OPPORTUNITIES for expanded service by the College have developed during the past few years. These have come about through cooperation with the United States government in its technical assistance program to aid the underdeveloped nations of the world.

On June 26, 1951, President Louis L. Madsen signed an agreement between the Utah State Agricultural College and the U.S. Government for cooperation in an agricultural development program in Iran to increase food production and agricultural efficiency there. Under this agreement the College will make available in Iran qualified persons in the various fields of agricultural development, education, research, and extension to develop a progressive agricultural economy in Iran.

There has been a growing recognition of the need for helping the underdeveloped nations to produce more food, to improve the nutrition, health, and sanitation of their people, and to improve and expand their educational programs. The opinion is shared by the leaders of our nation that this is our first line of defense against communism and the most effective procedure to follow in maintaining the independence and freedom of the peoples of the world.

DR. WALKER, director of the Agricultural Experiment Station and dean of the School of Agriculture, has responsibility for coordinating relations between the College and the federal government in the technical assistance program.

The Point Four Program

In his second inaugural address President Truman announced what has come to be known as the Point IV program a "bold new program for making the benefits of our scientific advances and industrial progress available for the improvement and growth of underdeveloped areas." He stated that it should be our "aim to help the free peoples of the world, through their own efforts, to produce more food, more clothing, more materials for housing, and more mechanical power to lighten their burdens."

Land-Grant Institutions Cooperate

Soon after this announcement the executive committee of the Land-Grant Colleges and Universities sent a message to the President in which they offered the cooperation of the land-grant colleges in this program. They pointed out the important role these institutions have played in the economic development of this country, and then expressed the belief that it is this type of program that will be most effective in strengthening the underdeveloped countries. Officials of the federal government have accepted this assistance and have given to the land-grant institutions a share of responsibility for planning and executing the Point IV program.

The work of the land-grant institutions in this program is in five related but distinct fields. First, the training of Americans to go abroad as agricultural specialists; second, the training of foreign students in America; third, cooperation with federal agencies in sponsoring visits of foreign nationals in this country; fourth, the lending of staff members to serve on missions in foreign lands; and fifth, the operation by individual land-grant institutions of projects in other countries in cooperation with the governments or educational institutions in these countries.

Training American Students to Serve Abroad

Within the past year many land-grant institutions have outlined courses to fit students for foreign agricultural service. During the summer session at Utah State three specialists from the State Department and the Office of Foreign Agricultural Relations gave courses designed to help fit students for foreign service.

Training of Foreign Students

An ever increasing number of foreign students and visitors are coming to the land-grant colleges to learn about our agriculture. During the past year there were 3041 foreign students in the United States and 371 of these were in Utah colleges. Since the war 775 foreign nationals have come from 27 countries to study our agriculture. Some 400 young farmers from European countries have been living on farms of America for a six months' period this year. Ten of these have been living with farm families in Utah. Many agricultural

(Continued on page 62)
FERTILIZERS FOR DRY LAND WHEAT

By HOWARD B. PETERSON

THE results of experiments with commercial fertilizers on dry land winter wheat for the period of 1942-50 support the following conclusions:

1. Commercial nitrogen when applied to winter wheat increases the yield, the protein content, or both.
2. There were no significant decreases in either yield or protein content of winter wheat as a result of fertilizer treatments.
3. Whenever an increase in protein was obtained, there was a decided decrease in the yellow berry content.
4. Forty pounds of nitrogen per acre proved the most profitable rate of application.
5. Weight per bushel of wheat was seldom increased.
6. Whenever differences in yield were obtained, the nitrate form of nitrogen fertilizer was slightly better than the ammonia.
7. In the northern part of the state early spring applications in the crop year were usually better than fall applications. At Nephi spring and fall applications were usually equally effective.
8. There was no crop response to phosphate.
9. The rainfall in northern Utah has been above normal during most of the period of these studies. The time and amount of rainfall seem significantly related to fertilizer response.
Survival of Wheatgrasses on Sagebrush Range Depends on Methods of Seeding as Well as Weather Conditions

By C. WAYNE COOK and L. A. STODDART

Improving sagebrush ranges through seeding has attracted considerable attention among farmers and ranchers of Utah. Demands for more information relative to species adapted and methods of seeding are constantly increasing. Livestock operators are aware that seeding, properly done, yields satisfactory stands, while haphazard seeding is a waste of time and money.

Perennial grasses seeded in dense sagebrush or Junegrass have little opportunity of becoming established. On land of level topography, free from rock and, hence, tillable, it is possible to eliminate these competing plants by large machinery. Such operations are limited to tillable land and frequently are costly for arid

Dr. COOK is associate professor and Dr. STODDART, professor and head of the Department of Range Management.

Cattle gazing range reseeded from sagebrush to wheatgrass

Results from Drilling

During the years 1947 to 1949 a seeding study was made on sagebrush land near Benmore, Utah. Three recently introduced species of wheatgrass, tall wheatgrass (Agropyron elongatum), intermediate wheatgrass, (Agropyron intermedium), and stiff-hair wheatgrass (Agropyron trichophorum) were compared to crested wheatgrass (Agropyron cristatum). Plantings were made in the fall (September) and early spring (April) and by broadcasting following various methods of soil treatment. All seeding was adjusted so that the same number of mature seeds was used for each species under each treatment. Seeding intensity was based on the number of seeds in 5 pounds of crested wheatgrass per acre which required 8.7 pounds of intermediate wheatgrass, 10.5 pounds of stiff-hair wheatgrass, and 11.1 pounds of tall wheatgrass.

In all species, seeding done with a drill in the spring produced more than four times more seedlings than fall seeding from the same number of viable seed. However, average survival from the fall plantings was 40 percent, compared to spring survival of only 11 percent. Earlier germination and growth from fall seeding produced a larger and more vigorous seedling previous to summer drought than spring seeding. Survival was influenced directly by size and vigor of plants at the beginning of summer dormancy brought about by hot and dry weather. Although the percent of survival of individuals was greater on plots planted in the fall, the higher emergence success on the spring planted plots resulted in slightly higher numbers of seedlings actually becoming established from the spring plantings (table 1).

All species gave about the same percent emergence and survival. An average of about 11 percent of the viable seed produced seedlings and only about 26 percent of these were still alive at the end of the second year. Thus, under good soil preparation and planting methods only (Continued on page 58)
Antibiotics Produce Faster Growth and More Efficient Food Utilization in Poultry

By CARROLL I. DRAPER

THE growth promoting value of antibiotics in the diet of the chick and poult has been well established during the past few years. Chicks and poult grow faster and utilize their feed more efficiently when only 10 grams of this wonder feed is added to a ton of feed.

About two years ago feed manufacturers found that the sludge left from the manufacture of penicillin was an excellent source of the newly discovered vitamin B_12_. They did not realize that this sludge also contained the new growth factor which was later found to be the penicillin left in the residue. Today antibiotics are available commercially for use in poultry and livestock feeds in the form of antibiotic and vitamin B_12_ supplement.

Research work at several commercial laboratories and institutions, including Utah State Agricultural College, has demonstrated that procaine penicillin, aureomycin, terramycin, and bacitracin are growth stimulants. Research has not progressed far enough to determine which one is superior.

Penicillin, aureomycin, and bacitracin have been included in diets fed to chicks and poult in feeding trials at the Utah Station. These antibiotics have been used in rations containing no animal protein as well as in standard diets containing animal protein.

Chicks and poult fed antibiotics grew from 6 to 10 percent faster than those fed diets that did not contain antibiotics. Also less feed was required to produce a pound of gain.

The mortality was low in all tests and did not differ a great deal with the various treatments. Antibiotics added to diets without fish meal gave a greater growth response than when added to rations containing fish meal. However, the diets containing fish meal plus antibiotics were superior to those containing fish meal only.

Antibiotics Most Effective for Chicks and Poults

The greatest growth response in chicks and poult is obtained during the first four or five weeks of age. Growth response decreases as the birds grow older and has largely disappeared when the birds are ten to twelve weeks of age.

Research work at several stations has demonstrated that antibiotics have little value in the laying and breeding diets when measured by egg production or hatchability of the eggs.

Field observations in Utah have suggested that high levels of certain antibiotics aid in the control of certain respiratory diseases.

NEW PUBLICATIONS


This bulletin reports the results of a survey of the canning corn enterprise on 58 farms in Cache County. It analyzes the man-labor requirements, the cost of production, the receipts and net returns, factors associated with success, and the use of mechanical harvesters. Yields per acre and the use of mechanical equipment were found to be important facts contributing to high net returns.


