the figure, one which might be built with the cooperation of the county, the other with the cooperation of the county or the state. These roads would tend to increase trade. Young people building homes would want to build them adjoining these streets for they would both be primary roads, well improved, and because they could have the conveniences and comforts of good living at far less cost; that is, providing they narrow the frontage of their farms and extend them farther back. Sewerage lines and all other comparable lines would be shortened, and the number of people who stand the cost of installing them would be increased. Had the homes been so located earlier, Lewiston’s fine culinary water system, which cost $250,000 could have been installed for less than half of what it has cost and every house could have been connected.

There is further reason for planning along lines similar to that indicated in the rough sketch. Experiment Station social studies of other communities besides Lewiston show without exception that: (1) families living around the periphery of the square blocked area on their farms, and (2) families living on inter-community roads for some distance out, have, on the whole, better homes and more home conveniences than farm dwellers who live out on their farms. They also appeal to be more community minded. The relative success of the three farm groups in establishing adequate homes is shown in figure 3.

The suggested plan of reducing the number of streets, making the primary ones of higher quality and greatly increasing the number of families who live adjacent to them would multiply the number who have the advantage which “edge families” enjoy. To live on the farm it is not necessary to live long distances from community centers in isolated places. We must get used to the idea that good housing and modern conveniences are coming to farm people. With planning, these costly additions can be had at perhaps half the cost which unplanned community developments require. Community planning concerns many things. Only through community plans dealing with oiled streets, paved sidewalks bordered with well kept grass and good trees, sewer lines, culinary water, under-ground telephone and power conduits, location of industrial plants, railroads, residences added to and modified by each generation, can gains be pyramided. A revival of interest in village and small city planning comparable in strength and vigor to that which existed during the pioneer period would do much towards redirecting social energy, some of which now goes to waste, into fruitful channels. Is it not time that “the hearts of the fathers” should be “turned to their children” in such a substantial enterprise? The time to devise basically sound small city and town plans, based on the underlying geographic environment and in harmony with the traditions and desires of the people so that community individuality emerges, is now.

NEW PUBLICATIONS

Bul. 308. A farm management study of farms with dairy enterprises in the Ogden area, Utah, 1937-39, by George T. Blanch and Dee A. Broadbent, Agricultural Economics Department.

This study is an attempt to ascertain the factors affecting the income from farming and the place that dairy cows should occupy in the organization of farms in the general irrigated type of farming area of northern and central Utah.

Bul. 309. Economic analysis of the milking enterprise on farms in the Ogden area, Utah, 1937-39, by George T. Blanch and Dee A. Broadbent, Agricultural Economics Department.

This bulletin contains an analysis of the milking enterprise on the same farms reported in bul. 308, and is a study of the factors affecting the costs and returns from the milking enterprise.

Either of these publications may be obtained free by addressing a card to the Utah Agricultural Experiment Station, giving the number and series of the publication desired.

Fig. 3. Average of 17 items covering adequacy of housing in Lewiston, by farm group. The 17 items are: (1) automobile, (2) bathtub and indoor toilet, (3) built within last 10 years, (4) cement sidewalk, (5) central heat, (6) daily newspaper, (7) electric lights, (8) in good repair, (9) separate living room, (10) painted within last 10 years, (11) piped in water, (22) radio, (13) refrigerator, (14) reproduction value over $300, (15) sewerage connection, (16) 1 room per person, (17). .6 bedroom per person
TWO NEW ANIMAL DISEASE LABORATORIES
ESTABLISHED BY STATION

Laboratories at Provo and Cedar City Will Serve Farmers in Central and Southern Parts of State

For several years the animal disease laboratory at the college under the direction of Dr. D. E. Madsen has served the farmers and stockmen of the state in the diagnosis and investigation of livestock and poultry diseases. Owing to the fact that the laboratory is situated in the extreme northern part of the state, however, and also because of the heavy load placed upon the one laboratory at Logan, it has not been possible to give the same degree of assistance to the farmers in the central and southern parts of the state as to those in the northern part.