The irrigation and drainage facilities of the Cub River area are described in this bulletin. A consolidation of these enterprises is suggested so that the land area can be more efficiently drained and the productive capacity of the land increased.

How Do Antibiotics Work?

The exact way antibiotics work is not definitely known. Several theories have been suggested. Evidence seems to be slowly accumulating to support the idea that the increased rate of growth is brought about by the action of antibiotics upon the microflora of the intestinal tract. Their action seems either to destroy harmful bacteria or make conditions favorable for the increase in numbers of helpful bacteria.

The destructive theory is based on the assumption that the bird and bacteria in the intestinal flora compete with each other for the feed nutrients. The antibiotic reduces the number of intestinal bacteria which leaves all the feed nutrients to be used by the bird.

The theory suggesting an increase in helpful bacteria suggests that certain bacteria secrete unidentified growth factors which are used by the bird for growth. Still another theory postulates that antibiotics are used directly in the body processes. While evidence is accumulating to prove or disprove these theories, a great deal more research will be necessary to answer the many questions about these newly discovered growth factors.

FARM AND HOME SCIENCE

Published Quarterly by the Agricultural Experiment Station Utah State Agricultural College Logan, Utah

R. H. WALKER, Director

GLADYS L. HARRISON, Editor

Address correspondence regarding material appearing in these columns either to the editor or to the author.

More detailed information on the subjects discussed here can often be found in Station bulletins and circulars or may be had through correspondence.
Studies give answers to some of the questions on the

Toxicity of DDT and Methoxychlor

CLYDE BIDDULPH, D. A. GREENWOOD, L. E. HARRIS,
C. I. DRAPER, G. Q. BATEMAN, L. L. MADSEN, WAYNE BINNS,
M. L. MINER, C. L. SORENSON and F. V. LIEBERMAN

Investigators in Utah and
other areas have shown that in
the production of alfalfa seed, alfalfa
weevil and lygus bugs are effectively
controlled by the application of DDT
to the alfalfa. The great increase in
alfalfa seed yields, resulting from the
use of DDT, has stimulated widespread interest in its possible use in
alfalfa hay production.

In order to obtain data upon which
to make safe insect control recommendations, investigations were be­
gun in the spring of 1947 to deter­
mine whether residual quantities of
DDT on alfalfa hay caused any toxic
effect when such hay was fed to
lambs, dairy cattle, swine, chickens,
and turkeys. Furthermore, tissues of
lambs and swine, and butter from
dairy cattle that consumed DDT­
treated hay were fed to rats.

All experiments were planned and
carried out so as to duplicate as
nearly as possible procedures that
might be used by farmers in dusting

(Continued on page 55)
A condition characterized by a swollen brisket has been affecting cattle of all ages in southeastern Utah for more than 25 years. The seriousness of this disease was brought to the attention of the Utah Agricultural Experiment Station by the county agent and cattlemen of Wayne County about two and a half years ago.

The disease seems to be most prevalent during the months of August and September among animals grazing on the summer range, although a few animals that have never been on the range have been affected in pastures in Loa Valley. Affected animals are usually noticed standing away from the rest of the herd. They have a rough hair coat, usually a greatly distended abdomen caused by an accumulation of fluid, and frequently a profuse diarrhea. Yearlings and older cattle frequently have a swollen brisket. The swelling or edema may extend up the neck and also be present in the throat region.

Calves do not swell in the brisket region as much as older cattle, but they may have some swelling in the area.

Cooperation among the Wayne County cattlemen, the county agent, the U. S. Forest Service, and the Agricultural Experiment Station has made this research possible. Don Brian, Wayne County cattleman, left, and La Zone Bagley, county agent, discuss plans for supplemental feeding.
Affected calves usually breathe hard and fast, have a severe diarrhea, drool saliva, lose weight rapidly, and have a rough hair coat. Forced driving of the affected animals often proves fatal. On several occasions affected animals have apparently recovered when taken to the home ranch in Loa Valley, but when taken to the range the following year they never survive.

Experiments have been under way for two years to determine how to prevent this disease. This year 100 animals were divided at random into two groups. All these animals are being pastured together in a section of land in U. M. Valley. Half the animals serve as controls and receive only range forage. The other half are being drenched individually twice a week with a solution containing mineral salts in an attempt to determine if the disease is caused by a mineral deficiency.

Two 20 acre pastures, one in U. M. Valley, and one in Seven-Mile Valley, have been fenced to hold sick animals after they contract the disease. These animals will receive the following treatments at random as they are brought to the pastures: (1) range forage, (2) fertilized hay from Cache Valley, Utah, (3) trace minerals, and (4) trace minerals plus fertilized hay from Cache Valley.

Another phase of the experiment consists of feeding bone meal, salt, and range pasture to approximately 700 head of cattle in U. M. Valley, and feeding bone meal, salt, and trace minerals to approximately 1,000 cattle in Seven-Mile Valley. In addition several creeps have been constructed in Seven-Mile Valley, and within each is placed bone meal, salt, trace minerals, and a protein concentrate containing trace minerals.

Range plants from U. M. Valley and Seven-Mile Valley and also forage samples from Loa Valley are being analyzed for trace minerals and other constituents to determine whether they are low in certain nutrients. It is hoped by these procedures to determine if brisket disease is caused from a nutritional deficiency.

At present, however, the cause of the disease is not known, nor how to prevent or cure it. Consequently no recommendations for practical treatment can be given. Ranchers should know that the Agricultural Experiment Station has not at this time recommended mineral mixtures or other materials to prevent brisket disease.
Supplementary Feeding of Range Sheep Pays Dividends

By ERNEST H. WHITCOMB, LORIN E. HARRIS, C. WAYNE COOK and DAVID O. WILLIAMSON

A

N EXPERIMENT has just been completed involving the feeding of various kinds of supplements to ewes on the range during the winters of 1948-49 and 1949-50. The ewes were grazed in Wah Wah and Pine Valleys west of Milford, Utah, from December to the latter part of April.

Determination of the nutritive content of the range forage consumed by sheep in this area indicated a deficiency of phosphorus, protein, and total digestible nutrients (energy). In view of these deficiencies it was believed desirable to see whether the production of range ewes would be increased by feeding supplements that would furnish these nutrients.

Ernest H. Whitcomb, a graduate student in animal husbandry, collected part of the data reported here for his master's thesis. Dr. Harris is professor of animal husbandry and Dr. Cook associate professor of range management. Mr. Williamson, research assistant, did the chemical analysis. The following organizations have furnished funds or facilities for the investigations: American Dehydrators Association, Desert Range Experiment Station of the Intermountain Forest and Range Experiment Station, Farmers Grain Cooperative, International Minerals and Chemical Corporation, Stieff and Company, Wilford Wintch.

The results measured on gain in weight, wool production, and lamb crop.

During the winters of each year ewes of each of six age groups including lambs to ewes over six years old, or a total of 162 ewes, were assigned by chance to 27 treatments. These treatments consisted of three levels of three supplemental feeds in all combinations: barley for energy, monosodium phosphate for phosphorus, and soybean oil meal for protein.

The supplements were fed every other morning to ewes individually during the period they were grazing on the winter range. The three levels of barley or soybean oil meal fed were zero, 0.28, and 0.56 pound; and the three levels of monosodium phosphate were zero, 0.46, and 0.60 ounce.

In addition to the ewes fed in the treatments described above, 36 other ewes, six of each age class, received only range forage.

Body Weight Changes

The sheep fed supplements maintained their weight throughout the winter better than the ewes receiving only range forage. Increasing amounts of barley and soybean oil meal prevented excessive weight losses, but in each case the larger amount of supplement did not produce signifi-
Fig. 1. Accumulative body weight gains made by ewes from November 20 to May 15 when fed three levels of barley significantly better results than the smaller amount (figs. 1 and 2).

Ewes fed monosodium phosphate at the rate of 0.46 ounce showed less weight losses than the ewes fed 0.60 ounce. These results show that phosphorus should be fed at an optimum level, and it is possible to feed too much (fig. 3).

Supplements Increase Wool Production

The clean weight of the wool produced by the ewes that were fed supplements averaged 3.70 pounds, compared to 3.41 pounds for sheep receiving only range forage.

Monosodium phosphate fed at the rate of 0.46 ounce produced 3.83 pounds of clean wool, while the sheep fed no monosodium phosphate produced 3.70 pounds, and those fed 0.60 ounce produced only 3.66 pounds of clean wool. These results show again that an optimum amount of phosphorus is necessary for high production.

Monosodium phosphate fed at the rate of 0.46 ounce, plus soybean oil meal at the rate of 0.28 pound resulted in the largest increase in clean wool production. This combination of supplements produced 3.96 pounds of clean wool while the sheep receiving range forage produced only 3.41 pounds.

These facts show that phosphorus and protein should be fed in the correct ratios and amounts to produce the maximum amount of wool.

Sheep are watered every other day

Supplemental feeding increased the grease wool of each ewe about 1 pound and the clean wool about 0.4 pound.
A Continuous Supply of Soil Moisture to the Growing Crop Gives Highest Yield

By STERLING A. TAYLOR

EXPERIMENTS conducted at the Utah Agricultural Experiment Station indicate that substantial increases in yield can be obtained by supplying the right amount of irrigation water to the soil before the crop shows signs of moisture depletion. A common irrigation practice is to apply large amounts of water in the spring when the supply is plentiful and to apply smaller, often insufficient, amounts later in the summer when the demand for water is high and the supply is often limited. As a result of inadequate water supply in some areas, it may not always be possible to supply the necessary water for maximum plant growth, particularly during the summer and fall months. In a large number of situations, however, better use could be made of the available water. In many areas there is sufficient water even in the hottest weather of summer if it is judiciously used.

The application of excessive water in the spring is frequently harmful to the soil and the growing crop. If deep percolation takes place valuable plant nutrients are leached from the soil and can only be replaced by fertilizer additions.

Ventilation of the Soil is Essential

Plants living and growing in soil use oxygen and produce carbon dioxide as a waste product. Plants are unable to breathe as higher animals do, consequently, each portion of the plant expels carbon dioxide and takes up oxygen from its immediate surroundings. With the exception of a few plants that grow with roots under water such as rice, it is not possible for plant roots to get oxygen from the part of the plant that grows in air. The roots therefore must receive oxygen from and expel carbon dioxide into the soil atmosphere. The carbon dioxide expelled from plant roots must then move out into the air above and the oxygen move from the air into the soil.

Excessive irrigation in the spring when soil is already moist may fill up many of the pore spaces and cause gaseous exchange to be inadequate. This may be particularly true on soils that have a high water table, an impervious layer, or a fine texture such as clay. Crops grown on soils that are not adequately aerated will frequently show yellowing of the leaves and stunted growth, symptoms that are similar to nitrogen deficiency. Although these same symptoms may be caused by other factors most of the...
yellowing on wet cold lands in the spring can be attributed to inadequate aeration. Yields may be adversely affected, however, even though yellowing does not appear.

Soil Moisture Tension Should Not Go Below 0.3 Atmospheres

Water is held in the soil by forces that arise in and between particles. If water is allowed to drain into dry soil beneath, it will move out of the wet soil until it is held in the soil with a tension of about 0.3 to 0.4 atmospheres. One atmosphere tension is 14.7 pounds per square inch of suction. If the tension is lower than this value for considerable periods of time, the soil will be inadequately aerated and crop growth will be retarded.

The tension is always zero at the water table and increases progressively with distance above the water table. In many soils the tension will read 0.3 atmospheres within a few inches above the water table, but in some soils that are inadequately drained or that contain slowly permeable layers, the tension may remain below 0.3 atmospheres almost to the surface for considerable periods of time after applications of excessive irrigation water. The soil moisture tension should therefore not be allowed to become lower than 0.3 atmospheres, except for short periods of time after irrigation. If tension measuring devices are not available, the moisture content at 0.3 atmospheres can be estimated from the amount of water held in a soil after 24 hours of free drainage into drier soil beneath. Excessive applications of water on moist soils may raise the water content above this value and should be avoided.

Crop Growth is Best if Tension is Kept Low

At the Logan Experimental Farm, crops (in a rotation of barley, two years of alfalfa, potatoes, and sugar beets) have been irrigated when the soil moisture tension dried to certain preassigned values. Crops on the driest treatment were irrigated when nearly all of the water available to the plant had been used as indicated by moisture tension devices. The crops on the next driest treatment were irrigated when two-thirds the available water in the root zone had been used as indicated by moisture tension. Crops on the medium wet treatment were irrigated when one-third the available water in the root zone had been used. The wettest plot was kept as near 0.3 atmosphere tension as possible. Tensiometers and plaster resistance blocks were placed in the soil at various depth intervals to indicate the soil moisture tension at all times. These devices were used to indicate the time of irrigation. Whenever water was applied precautions were taken to apply just the right amount to bring the entire soil profile to a moisture tension of 0.3 atmospheres. In this way excessive losses from deep percolation were avoided. Dry layers in the lower

MOISTURE AND CROP YIELDS

Vegetative growth of sugar beets, potatoes, and alfalfa is inhibited before the moisture is reduced in the soil to a point that the crop shows visible symptoms of wilting or color change. Devices for measuring soil moisture such as tensiometers and resistance blocks are of value in indicating the soil moisture tension. Results of experiments indicate that crops should be irrigated before the moisture in the root zone reaches 4 atmospheres of tension.

If moisture measuring devices are not available, crops should be irrigated when plants either noticeably wilt on hot days or turn a dark green color which indicates soil moisture stress. Crops producing highest yields did not noticeably wilt even on the hottest days of the summer.
Juvenile Detention Facilities Inadequate in Rural Utah

By DON C. CARTER

WHEN children are placed in detention in the rural counties of Utah, they are held in places where the physical and social conditions are such that the experience is a damaging, injurious one, instead of a constructive part of treatment provided by society to promote their rehabilitation. This situation is contrary to the intent of the law in Utah. It is more serious in rural areas than in the metropolitan centers. It is at variance with prevailing Christian and ethical concepts of helping children to become constructive participants in society, and with existing knowledge concerning causes of misbehavior and methods of rehabilitation.

These conclusions are based upon a study of detention in Utah which revealed that approximately 750 to 1000 children a year are held in detention for periods of time which range from overnight to several weeks. The basic and most generally available facility for the care of these children, some of whom are as young as eight and nine years of age, is the county jail. Counties in Utah comprising more than half of the area of the state, in the rural areas particularly, are inadequately equipped even to comply with the law regarding the detention of children under sixteen, which states:

Children under the age of sixteen years . . . shall not be confined in the jails, lockups or police cells . . . It shall be the duty of municipalities and counties to make provision for such children . . . either by arrangement with some person or society . . . or by providing suitable premises entirely distinct and separate from the ordinary jails, lockups or police cells. (Utah Code Annotated 14-7-48)

Nevertheless, in most counties children of all ages, for whom detention is necessary, are held in the local jails simply because there is no other place available for use. Juvenile court officials in more than half the state are handicapped in their efforts to serve the needs of children, and of the community, because of this serious lack of available resources needed to carry forward an effective program of rehabilitation. Even in
the metropolitan centers, where the larger numbers of children are detained outside of jails, there is need for improved services.

Utahns, who may have felt some pride in the recognition afforded their state for the development of other excellent services for children, may learn with some surprise and indignation that children in most communities must be detained in jails intended for the incarceration of adults. Despite the laudable record of change and growth to provide better services and treatment in other aspects of the juvenile court program, there have been no successful improvements in the overall plan for detaining children in Utah since the establishment of the first juvenile courts in this state in 1905.

Development of the Juvenile Courts

When the first juvenile courts in Utah were established, they were local courts, serving only cities of the first and second class (Salt Lake City and Ogden). Detention, also, was originally a responsibility of local government, and has remained so. The juvenile court, however, has been expanded and modified to provide more equal services for children in all areas of the state. Developing from a recognition that each small county could not afford and did not need a full-time probation officer, there has evolved in Utah a state juvenile court service with probation officers stationed in strategic locations where they can serve a part of a county, or several counties, depending on the need. Utah was the first state to develop this type of program as a means of providing better juvenile court services for rural areas.

Right, detention room, Weber County. Urban detention quarters are sanitary and supervised. While inadequate in some respects they are superior to most rural quarters.

Right, exterior and interior views of Cache County detention home. This type of facility promotes opportunities for effective rehabilitation.

Other states are now adopting similar plans to enable them to extend improved social services to rural counties with limited population.