Turkey growers and poultrymen particularly, as well as the livestock producers, have sensed the need for a laboratory in the central or southern part of the state similar to the one at Logan where farmers could take their sick animals for diagnosis and where they could obtain instruction in the prevention and control of disease in the flocks and herds. With funds made available by the Legislature two branch laboratories are being established in order to meet adequately the needs of the industry for aid in the fight against disease.

One of the laboratories will be at Provo where the Utah County Commissioners have generously furnished a building at 1201 West Center Street near the viaduct. Dr. M. L. Miner, a graduate of the Utah State Agricultural College and of the Veterinary School at Iowa State College has been appointed to direct the work at this laboratory. During the past two years Dr. Miner has been on the staff of the Veterinary School at Michigan State College where he was engaged in poultry and animal disease research and diagnostic work.

The other branch laboratory is being established at the Branch Agricultural College at Cedar City. There Dr. Rue Jensen will direct the work. Dr. Jensen is also a graduate of the Utah State Agricultural College. His professional veterinary training was obtained at the Colorado State Agricultural College Veterinary School. During the past year he has been at the Louisiana State University where he has been teaching veterinary science and doing research work on livestock diseases. In addition to directing the animal disease laboratory at the Branch Agricultural College, Dr. Jensen will also teach courses in veterinary science, poultry diseases, and bacteriology.

Farmers, stockmen and poultry raisers are invited to use the services of these three laboratories where they may obtain aid in the solution of their animal disease problems. Diagnostic tests will be made to determine the diseases affecting the animals and where necessary investigations will be made to determine the most effective ways and means of treatment and control of the disease. The workers at the laboratories are not to replace the practicing veterinarians, but rather to assist them in determining the nature, cause and control of serious disease problems. The laboratories will also cooperate with the state veterinarians of the State Department of Agriculture and aid in the animal disease control program for the state. By these means it is hoped to develop a better understanding of what should be done to keep our livestock and poultry healthy.

How to Whip Thin Cream

The New York Agricultural Experiment Station at Geneva has found that thin cream may be whipped by adding one level teaspoonful of any one of four vegetable gums (karaya gum, gum acacia, gum tragacanth, and locust bean gum) to a cup of cold cream. The gums are good water absorbents and emulsifying agents and take the place of the fat globules. These gums are inexpensive and are a pure food product in themselves. They should be available at drug stores, and one ounce is enough for about eight batches of whipped cream. The formula used at the New York Station calls for one cup of cold cream, two tablespoonfuls of sugar, one level teaspoonful of gum, and a few drops of vanilla. The sugar and gum are mixed dry until free from lumps, the mixture is then added to the cold cream slowly while stirring, and the cream whipped at once. The cream should whip in two or three minutes.

Farm population at the end of 1942 was the lowest of any time since 1910 when farm population was first estimated. It is estimated that there was a net loss of 1,227,000 persons from farms in the United States in 1942 as a result of wartime expansion in industry and the armed forces.
Soils—Basic Agricultural Resource of Wasatch Front Area

By D. S. JENNINGS and LeMOYNE WILSON

This is the second of a series of articles reporting findings on the opportunities for development and stabilization of agriculture in the defense and industrial areas in Utah during the war and post war periods. Other phases of this study will be published in future issues of Farm and Home Science.

The agricultural study is one part of a larger study which includes chapters on industrial development, water and power, transportation, recreation and rehabilitation, public works, and community planning. This study was published by the Utah State Department of Publicity and Industrial Development.

THE valley lands west of the main Wasatch Front are largely in the northeastern part of the old Bonneville Lake Basin. The Great Salt Lake, which is a shrunken remnant of Lake Bonneville, occupies the lowest position in elevation in the old Bonneville Basin, and has an areal extent of about 2,000 square miles. In the course of its history, Lake Bonneville underwent several periods of filling, followed by periods of lowering, with intermittent periods of relative balance. It was while the lake fluctuated just under 4,800 feet above sea level, that many of the more important land features along the western base of the Wasatch Mountains were formed. Streams built large alluvial fans, many of which ultimately coalesced, forming extensive areas of gentle sloping valley fill or terraces of the valleys. The sorting of rock material by the combined action of stream and lake waters is responsible for the pattern of soil material laid down, and therefore, for the pattern of the use to which the land is today best adapted. The valley areas west of the Wasatch Front, although approximately 5,000 feet above sea level, have afforded a vast depositional area for the rock sediments gathered by the streams from the mountain areas and transported by them to the valleys below. It is from these sediments that the soils of our valley lands of the Wasatch Front have developed.