Development of Detention Facilities Has Lagged

Responsibility for juvenile detention, however, has not developed in the same direction. Consequently, in a state system for the administration of the juvenile court and probation services, detention has lagged behind and grown progressively more out of step as other phases of the juvenile court have improved with the development of centralized administration. Detention, as a phase of treatment of children with problems, has remained static in almost all communities of the state, without improvement since the inception of the program almost a half century ago.

The cause for this situation appears to be the fact that each county is responsible for providing detention quarters for the children in its area. All counties have a need for some detention, but not all of them need a detention home. The situation is similar to that which gave rise to the state administered juvenile court system in which it became clear that each county did not need a probation officer, while some counties needed a large staff. To expect each rural county in Utah to provide a detention home, with a supervisor and other important requisites, would be placing an impossible financial burden upon these counties entirely out of proportion to the need for the service. Yet, the result, as long as each county is individually responsible, has been to provide nothing better than the outmoded county jail, the use of which is usually destructive and harmful, and tends to prevent rather than promote the rehabilitation of the child.

Problem of Detention

The problem of detention of children cannot be dismissed lightly. It is a necessary part of the juvenile court function. But too often there is a failure to recognize that children are detained at a point of crisis in their lives when they are confused and impressionable. They can be seriously damaged emotionally by their resentment of detention and the nature of their experiences in this situation. Too often the attitude of the public is that a damaging experience like being locked in jail is "just what they deserve." The weakness of this position, however, is the failure to recognize that what children deserve may be quite different from what will be effective in aiding in rehabilitation or correction. They may "deserve" this kind of treatment, but to provide experiences of this kind may only make them more hostile and resentful, and thus retard, rather than promote, their favorable adjustment in society. The child who

(Continued on page 60)
The production of canning tomatoes is a relatively profitable enterprise for farmers in areas where the crop can be grown and marketed and when good cultural practices and sound management are used. The net returns to tomato producers in Davis and Weber Counties for the two-year period 1948-49 averaged $34.53 per acre or $2.36 per ton.

A two-year study of the economics of tomato production was made in Davis and Weber Counties, covering the 1948 and 1949 crop years. One hundred and seventy-nine fields were included in the study.

Net returns from the enterprise averaged $315.51 per acre or $21.47 per ton of tomatoes. Net returns as here used is the total of receipts minus all costs to the tomato enterprise. The receipts included the amount paid the grower for the tomatoes plus any miscellaneous items such as insurance collected for damage to the crops, delivery allowances where such existed, and the estimated value of the crop residue as livestock feed or fertilizer.

Costs averaged $281 per acre or $19.11 per ton, which was equal to 89 percent of the receipts. They included the purchase price of plants, fertilizers, insecticides, and rent on boxes, plus charges at the customary community level allowed for all labor, machinery, land, water, barnyard manure, and any other miscellaneous items. Man-labor, compensated at the rate of $.93 per hour, amounted to 56 percent of the total expense. Plants, interest on fixed and working capital, and mechanical power were other important items of cost. Each of these amounted to about 10 percent of the total. The costs classified as overhead, including interest and taxes, were larger than the cost of materials used, including plants, or the entire cost of power (table 1).

The level of costs in 1949 was 3 percent higher than in 1948, but on a ton basis, the costs were lower in 1949 by 4 percent because of greater yields per acre.

Inasmuch as the costs included the labor of the operator and members of his family, net returns do not measure what the enterprise returned to the family to enable it to live or save. When the family labor is added to the net return, the amount is $101 per acre or 32 percent of the gross receipts. This amount, on the average, would be available for family use. If the growers were out of debt and owned their land and equipment, then the charges made for interest would also be available for family living or saving. The average interest charge per acre was $26.80. No information was obtained on the amount of interest actually paid for use of borrowed capital.

Factors Influencing Net Returns

The net returns from tomato production are the result of a large number of factors, some of which affect the receipts and some of which affect the expenses. Of the factors that can be directly studied, yields per acre were most closely associated with net returns. As yields increased, net returns also increased. Efficient use of man-labor as measured by hours spent per acre also increased the net returns. As the size of fields increased,
Table 1. Total receipts, costs, and net returns from tomato production, Davis and Weber Counties, 1948-1949

<table>
<thead>
<tr>
<th>Item</th>
<th>Per acre</th>
<th>Per ton</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total receipts</td>
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<td>$21.47</td>
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<tr>
<td>Cost of production materials</td>
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<td>$2.82</td>
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<tr>
<td>Overhead</td>
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<tr>
<td>Total costs</td>
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<td>$13.11</td>
</tr>
<tr>
<td>Net return</td>
<td>$35</td>
<td>$2.36</td>
</tr>
<tr>
<td>Net returns plus family labor</td>
<td>$101</td>
<td>$6.87</td>
</tr>
<tr>
<td>Total return plus interest</td>
<td>$128</td>
<td>$8.70</td>
</tr>
</tbody>
</table>

the labor requirements and power requirements per acre tended to be reduced, which reduced total costs and increased net returns. A high proportion of tomatoes in the top grade also increased net returns, although the proportion of tomatoes that graded no. 1 was not found to be associated closely with any other factor.

There was a considerable variation among growers in the net returns per farm, per acre, and per ton. The number of acres grown influenced the return per farm. The variation was from a loss of $1353 to a gain of $2437. Of the 131 growers involved in the 2-year study, 51 had a minimum return, or expressed in another way, they did not earn the current rate of interest on their capital and the current wages for their labor.

Expressed as net returns per acre, the variation was also wide. Sixteen growers had minus net returns of more than $75 per acre, while 14 producers had plus net returns in excess of $150 per acre. When net returns were calculated on a per-ton basis, the proportionate variation was even greater.

Factors Influencing Yields

On the basis of the two years' study there seems to be some important relationships that have a bearing on yields. Among these are: (1) Early planting tends to increase yields; (2) Tomatoes following alfalfa in a rotation increased yields, while the poorest yields were obtained when tomatoes followed tomatoes; (3) While all the classes of soil occurring in the fields studied were good soils, loam and clay soils yielded slightly more than the light sandy soils; (4) In general, tomatoes responded to applications of commercial fertilizers when applied alone or in connection with barnyard manure; (5) The Moscow variety of tomatoes was the most extensively used and showed the highest yield; (6) Between the limits of 3500 and 4500 plants per acre, the number of plants had little if any effect on yields; (7) The proper number of times to irrigate and cultivate cannot be stated with certainty, but the data strongly indicate that some fields were irrigated and cultivated more than necessary for the highest yields and greatest net returns; (8) While the most successful producers are not the same year after year, the chances are about two out of three that the producer making the highest profits one year will be among those making the highest profits the next year, or he will be among the group 2 out of each 3 years.

TOXICITY OF DDT

(Continued from page 45)

the same as used by farmers of this area.

Feeding of DDT-Dusted Hay to Lambs

Plots of alfalfa were dusted with 1, 2, and 4 pounds of technical DDT per acre. This alfalfa, as well as alfalfa from untreated plots, was harvested and fed to lambs. Untreated alfalfa hay was also fed to lambs along with DDT in capsules at the following amounts in parts per million (ppm) of hay: 0, 50, 100, and 200. The lambs were fed half hay and half grain. Eight lambs were fed each level of DDT-dusted hay and DDT in capsules for 112 days. Thus a total of 64 lambs were used.

The average DDT residue on the alfalfa hay was 0, 15, 22, and 42 ppm when 0, 1, 2, and 4 pounds of DDT were applied per acre.

There were no significant differences in rate of gain in body weight, total gain, or feed consumption of the lambs.

The average amount of DDT present in the mesenteric and kidney fat was 1.9, 15.8, 18.2, and 44.2 ppm in the lambs consuming alfalfa hay dusted with 0, 1, 2, and 4 pounds of DDT per acre, respectively, and 0, 19.6, 32.1, and 73.4 ppm in the fat of lambs receiving capsules containing 0, 50, 100, and 200 ppm DDT.

The average amount of DDT in muscle, liver, kidney, and brain varied from 0 to 1.7 ppm.

There were no gross or histopathological changes in liver, gall bladder, kidney, cerebrum, cerebellum, medul-

For September 1951

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la oblongata, hind and fore leg muscle, or thyroid of the DDT-treated animals.

Feeding Lamb Tissue to Rats

Weanling rats were fed diets containing 22 percent lamb fat and 65 percent lamb leg from the lambs described above. One rat was fed the fat from each lamb, making eight replications of rats as far as DDT level was concerned, and a total of 64 rats in all. The period of feeding was 16 weeks.