General Characteristics of the Soils

A detailed soil survey has been made of the Salt Lake area, which area includes most of the valley lands in Salt Lake County and of the Utah and Goshen Valleys in Utah County. In connection with the detailed soils work, an alkali map and a land classification map were made. The following general discussion of the soils of the Wasatch Front area is based largely on the studies made of the soils of these two counties.

Like most soils of arid regions, the soils of this area are rich in mineral food elements. In many cases, even when the soil is provided with good drainage, the more soluble salts, often termed "alkali," are found, especially in the subsoil. Calcium carbonate (lime) and gypsum are common constituents. The soils of this area are generally higher in organic matter and nitrogen than are those of the arid sections of the southwest.

On the basis of topographic position, relief, drainage, moisture holding capacity, and internal soil characteristics, the soils can be quite logically classified into three groups: (1) The well-drained mid-valley soils, derived from medium to fine textured materials. These soils are located quite generally between 4,300 and 4,500 foot contours on the smooth, gently sloping terraces and alluvial fans. They are well adapted to a wide variety of crops. Sugar beets, alfalfa, and grain are grown extensively and produce maximum yields. Some soil types of the group are well adapted to such crops as potatoes, tomatoes, and canning peas. These soils constitute the main area of valley land well adapted to production of general farm crops under irrigation, and make up the larger areas of the class 1 and class 2 lands.

(2) The coarse high-valley soils, that are well to excessively drained, and underlain by coarse sand and gravel. These soils have developed principally on gravelly alluvial fans of gentle to moderate slope, and smooth to gently rolling or ridgy relief. Drainage is good to excessive. These soils are not well adapted to the production of general farm crops, but are better adapted to the production of fruits and vegetables. The land classification based on general farming would place these soils mainly in classes 2 and 3. If the classification was based on some specific fruit or vegetable crop, it might be considerably different.

(3) Fine textured low-valley soils, which include poorly drained soils of the lower and flatter portions of the alluvial fans and terraces, and also the poorly drained salty soils of the old lake plains. The poorly drained lands in the lower flatter portions of the terraces and fans generally make good pastures, and even the highly saline areas afford some grazing. Areas of class 4 that are reclaimable are extensive in this group.

The Land Classification Situation in the Wasatch Front Area

The area in Salt Lake and Utah Counties now has a complete soil survey while areas in Morgan, Weber, and Box Elder Counties are in process of completion. The soil survey field work in the latter areas was done by the Soil Conservation Service. There is an urgent need for survey work in the valley lands, especially in Weber, Davis, and Box Elder Counties. The Utah Station with the aid of federal agencies engaged in soil survey work plans to do this work as soon as possible, with the aim of eventually completing a soil survey, either detailed or reconnaissance, of the entire area.

The soil survey classifies the land into six classes, the first three of which are considered to be arable and the last three non-arable.

A summary of each of the six land classes for the Salt Lake and the Utah-Goshen Valleys areas is given in table 1. A total of 626,084 acres is included in the two areas. Of this 272,485 acres or 43.5 percent are arable and 312,425 acres or 50.0 percent are non-arable, while miscellaneous areas consisting essentially of water surfaces and urban areas make up over 41,000 acres or 6.5 percent.

From an average of similar data for all surveys made and tabulated in the state to date, it can be stated that of the total valley land area of Utah only 40 percent is arable. Applying this generalization to Box Elder County there would be an arable land area for this county of 306,000 acres.

Neither the distribution of the three arable land classes nor the total arable land is known for Davis or Weber Counties. The yields obtained from the cropland in these two counties appear to be at least equal to those of Salt Lake and Utah Counties. It may, therefore, be safe to use the distribution found in the two latter counties to obtain an estimate of the distribution in the two former counties. The cropland for Davis County is given as 40,000 acres, and for Weber County 52,000 acres.

Using these estimates for Davis, Weber, and Box Elder Counties and the
data given above for Salt Lake and Utah Counties, the distribution of the arable land classes is obtained for the area immediately west of the main Wasatch Front and is given in table 2.

In each of the five counties considerable areas of arable land are now being used for war establishments. In the five counties, 11,885 acres of arable land, of which nearly 5,000 acres are in classes 1 and 2 and over 7,000 acres in class 3, are taken out of crop production. The loss of arable land in Davis County is over 5,000 acres, of which 750 or more are in classes 1 and 2, and over 4,500 are class 3 or better, while in Weber County the loss in arable land is over 2,300 acres, of which more than 1,200 are in classes 1 and 2 with about 1,000 in class 3.

Soil and Crops Problems

Perhaps the most important function of the soil survey is the mapping and establishment of soil units. It is now recognized that all recommendations and all investigations concerned with soils and crops should carefully consider the soil type or soil unit. With the basic knowledge at hand regarding the fundamental soil units, it is possible to make an intelligent attack on any soil problem that may be encountered. It is known that the experience of one farmer gained on one soil frequently cannot be duplicated by the same farmer on another soil. In the matter of fertilizer recommendations, both the requirements of the plant and the nature of the soil are important. In order to make proper recommendations of fertilizer applications, it is necessary to obtain data from known soils and extend the information gained to the same soils.

Plans for the Better Use of Class 4 and 5 Lands

The soil survey maps of Salt Lake and Utah Counties have been carefully examined and estimates made on the acreage of low lying class 4 land which might be utilized to better advantage. There are approximately 25,000 acres of such land. The alkali content is low enough that the soil may be so managed that palatable plants can be grown with fair production. There is probably an equal amount of similar land in Box Elder, Davis, and Weber Counties, making a total for the Wasatch Front of around 50,000 acres.

This land, properly handled, may be made to produce pasture forage in sufficient quantities to carry from one-fourth to one-half animal unit per acre per grazing season. If this goal can be realized it may be possible to carry from 12,000 to 25,000 head of cattle for a period of 5 months each year.

In addition there is also a large acreage of high lying classes 4 and 5 land, the use of which might be greatly improved if attention were given to seeding such land to improved forage plants, and thereby increase the spring and fall pasturage for range livestock. The need for such feed is pressing and would greatly facilitate livestock production. Heavy equipment should be made available to be used in preparation of this land for seeding. It is estimated that there are in Salt Lake and the Utah-Goshen Valleys approximately 75,000 acres of this type of land now growing brush, or plants of low quality feed value, most of which might be better utilized by such a plan. The other six counties of the Wasatch Front probably have as much or more of such lands.

Marginal Dry Farm Land

There is glaring evidence that large acreages of steep dry farm land in this area are being eroded at a deplorable rate. The only economic way in which this land can be permanently saved is to seed it to forage which will better hold the soil. The feed which would be produced on this land is badly needed in our range program.

Red Clover

Experiments and farm practice have demonstrated that red clover can be successfully grown on good land in this area in short rotations and on the better lands with rather high water tables. This crop is especially adapted to clay loams and silty clay loams. The common varieties will produce one good hay crop or a seed crop the first year if seeded without a nurse crop. The second year a good hay crop and a seed crop can be produced. In this area two crops may be harvested the third year. The yields of hay are high and the seed is in great demand in the East and Middle West.

Utah Gains in Population

Utah was one of the 12 states that showed an increase in population between 1940 and 1943. The Bureau of the Census gives an increase of 34,248 people or 6.2 percent.

Only two other Mountain States showed population increases, Arizona with an increase of 15.5 percent, and Nevada with 22.4 percent.

The civilian population of the United States decreased by approximately 3,100,000 or 2.4 percent. This is because the increase in the size of the armed forces outstripped the natural increase.

People have moved in large numbers to centers of greatest war activity. Of the four regions of the United States, only the West increased in population. The Northeastern States, the North Central States and the South lost more than 6,000,000 persons to the West and the armed forces.

Washington, Oregon and California all increased in population. East of the Mississippi River, in states, Florida, Maryland and Virginia, and the District of Columbia had appreciable increases. Three other states, Michigan, Connecticut and Delaware had slight increases. The heaviest loser was New York, with a drop of about 650,000 in civilian population.