The rats gained at a normal rate and showed no gross pathology or microscopic changes in liver or kidney. The amount of DDT in the fat of the rats fed lamb fat (lamb consumed DDT-dusted alfalfa hay) varied from 14 to 95 ppm, and in rats fed lamb leg (lamb consumed DDT-dusted hay) the amount of DDT varied from 55 to 101 ppm. In those rats fed lamb fat from lambs receiving DDT in capsules, the amount of DDT varied from 10 to 100 ppm, and in those fed lamb legs from capsules fed lambs the amount of DDT varied from 35 to 144 ppm.

DDT in Milk and Tissues of Dairy Cows Fed DDT-Dusted Alfalfa Hay

Sixteen dairy cows were fed hay dusted with 0, 0.5, 1, 2, and 4 pounds of technical DDT per acre for a period of 51 to 113 days. The DDT residue on the hay varied from 0 to 36 ppm.

DDT appeared in the milk promptly after the cows consumed DDT-dusted hay. The concentration gradually increased until maximum amounts of 0, 2.2, 3.8, 7.2, and 12.5 ppm of DDT were obtained in the milk of cows consuming hay dusted with 0, 0.5, 1.2, and 4 pounds of DDT per acre, respectively.

DDT persisted in the milk at low levels (less than 1 ppm) for four months after the feeding of the DDT-dusted hay was discontinued. It disappeared completely by 6.5 months after discontinuing the feeding of dusted hay. Four cows had DDT in their milk at the end of their lactation period, and, after calving, traces of DDT were still present.

No DDT was found in the blood of the cows before they were placed on the DDT-dusted hay. A maximum of 0.2 ppm DDT was present in the blood at the close of the feeding period.

Four cows were slaughtered and the tissues were analyzed for DDT. The analysis showed a maximum of 89 ppm in mesenteric fat, 90 ppm in kidney fat, 1.1 ppm in the liver, 1.3 ppm in muscle, and 0.1 ppm in the kidney. The greatest amount of DDT was present in the tissues of cows consuming the hay dusted with the higher levels of DDT.

The ingested DDT did not affect milk or butterfat production or feed consumption of the cows.

There was no gross or microscopic pathology in the liver or kidney of the cows after consuming the DDT-dusted hay.

Cream from each cow was churned and the butter was fed to rats for 16 weeks. The butter made up 22 percent of the diet and contained 12, 46, 69, 107, and 188 ppm DDT, respectively. The body fat of the hens contained 2.5, 2.8, and 6.4 ppm methoxychlor. The amount of DDT found in the body fat of the rats varied from 3.4 to 32.1 ppm after consuming diets containing swine fat, from 6.0 to 35.9 ppm after consuming swine shoulder, and from 9.4 to 28.8 ppm after consuming swine bacon.

DDT persisted in the milk of cows for 14 weeks. There was no significant effect of the DDT on gain in body weight or food consumption, and there was no gross pathology or microscopic changes in liver or kidney of the rats. The amount of DDT in swine fat varied from 0 to 15.3 ppm, in the shoulder from 0.3 to 8.7 ppm, and in the bacon from 0.3 to 11.2 ppm. The amount of DDT found in the body fat of the rats varied from 7.4 to 32.1 ppm after consuming diets containing swine fat, from 6.0 to 35.9 ppm after consuming swine shoulder, and from 9.4 to 28.8 ppm after consuming swine bacon.

Feeding Methoxychlor Dusted Hay to Dairy Cows

Methoxychlor was added to a mash containing DDT at levels of 0, 1, 2, and 4 pounds of DDT per acre. The mash was fed to cows as described above. The average DDT content of the eggs was 2.5, 2.8, and 6.4 ppm when the hay had been dusted with 1, 2, and 4 pounds of DDT per acre. DDT was also added to a mash containing undusted alfalfa at levels of 0, 50, 100, and 200 ppm DDT. The hens were fed 50 percent of the above mash and 50 percent of a grain mixture.

The average DDT content of the eggs was 2.5, 2.8, and 6.4 ppm when the hay had been dusted with 1, 2, and 4 pounds of DDT per acre. DDT was also added to a mash containing undusted alfalfa meal at levels of 0, 50, 100, and 200 ppm DDT. The hens were fed 50 percent of the above mash and 50 percent of a grain mixture.

The average DDT content of the eggs was 2.5, 2.8, and 6.4 ppm when the hay had been dusted with 1, 2, and 4 pounds of DDT per acre. DDT was also added to a mash containing undusted alfalfa meal at levels of 0, 50, 100, and 200 ppm DDT. The hens were fed 50 percent of the above mash and 50 percent of a grain mixture.

Effect of Feeding DDT-Dusted Alfalfa to Swine and of Feeding the Swine Tissues to Rats

Twenty-four male and twenty-four female weanling pigs were fed undusted and DDT-dusted hay in their diets at the following percentage levels: 0, 3, 6, 9, 12, 15, 18, 21, 24, 30, and 33. The alfalfa was dusted in the field at the rate of 2 pounds of technical DDT per acre, and the hay had a residue of 23 ppm of DDT. The pigs were fed until they reached market weight (approximately 210 pounds) or from 114 to 164 days. DDT did not affect the body weight gain, and there was no gross pathology or microscopic changes in liver or kidney of the pigs.

Rats were fed raw fat, cured bacon, and cured shoulder from the pigs for 14 weeks. There was no significant effect of the DDT on gain in body weight or food consumption, and there was no gross pathology or microscopic changes in liver or kidney of the rats. The amount of DDT in swine fat varied from 0 to 15.3 ppm, in the shoulder from 0.3 to 8.7 ppm, and in the bacon from 0.3 to 11.2 ppm. The amount of DDT found in the body fat of the rats varied from 7.4 to 32.1 ppm after consuming diets containing swine fat, from 6.0 to 35.9 ppm after consuming swine shoulder, and from 9.4 to 28.8 ppm after consuming swine bacon.

(Continued on page 64)

Farm and Home Science
Studies on Panguitch Experimental Farm Helpful to Farmers in High Mountain Valleys

By REX NIELSON

THE area around Panguitch in Garfield County with an elevation of 6,700 feet is typical of conditions in many mountain valleys of high altitude in the state. There is an average growing season of only 83 days, and summer frosts are not uncommon. Irrigation water is usually plentiful in the spring but is often scarce during the late summer and fall. Livestock production is the dominant agricultural enterprise and feed supply is the greatest limiting factor in farm income.

In 1909 the United States government transferred title of a former Indian school farm near Panguitch to the State of Utah. Two years later, the state legislature set the farm apart for experimental work by the Utah Agricultural Experiment Station. Some livestock and pasture investigations were conducted on the farm between 1920 and 1932. Following a drastic reduction in state appropriations during the depression, the farm was leased to private operators. Now increasing use is being made of the farm for experimental purposes.

Studies made on the Panguitch Farm and on other farms in the valley show that livestock feed production can be greatly increased in the area by improved farm practices.

Pasture Improvement

Many pastures in Garfield County and other mountain valley areas are native grasses. A common pasture management program has been to flood the pastures intensively, often almost continuously, during the early spring or until water becomes scarce. This flooding has leached the soils of many plant nutrients and has drowned out many of the best legume and grass plants. The water loving plants that endure are generally low yielding and make poor quality feed.

Pasture improvement should consist first in plowing up old native grass and sedge meadows, cropping to grain a year or more to destroy the grass roots, and then reseeding with improved pasture mixtures.

Improved pastures usually respond well to fertilizer treatment. Native grass pastures respond but little, and yields are low. The hay yields from one cutting on two pastures on the Panguitch Farm are shown in table 1.

In the pasture tests fertilizer was applied in the spring of 1949. No additional treatments were made in 1950. The south pasture was principally bluegrass and white Dutch clover. The north pasture contained improved pasture grasses, such as orchard and brome. Nitrogen treatments usually do not increase yields beyond the year of application. That was true in this case. Phosphorus applications increased yields and the effects were more lasting than those of nitrogen. The phosphate also markedly increased the percent of clovers and the percent of phosphorus in the hay.