These estimates of population are based on the number of registrations for war ration book 2.

Table 1. Acreages and percentages of the six land classes in the Salt Lake and the Utah-Goshen Valleys area

<table>
<thead>
<tr>
<th>Land class</th>
<th>Salt Lake area</th>
<th>Utah-Goshen Valleys area</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>37,370</td>
<td>34,110</td>
<td>71,480</td>
<td>11.4</td>
</tr>
<tr>
<td>Class 2</td>
<td>35,084</td>
<td>35,720</td>
<td>70,804</td>
<td>11.5</td>
</tr>
<tr>
<td>Class 3</td>
<td>50,204</td>
<td>60,871</td>
<td>111,075</td>
<td>17.7</td>
</tr>
<tr>
<td>Total arable land</td>
<td>122,549</td>
<td>149,936</td>
<td>272,484</td>
<td>43.5</td>
</tr>
<tr>
<td>Class 4</td>
<td>25,742</td>
<td>53,825</td>
<td>79,567</td>
<td>12.7</td>
</tr>
<tr>
<td>Class 5</td>
<td>58,191</td>
<td>83,639</td>
<td>141,830</td>
<td>22.7</td>
</tr>
<tr>
<td>Class 6</td>
<td>32,264</td>
<td>38,655</td>
<td>70,919</td>
<td>14.5</td>
</tr>
<tr>
<td>Total non-arable land</td>
<td>136,197</td>
<td>176,119</td>
<td>312,316</td>
<td>49.9</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>26,941</td>
<td>14,233</td>
<td>41,174</td>
<td>6.6</td>
</tr>
<tr>
<td>Area total</td>
<td>285,796</td>
<td>340,288</td>
<td>626,084</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 2. Distribution of arable land for five Wasatch Front counties

<table>
<thead>
<tr>
<th>Class 1</th>
<th>Class 2</th>
<th>Class 3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt Lake</td>
<td>37,261</td>
<td>35,084</td>
<td>50,204</td>
</tr>
<tr>
<td>Utah</td>
<td>34,110</td>
<td>35,720</td>
<td>60,871</td>
</tr>
<tr>
<td>Box Elder</td>
<td>91,494</td>
<td>95,166</td>
<td>186,660</td>
</tr>
<tr>
<td>Davis</td>
<td>11,960</td>
<td>12,440</td>
<td>15,600</td>
</tr>
<tr>
<td>Weber</td>
<td>15,548</td>
<td>16,172</td>
<td>20,280</td>
</tr>
<tr>
<td>Total</td>
<td>190,373</td>
<td>213,817</td>
<td>266,295</td>
</tr>
</tbody>
</table>
INCREASED FOOD PRODUCTION
(Continued from page 1)

It is recognized by the staff working on this study that the most potent factor in obtaining increases in food production during this war emergency is a favorable price relationship for agricultural products. To obtain the necessary food to feed the men in the armed forces, civilian population, and to fill lend-lease commitments, commensurate prices and income between farm and non-farm groups must be maintained. Also a relatively favorable price relationship between essential foods must be established and maintained if a balanced food production program is to result.

Price support programs and price policies for agriculture as well as price controls and marketing regulations should be known and included in agricultural programs before planting time. The delay on the part of the federal government in announcing price programs and policies greatly handicapped the 1943 agricultural program in Utah. The announcements of price schedules for canning crops and sugar beets for 1943 were too late for the farmers in Utah to plan properly their farm programs.

Farmers favor prices for agricultural products at the market place and prices equal to those received by non-agricultural groups. If food shortage is as acute as reported and increased production of certain agricultural products is seriously needed, then an increase in prices of these commodities to increase production may be advisable. Increases in prices paid for ships and guns have resulted in increased production of these commodities. The same economics applies to food production.

Unless the present confusion on agricultural food production, prices and distribution regulations can be cleared up satisfactorily, food supplies will be adversely affected. To obtain increased food production during this war emergency a balanced price program for the essential agricultural products will be required.