An eleven acre pasture was seeded in 1949 at the east end of the farm. Some of this area was reseeded in 1950. Water has been extremely limited in 1951. Although yield data were not taken on this pasture, its superiority over native and bluegrass meadows on adjacent farms was clearly evident. The improved pasture with alfalfa, orchard grass, brome grass, and timothy will yield from 1 to 1½ tons of dry hay. The unimproved meadows will yield less than ½ ton per acre.

Alfalfa

More alfalfa should be grown in Garfield County. Even with the short season, alfalfa will generally produce more and better forage than the grass pastures of the area.

The author conducts a field day at the experimental farm
Soils of the area are frequently deficient in phosphorus. This deficiency is strikingly apparent in alfalfa yields. Thirty acres of alfalfa were planted on the Panguitch Farm in the spring of 1949. Phosphate was applied just before planting. An unevenness of growth, with heavy growth at the ends where turns were made with the fertilizer drill, proved that the original phosphate application was not adequate. Strips of concentrated superphosphate at 200 and 400 pounds per acre were drilled through the field in the spring of 1951.

An experimental plot test was made on the same previously fertilized field. The treatments were applied in the spring of 1950. Yields were obtained in 1950 and 1951 and are shown in Table 2.

Cereal Crops

Because of the short, cool growing season, many crops best adapted to the central valleys of the state may not do well near Panguitch. Tests on cereal varieties have been made to select those best adapted. Yield data from these tests indicate that several new varieties being tested may replace the old varieties now grown in the area. Additional tests over a period of years will be necessary before the most reliable high yielding varieties can be selected.

SURVIVAL OF WHEATGRASSES

(Continued from page 43)

brush was eradicated by one of three implements, namely: wheatland plow, tumbling-log harrow, and rail. Plantings were made in the fall and early spring at the same dates as the drilling, and the same four species and seeding intensities were used.

Percentage emergence when all treatments and seasons were consid-

Results from Broadcast Seeding

Previous to broadcast seeding, sage-

Table 1. Average percent of viable seed producing normal seedlings and average survival two years later from four species of wheatgrass seeded by drilling during two seasons

<table>
<thead>
<tr>
<th>Factors studied</th>
<th>Viable seed emerging</th>
<th>Seedlings surviving</th>
<th>Seedlings per sq. ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species</td>
<td>percent</td>
<td>percent</td>
<td>percent</td>
</tr>
<tr>
<td>Crested wheatgrass</td>
<td>8.1</td>
<td>23</td>
<td>.25</td>
</tr>
<tr>
<td>Intermediate wheatgrass</td>
<td>10.7</td>
<td>31</td>
<td>.43</td>
</tr>
<tr>
<td>Stiff-hair wheatgrass</td>
<td>10.3</td>
<td>20</td>
<td>.26</td>
</tr>
<tr>
<td>Tall wheatgrass</td>
<td>15.2</td>
<td>29</td>
<td>.57</td>
</tr>
<tr>
<td>Season</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td>4.3</td>
<td>40</td>
<td>.37</td>
</tr>
<tr>
<td>Spring</td>
<td>18.5</td>
<td>11</td>
<td>.43</td>
</tr>
<tr>
<td>AVERAGE</td>
<td>11.3</td>
<td>26</td>
<td>.39</td>
</tr>
</tbody>
</table>

Table 2. Average percent of viable seed producing normal seedlings and average survival two years later from three methods of sagebrush eradication with seed broadcast before treatment

<table>
<thead>
<tr>
<th>Factors studied</th>
<th>Viable seed emerging</th>
<th>Seedlings surviving</th>
<th>Seedlings per sq. ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species</td>
<td>percent</td>
<td>percent</td>
<td>percent</td>
</tr>
<tr>
<td>Crested wheatgrass</td>
<td>5.0</td>
<td>21.9</td>
<td>.14</td>
</tr>
<tr>
<td>Intermediate wheatgrass</td>
<td>4.2</td>
<td>29.0</td>
<td>.17</td>
</tr>
<tr>
<td>Stiff-hair wheatgrass</td>
<td>3.6</td>
<td>37.6</td>
<td>.17</td>
</tr>
<tr>
<td>Tall wheatgrass</td>
<td>5.0</td>
<td>37.9</td>
<td>.25</td>
</tr>
<tr>
<td>Season</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td>6.3</td>
<td>32.2</td>
<td>.26</td>
</tr>
<tr>
<td>Spring</td>
<td>3.0</td>
<td>29.9</td>
<td>.12</td>
</tr>
<tr>
<td>Brush eradication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tumbling-log harrow</td>
<td>5.1</td>
<td>19.3</td>
<td>.13</td>
</tr>
<tr>
<td>Wheatland plow</td>
<td>4.2</td>
<td>51.7</td>
<td>.28</td>
</tr>
<tr>
<td>Rail</td>
<td>4.5</td>
<td>26.5</td>
<td>.15</td>
</tr>
<tr>
<td>AVERAGE</td>
<td>4.5</td>
<td>31.5</td>
<td>.18</td>
</tr>
</tbody>
</table>

Table 1. The yield of hay (dry basis) in two pastures on the Panguitch Farm

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Rate per acre</th>
<th>Yield</th>
<th>South pasture 1949</th>
<th>North pasture 1949</th>
<th>1950</th>
<th>P in forage 1950</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>pounds</td>
<td>tons/acre</td>
<td>tons/acre</td>
<td>tons/acre</td>
<td>tons/acre</td>
<td>percent</td>
</tr>
<tr>
<td>No treatment</td>
<td>——</td>
<td>1.46</td>
<td>1.30</td>
<td>.72</td>
<td>0.13</td>
<td></td>
</tr>
<tr>
<td>Concentrated superphosphate (P)</td>
<td>200</td>
<td>1.66</td>
<td>1.91</td>
<td>.98</td>
<td>0.21</td>
<td></td>
</tr>
<tr>
<td>Ammonium nitrate (N)</td>
<td>125</td>
<td>1.90*</td>
<td>1.83</td>
<td>.68</td>
<td>0.30</td>
<td></td>
</tr>
<tr>
<td>N plus P</td>
<td>2.16**</td>
<td>2.45*</td>
<td>2.15**</td>
<td>2.03</td>
<td>1.21</td>
<td>0.16</td>
</tr>
<tr>
<td>Farm manure (M)</td>
<td>10 tons</td>
<td>2.15**</td>
<td>3.02*</td>
<td>1.06</td>
<td>0.24</td>
<td></td>
</tr>
</tbody>
</table>

*Yield significantly better than on untreated plots.
**Yield highly significantly better than on untreated plots.

Table 2. The yield and phosphorus content of first crop alfalfa on the Panguitch Farm in relation to fertilizer treatment

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Rate per acre</th>
<th>Yield</th>
<th>Phos. content</th>
<th>1950</th>
<th>1951</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>pounds</td>
<td>tons/acre</td>
<td>percent</td>
<td>tons/acre</td>
<td>percent</td>
</tr>
<tr>
<td>No treatment</td>
<td>——</td>
<td>1.16</td>
<td>.16</td>
<td>0.64</td>
<td></td>
</tr>
<tr>
<td>Concentrated superphosphate (P)</td>
<td>200</td>
<td>1.62</td>
<td>.18</td>
<td>1.70</td>
<td></td>
</tr>
<tr>
<td>Concentrated superphosphate (P)</td>
<td>400</td>
<td>1.46</td>
<td>.18</td>
<td>1.83</td>
<td></td>
</tr>
<tr>
<td>P plus ammonium sulfate (N)</td>
<td>200</td>
<td>1.89</td>
<td>.19</td>
<td>2.10</td>
<td></td>
</tr>
<tr>
<td>P plus N plus muriate of potash</td>
<td>200</td>
<td>1.59</td>
<td>.17</td>
<td>1.68</td>
<td></td>
</tr>
</tbody>
</table>
erated ranged from 3.65 for stiff-hair wheatgrass to 5 percent for crested wheatgrass (table 2). Fall broadcasting gave higher emergence percentages than spring broadcasting. The fall seeding produced 0.26 plants per square-foot area compared to 0.12 for spring seeding (table 2). None of these seedlings was considered satisfactory after two years.

**Seedling Survival and Extent of Brush Eradication**

Study of methods of brush eradication showed that percent of sagebrush kill and type of soil treatment markedly affected the percent of seedling survival. This was directly related to the number of competing plants remaining after eradication treatment. Use of the rail or the tumbling-log harrow killed about 40 percent of the sagebrush plants, whereas plowing killed about 95 percent. About 52 percent of the seedlings survived on plowed areas and only about 26 and 19 percent on the railed and harrowed areas, respectively (table 2).

The Effect of a Firm Seedbed Prior to Seeding

In the spring of 1949 the four species of wheatgrass were planted by five different methods on sagebrush range. Sagebrush was eradicated in two areas by plowing at different periods and in another area by raling. One series of plots was firmed with a cultipacker previous to and after planting, and another series received no firming treatment. Seeding was done by broadcasting and by drilling with a surface drill and a semi-deep furrow drill.

Seeding counts made in the early summer of 1949 showed that emergence was significantly greater on all plots that had been firmed by cultipacking regardless of whether they had been drilled or broadcast. The average percent of viable seed emerging was 46 percent on firmed plots compared to only 24 percent on unfirmed plots.

On firmed plots seedling emergence was similar for both surface and semi-deep furrow drill. However, on unfirmed plots the semi-deep furrow drill gave slightly better results.

There were no great differences in percent of emergence or percent of survival at the end of the first year among the four wheatgrass species.
or between the different methods of brush eradication.

From this study it was concluded that a firm seedbed was beneficial to seedling emergence. It is believed that firming improved the soil structure by increasing soil aggregation. Such tillage, however, should be done when the soil moisture is at a level that will induce soil aggregation. This practice is not advisable on heavy soils where crust formation will affect seedling emergence.

Drill Types

Plantings of the four wheatgrass species were made in 1948 during the fall (September) on sagebrush areas that had been plowed or railed one year prior to seeding. Plantings of each species were made with a semi-deep furrow drill, a surface drill, and a unitiller.

The semi-deep furrow drill and the surface drill gave markedly better results than the unitiller (Table 3). The semi-deep furrow drill and the surface drill produced 1.11 and 0.93 seedlings per square foot and was highly satisfactory, whereas the unitiller produced only 0.44 seedlings per square foot and was considered unsatisfactory.

All species gave about the same results except crested wheatgrass which had a lower emergence percentage than other wheatgrasses. This was believed caused to a large degree by the deep coverage of the seed by the soil that fell back into the furrow of the unitiller.

Again it was noted that the percent seedling survival was proportional to the competing vegetation on the area during the first summer. The area of sagebrush that was plowed one year prior to seeding had a moderate cover of a annual weeds at the time of seeding. The railed area had only a moderate kill of sagebrush (40 percent) and produced poor seedling emergence and survival. Plowing one month in advance of planting produced the best results. However, it should be pointed out that the sagebrush area did not have any appreciable amount of cheatgrass or annual bromegrass, and the invading annuals were weeds other than cheatgrass.

Table 4. Average chemical composition of four species of wheatgrass growing on foothill ranges of Utah, June 19 to July 6

<table>
<thead>
<tr>
<th>Species</th>
<th>Ether extract</th>
<th>Crude protein</th>
<th>Crude fiber</th>
<th>Lignin</th>
<th>Cellu-lose</th>
<th>Total ash</th>
<th>Calcium</th>
<th>Phosphorus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crested wheatgrass</td>
<td>3.11</td>
<td>7.56</td>
<td>32.9</td>
<td>7.63</td>
<td>41.7</td>
<td>6.72</td>
<td>.39</td>
<td>.23</td>
</tr>
<tr>
<td>Intermediate wheatgrass</td>
<td>2.68</td>
<td>7.69</td>
<td>36.8</td>
<td>6.72</td>
<td>39.4</td>
<td>8.20</td>
<td>.40</td>
<td>.23</td>
</tr>
<tr>
<td>Stiff-hair wheatgrass</td>
<td>3.77</td>
<td>7.81</td>
<td>33.0</td>
<td>7.43</td>
<td>39.3</td>
<td>7.34</td>
<td>.38</td>
<td>.22</td>
</tr>
<tr>
<td>Tall wheatgrass</td>
<td>2.87</td>
<td>7.63</td>
<td>34.1</td>
<td>6.94</td>
<td>38.9</td>
<td>7.98</td>
<td>.41</td>
<td>.30</td>
</tr>
</tbody>
</table>

Chemical Content of Wheatgrasses

The four species of wheatgrass used in this study were similar in nutritive content during the spring grazing season (Table 4). Samples were collected from each species on June 19 when plants were in early head or late boot stage and again July 5 when all plants were in full head. These plants were all grown on the same plot where soil and growing conditions were identical. Crested wheatgrass and stiff-hair wheatgrass were somewhat more advanced in growth stages, yet, there were no significant differences in nutritive content.

JUVENILE DETENTION FACILITIES

(Continued from page 53)

is held in detention has seldom had a wholesome family life, with healthy social contacts and the affection he needs to develop a sense of security and well-being. Most of these children have already been hurt, punished, beaten, and branded as failures. When the forces of society are finally set in motion to provide services intended to promote correction, it is highly important that these forces begin on a constructive level. The task of rehabilitation is difficult enough without the inclusion of destructive influences within the corrective agencies themselves.

Concern Over Problem

The inadequacy of existing facilities has not remained unnoticed. Public officials and interested citizens have expressed concern, and have sought a favorable solution to the problem. This concern has led to the use of the somewhat better detention facilities in Salt Lake, Weber, and Cache Counties to serve adjoining counties at least on a limited basis. Officials in Utah County and surrounding counties have joined together to attempt a cooperative plan to provide improved services in this area of the state where the number of children detained is large, and the need for improved facilities is most urgent. The possibility that rural counties can successfully join hands to provide on a cooperative basis a suitable facility to serve several counties should not be overlooked. The obstacles are great, however, and unless it is possible for the rural counties to move forward in developing some means of providing adequate detention services, it would seem imperative that detention be made a part of the juvenile court administratively as well as functionally. This would make it possible to provide suitable detention homes on a district basis throughout the rural areas of the state and appears to be the only means of keeping children out of jail, except the younger child who can be detained in a foster home.

There appears to be every indication that the counties are unable to provide the facilities necessary for a satisfactory detention program for children in Utah, and it seems that the best way to bring detention up on a par with other services for children is to integrate it with these services and make it a responsibility of the State Bureau of Services for Children.

Farm and Home Science
which now administers the juvenile court and other public child welfare services.

Utah has traditionally felt deep concern for the welfare of its children. It is to be hoped that in the matter of detention care, it will be possible soon to comply more fully with the philosophy of the state law governing this function which reads as follows:

The provisions of this chapter shall be construed to the end that the care and custody and discipline of the child shall approximate as nearly as may be that which shall be given by its parents, and that as far as practicable any delinquent child shall be treated, not as a criminal, but as misled and misguided and needing aid, encouragement, help and assistance. (Utah Code Annotated 14-7-49)

SOIL MOISTURE

(Continued from page 51)

As long as most counties in the state remain unable to comply with the spirit and intent of this law, as well as being unable to comply with the legal provisions forbidding the detention of children under sixteen in jails, Utah citizens can scarcely feel that they are adequately meeting their responsibilities to their children who may require detention care.

depths of the rooting zone were also avoided by carefully applying just the right amount of water to penetrate through the rooting zone to the deeper soil which remained continuously moist.

These precautions together with the fact that the soil used has excellent internal drainage, effectively prevented any reduction in crop yields resulting from inadequate aeration of the soil.

A record was kept of the moisture tension at the various depths in the soil at periodic intervals during the growing season. For each plot the tension readings at the various depths and at the various times were added to get a single value for the season. The mean value known as the "mean integrated soil moisture tension" was then calculated.

The plots that were allowed to become drier and remain that way for longer periods of time, gave higher mean integrated soil moisture tension values than those that were not allowed to dry out so much between applications of water.

The yields of sugar beets, alfalfa, and potatoes have been related to mean integrated soil moisture tension and the results are shown in figs. 1, 2, and 3. Yields of barley were not reliable because the barley lodged badly.

It should be noted that even the driest of these plots were moist for a substantial part of the season. At the beginning of the season and after each irrigation the soil throughout the root zone was thoroughly moist. The soil gradually dried out until it reached the moisture level desired and was again irrigated. This resulted in the mean moisture tension being considerably smaller than the maximum tension obtained in any plot.

Yields of Sugar Beets

With sugar beets, yield decreased between 0.8 and 2.5 tons per acre, 95 percent of the time, for each increase of 1 atmosphere of mean integrated soil moisture tension. In particular those plots that were irrigated before any sign of visual wilting or dark color occurred gave highest yields. Yields were reduced more markedly in the plots that were dried until the moisture reached 4 atmospheres in the root zone. The leaves of the beets on these plots showed a dark color and visible signs of wilting before irrigation water was applied. The more pronounced the wilting before irrigation the more severe the yield reduction.