The present established prices are not favorable to increasing some of the foods most needed, but on the other hand are favorable to certain commodities where the production is of less importance. This is illustrated by the unbalanced price ratio between feed grains, especially corn, and some livestock prices. Present prices of sugar beets, wool, dry beans, pole beans, Lima beans, and cannning peas are out of relationship with other prices. Tomato prices are more favorable than some other farm prices; however, they are lower than prices set for California and the Northwest, Utah's competitive area. During 1943 farmers have not responded to the production of some of these commodities and adjustment in relatives prices for these crops will be necessary if production is to be maintained or increased. During 1943 livestock and meat prices have been favorable to the price of feed grains. However, the present uncertainty of the amount of feed available and the price relationship of feed grains to livestock is retarding and will continue to retard production until a better understanding of price policies and a better price relationship of these two commodities are known.

Prices of agricultural products must be coordinated with the war food program if increased production is to result. The policy adopted by the federal government for agricultural products for 1944 and 1945 will be the major factor in determining the agricultural production in the state of Utah and other agricultural areas. The same economics applies to food production.

Price Relationships and Food Production

The treatment may be especially useful, however, in that it offers a means of eliminating the spread from infected cows. Little progress will be made in control if only clinical cases are treated as they occur. The objective rather should be to eliminate the infection from the herd by treating those cows spreading it. Since all infected cows cannot be detected by ordinary means it is necessary to apply special tests to the herd to determine the infected cows. Various tests are available but the test made at a laboratory by incubating an aseptically collected milk sample and examining the same by a microscope is the most satisfactory manner of detecting infection. The pathology laboratory at the Utah Agricultural Experiment Station is offering such a testing service to residents of Utah. Dairymen or veterinarians interested should write the laboratory requesting empty sterile vials (one vial for each cow), and directions for collecting the milk. A laboratory charge of 10 cents per sample is made. Any udder infusion treatment instituted should be under the direction of a licensed veterinarian.

Emphasis is placed on the prevention of this disease through sanitary measures. It is more satisfactory to prevent the disease than to treat it. A program of sanitary procedures, frequent tests to detect new infections, and segregation or removal of infected cows will control and probably eliminate this disease. Treatment of infected cases may be a useful adjunct to free infected herds from this malady.

A more detailed discussion of tests for the detection and treatment of this disease is given in Station circular 118, Mastitis of dairy cows, which is available on request.

Dr. Ethelwyn B. Wilcox has been added to the staff in Home Economics. Part of her time will be spent in nutrition research. Dr. Wilcox is a native of Iowa and received her Ph.D. degree from Iowa State College. She comes here from Washington State College.
MOISTURE and nitrogen are two important factors that limit crop production on dry land farms. In most cases there is insufficient water for irrigation so the moisture factor can be benefited only by catching and conserving that water which falls upon the land. This conservation of moisture is usually best accomplished by such practices as summer fallow, the use of stubble, mulch, contour farming, strip cropping, and in extreme cases by the use of terraces.

Wheat is about the only crop grown on dry farms under the usual system of management. Little or no manure is applied, and seldom is a green manure crop turned under to add nitrogen to the soil. Under such a system the organic matter and nitrogen of the soil are depleted and crop yields decline. Some farmers are able, and do grow alfalfa in a rotation with wheat. This is desirable and helps to maintain the necessary nitrogen supply above a critical level. When neither alfalfa nor a green manure crop is grown to be turned under, and where no barnyard manure is available, some other means of supplying the soil with nitrogen must be found, if crop yields are to be maintained.

(Top) No fertilizer, (bottom) 250 pounds of sodium nitrate per acre. Note the difference in size of plants as indicated on the board. The growth was also more dense on the fertilized plots.

The United States is now the largest producer of chemical nitrogen in the world. In the future large supplies will be released as fertilizer. The price should be less than in the past. This opens the possibility of using nitrogenous fertilizers on dry land farms. If a fertilizer can be applied with profit, it will offer at least a temporary solution to some of the dry land nitrogen-problems.

Some recent experiments have been conducted on dry land farms and the results indicate that increased yields of winter wheat are obtained by the use of ammonium sulfate or sodium nitrate when applied broadcast in the early spring on winter wheat. Results obtained at Petersburo, Cache County, in 1942 are shown in table 1.

### Table 1. Average yields of wheat receiving different amounts of fertilizer

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Y = yield increase (bushels per acre)</th>
<th>Avg. yield</th>
<th>Yield increase</th>
<th>Crop value increase</th>
<th>Fertilizer cost*</th>
<th>Profit and return to cover extra expense</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>17.9</td>
<td>25.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ammonium sulfate</td>
<td>25 pounds per acre</td>
<td>23.6</td>
<td>5.7</td>
<td>7.9</td>
<td>0.75</td>
<td>1.10</td>
</tr>
<tr>
<td></td>
<td>50 pounds per acre</td>
<td>27.7</td>
<td>9.8</td>
<td>11.6</td>
<td>1.17</td>
<td>1.39</td>
</tr>
<tr>
<td></td>
<td>100 pounds per acre</td>
<td>31.3</td>
<td>13.4</td>
<td>14.9</td>
<td>1.60</td>
<td>1.96</td>
</tr>
</tbody>
</table>

In 1943 at Paradise, Cache County, a comparison has been made between sodium nitrate and ammonium sulfate at different rates. A summary of the data obtained is given in table 2.

These data indicate that dry land farms are deficient in nitrogen and that when moisture conditions are favorable, a profitable response may be expected from the use of nitrogen fertilizer. They also suggest that sodium nitrate may be more effective per pound of nitrogen than ammonium sulfate. Similar tests are being conducted at Nephi, Juab County, this season but the results are not yet available. Before general recommendations can be made for the use of these fertilizers, more trials must be run using different nitrogen materials over a wide area. It should be remembered, however, that fertilizer will not solve all the problems connected with dry farming, and to be profitable care need be taken to apply it where a definite response can be obtained. This will not be on the shallow eroded soils on the steep side hills. For such places an increase of up to 50 percent might be expected but this cannot be worthwhile because the yield would still be too low. Land that is steep and has had the top soil removed so the white subsoil shows, should be retired to grass as soon as possible, and fertilizer and effort applied to production and to maintaining the better land.

When the price of wheat is high and the cost of fertilizer favorable, nitrogenous materials will have a beneficial place in the management of some dry land farms of Utah.

### Table 2. Average yields, fertilizer costs, and crop value increase of wheat for various nitrogen fertilizer applications

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Avg. yield</th>
<th>Yield increase</th>
<th>Crop value increase</th>
<th>Fertilizer cost*</th>
<th>Profit and returns to cover extra expense</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>25.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ammonium sulfate</td>
<td>28.2</td>
<td>2.3</td>
<td>2.76</td>
<td>0.66</td>
<td>1.10</td>
</tr>
<tr>
<td>25 pounds per acre</td>
<td>29.2</td>
<td>3.3</td>
<td>3.96</td>
<td>1.32</td>
<td>2.64</td>
</tr>
<tr>
<td>50 pounds per acre</td>
<td>31.0</td>
<td>5.1</td>
<td>6.12</td>
<td>2.65</td>
<td>3.47</td>
</tr>
<tr>
<td>100 pounds per acre</td>
<td>38.5</td>
<td>12.6</td>
<td>15.12</td>
<td>5.30</td>
<td>9.82</td>
</tr>
<tr>
<td>Sodium nitrate</td>
<td>31.0</td>
<td>5.1</td>
<td>6.12</td>
<td>0.83</td>
<td>5.29</td>
</tr>
<tr>
<td>31.2 pounds per acre</td>
<td>35.7</td>
<td>9.8</td>
<td>11.76</td>
<td>1.66</td>
<td>10.10</td>
</tr>
<tr>
<td>62.5 pounds per acre</td>
<td>35.3</td>
<td>9.4</td>
<td>11.28</td>
<td>3.31</td>
<td>7.97</td>
</tr>
<tr>
<td>125 pounds per acre</td>
<td>43.3</td>
<td>17.4</td>
<td>20.88</td>
<td>6.62</td>
<td>14.26</td>
</tr>
</tbody>
</table>

*Wheat valued at $1.20 per bushel.

**Ammonium sulfate and sodium nitrate valued at $2.70 per ton, F.O.B. Salt Lake.

Note: Sodium nitrate contains 16 percent nitrogen, ammonium sulfate 20 percent.