Stands of Alfalfa

Well established stands of alfalfa were very deep rooted and a large reservoir of water was available to the crop from the soil. As a result no wilting of alfalfa occurred on any plots prior to first cutting and no differences in yield occurred. During the growth of the second cutting however moisture became limiting. The plots that were allowed to dry until the soil moisture reached or exceeded 4 atmospheres turned dark green in color and some plots visibly wilted on hot days. This resulted in differences in yields. The total yield of all three crops was also decreased between .3 and .7 tons per acre for each increase in 1 atmosphere mean integrated soil moisture tension in 95 percent of the cases. There were small differences between plots kept below 1 atmosphere of moisture tension but plots allowed to dry beyond this point showed either a dark green color or wilting symptoms just prior to irrigation. The decrease in yield was inversely proportional to the magnitude of the tension just prior to irrigation.

Yields of Potatoes

Potatoes showed more response to changes in moisture tension below 1 atmosphere than any of the other crops. The plots showing reduction in yield are characterized by dark green colors and wilting symptoms prior to irrigations.
specialists have come from other countries to experiment stations and other places in the United States where they can obtain technical information that will assist them in their work in their home country. A summary statement released by the U.S. government reports 41 such visitors during the week of August 5 to 11; 190 since July 1, 1951; 2190 since January 1, 1951; and 534 in the country during the month of July. From July 1950 to July 1951 more than 3000 agricultural leaders from 77 countries visited the United States to learn about our agriculture.

Staff Members Serve on Foreign Missions

A central roster of agricultural specialists available for foreign assignments has been set up in the Office of Personnel in the U. S. Department of Agriculture. Specialists from all the land-grant institutions have been lent for foreign service. At the present time President Emeritus Harris is technical director of the United States Joint Commission for Rural Improvement in Iran, Professor Alvin Bishop of the Irrigation Department from Utah State, is serving for the summer months in the Dominican Republic; Dr. V. L. Israelsen, professor of agricultural economics, is on a two-year assignment in Puerto Rico; Professor Ernest Jeppsen has been in Panama for the past 3½ years in charge of developing a vocational education program under sponsorship of the U. S. Office of Education; Dr. and Mrs. E. L. Waldee are in Indonesia on an assignment with the Economic Cooperation Administration; and Dr. Vaughn Hansen, irrigation engineer, is in Brazil for a special assignment on irrigation development.

Projects in Foreign Countries

The fifth field of service, that of projects between the individual land-grant institutions and foreign countries, is just now developing. The University of Arkansas was the pioneer in the field. It is working with the Agricultural School Divisa in Panama on a program of education, research, and extension.

Land-grant colleges undertaking projects to aid agricultural development in foreign countries are Texas A & M College, Michigan State College, University of Minnesota, New Mexico A & M College, University of North Carolina, University of Wisconsin, Purdue University, and Utah State Agricultural College.

Utah State in Iran

The Utah State Agricultural College was asked to participate in the program with Iran because: (1) The climate and agricultural crops of Iran and Utah are similar so that the personnel from the College are already familiar with many of the production problems. Likewise many of the high-yielding varieties of crops and improved cultural methods developed...
in Utah have special promise for Iran. (2) Several of the faculty have already had field experience in Iran or similar areas of the Near East. (3) A number of Iranian students have studied agriculture at the College. These men are now among the prominent agricultural technicians in Iran who will participate in the program. The close relationship between these Iranians and the College should greatly facilitate the mutual understanding of objectives and procedures necessary for the successful operation of the program.

Consequently the agreement with the College is aimed at improving agricultural conditions by strengthening and coordinating existing educational, research, and extension institutions, and by organizing and conducting demonstrations of improved agricultural practices.

Dr. F. S. Harris is in charge of the Point IV Mission in Iran. Working with him are several technicians of the U. S. Department of Agriculture including Dr. George Stewart who, until recently, was on the staff of the Intermountain Forest and Range Experiment Station at Ogden. Dr. Stewart also was formerly head of the Agronomy Department at Utah State Agricultural College.

In the near future several agricultural specialists will go to Iran under sponsorship of the College. In the first group will be two irrigation engineers, an agricultural engineer who has specialized in farm building construction, a veterinarian, a vocational agriculture instructor, an extension specialist, and a horticulturist. Men from the College faculty will be sent to fill most of these positions. Other agricultural specialists of Utah will be employed for other positions. It is anticipated that specialists in other technical fields of agriculture will be employed for service in Iran within the next few months. Most of the men who accept these assignments will take their families and will remain in Iran for a period of two years. When they complete their assignment, they will be replaced by other specialists.

The objective of this program is to train Iranian technicians and develop an organization to carry on a rural improvement program which will serve to strengthen the agricultural economy of the country in much the same manner that the Experiment Station, Extension Service, and the College has done in this country. It is the firm conviction of those in charge that if American technicians can aid the Iranian people to produce more food, better housing, and improve the economy and living standards of the people they will develop a sense of freedom and will not become interested in communism. The College and its staff in this program will have a broadened opportunity for service. It is hoped that its influence will contribute measurably to a richer life for the Iranian people and to a lasting world peace.

SUPPLEMENTARY FEEDING OF RANGE SHEEP

(Continued from page 56)

Supplements Increase Lamb Crop

The largest lamb crop resulted from combinations of soybean oil meal and monosodium phosphate (fig. 4). This emphasizes again the importance of a proper ratio and amount of the two supplements in the diet.

It appears that increasing the amount of monosodium phosphate or soybean oil meal with 0.28 pound of barley increased the lamb crop (figs. 5 and 6). Larger amounts of barley fed with phosphorus and protein, however, did not result in a larger lamb crop.

Practical Recommendations

In Utah most of the sheep subsist on range forage during the entire year. Under favorable conditions and well managed ranges forage consisting of browse, grass, and forbs frequently supplies all the nutrients necessary; however, under conditions of scarcity of forage, especially on the winter range or unfavorable climatic conditions, it becomes necessary to supplement the sheep's diet. The condition of the sheep, the amount and kind of forage on the range, climatic conditions, and the time of year will determine when and what kind of supplements to feed.

Usually alfalfa hay, dehydrated alfalfa pellets, barley, cottonseed meal and bone meal, or other safe phosphorus supplements are the cheapest feeds in this area. Supplements for a saltbush type range should be relatively high in protein and phosphorus.
TOXICITY OF DDT

(Continued from page 56)

all eggs produced during seventeen months of production. When these hens were sacrificed after 27 months of production, the DDT content of the body fat was 340, 456, and 2148 ppm for the 50, 100, and 200 ppm DDT treatments, respectively.

Practically all of the DDT is contained in the yolk, relatively little being present in the white of the egg.

Egg production and mortality of the hens were not influenced by the DDT during 27 months of feeding the experimental diets.

Feeding DDT to Chicks and Turkey Poults

Chicks fed DDT-dusted alfalfa hay (treated with 0, 1, 2, and 4 pounds DDT per acre) gained weight normally, consumed the same amount of feed as normals and had the same mortality rate as normals. Adding 50, 100, and 200 ppm DDT to the mash had no influence on feed consumption or weight gain, but there was a slightly increased mortality at the 200 ppm level.

In turkey poults fed the same levels of DDT-dusted alfalfa hay and DDT in the mash, gain in body weight and feed consumption were not influenced, but mortality was 31.5 percent at the 100 ppm DDT level, and 100 percent at the 220 ppm DDT level. In the latter group there were neuro-muscular symptoms characteristic of DDT poisoning. In pouls fed the DDT-dusted alfalfa hay, mortality was not different from that of pouls fed undusted hay.

Although DDT is used to some extent in the production of alfalfa hay, its use for this purpose is not recommended by the Utah Agricultural Experiment Station and so far as we are aware, it is not so recommended by other governmental agencies. Its use, however, is recommended both by the Utah Agricultural Experiment Station and the U. S. Department of Agriculture for the control of lygus bugs and alfalfa weevil on alfalfa being grown for seed. These insects if not controlled, seriously reduce seed yields. The recommendations of the Utah Agricultural Experiment Station for control of these insects are given in circular 125.

CONTRIBUTIONS TO RESEARCH

May 15 to August 15, 1951

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