Farm & Home Science Vol. 3 No. 1, March 1942
The outlook for agricultural production and prices for 1942 indicate that Utah's cash farm income should be in the neighborhood of 60 million dollars, which is about 15 million dollars above average and 30 million dollars above the low point of the depression. Most of Utah's agricultural income is from sheep, beef cattle, sugar beets, canning crops, dairy and poultry products; all of which are in demand and have a favorable price outlook. These, together with the favorable demand for Utah minerals and increased demand from large defense developments in the intermountain area, are the major factors supporting an increased income for Utah for the coming year.

In response to increased farm prices, and in compliance with agriculture's wartime production goals, total output of farm products is expected to be the largest on record. In spite of record supplies expected, prices are likely to rise, resulting partly from increased consumer income, partly from restrictions on output of civilians' manufactured goods, and partly from expected government purchase for lend-lease shipment. The United States Department of Agriculture estimates that because of the influence of these factors, prices of farm products are expected to average about 25 percent above 1941. This, however, will be only about 5 percent above the January 1942 level.

Consumer demand for farm products in 1942 as compared to 1941 will be supported by larger money income received by consumers as well as by higher levels of employment. It is now estimated that the nation's income for 1942 will exceed 100 billion dollars, which would represent an increase of about 10 to 15 percent over the total for 1941. This increased income will not be uniformly distributed among all consumers. Some groups with fixed income and increased taxes will have less money to spend during the coming year than during 1941. It is true that increases received by consumers will go partly to pay the large increase in taxes, which may amount to about half the increase in income payments to the individual for 1942. In addition, purchasing of defense bonds by the public will reduce money which would otherwise be available for purchasing farm and other consumptive goods. On the other hand, the deficiencies of some types of industrial goods will permit a larger expenditure for food products. It is expected that a higher percent of the consumers' income will be spent for food products than would be the case if a full line of non-agricultural goods were available.

Our participation in the war has increased government purchases of farm products for shipment to our allies and for accumulating reserves. The reduction of imports in the Pacific will also add to demand on stocks in this country, both for the same commodities and for substitutes. The net effect of changes in domestic and foreign situation should greatly increase demand for farm products in 1942 over 1941, although the advance from present levels may not be large.

Increase in farm prices during the first 2 years of World War I and World War II have been similar. In August 1914 the index of Utah prices was 101, and in

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**POINTERS ON FEEDING FOR EGG PRODUCTION**

1. Choose chicks from disease-resistant, high egg-producing stock.
2. House them in dry, roomy and well ventilated quarters.
3. Feed hens all they can consume of feeds that will supply all factors necessary to maintain the body and to manufacture eggs.
4. Home grown feeds will give satisfactory results and are usually much cheaper than imported feeds.

Suggested ration for laying hens:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount (pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>90</td>
</tr>
<tr>
<td>Barley</td>
<td>50</td>
</tr>
<tr>
<td>Oats</td>
<td>20</td>
</tr>
<tr>
<td><strong>Mash</strong></td>
<td><strong>Continued</strong></td>
</tr>
<tr>
<td>Ground wheat</td>
<td>30</td>
</tr>
<tr>
<td>Wheat bran</td>
<td>20</td>
</tr>
<tr>
<td>Shorts</td>
<td>10</td>
</tr>
<tr>
<td>Ground barley</td>
<td>30</td>
</tr>
</tbody>
</table>

**Mash—Continued**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount (pounds)</th>
</tr>
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<tbody>
<tr>
<td>Meat meal and/or</td>
<td></td>
</tr>
<tr>
<td>fish meal</td>
<td>22</td>
</tr>
<tr>
<td>Salt</td>
<td>1</td>
</tr>
<tr>
<td>Ground limestone</td>
<td></td>
</tr>
<tr>
<td>(low magnesium)</td>
<td>2</td>
</tr>
<tr>
<td>Alfalfa meal</td>
<td>10</td>
</tr>
<tr>
<td>Vitamin D—(D-activated animal sterol)</td>
<td></td>
</tr>
</tbody>
</table>

The eggs in each basket represent the average yearly production of the flock from which each hen came. Feeding, management or heredity may be responsible for this difference in production. Low production in farm flocks is usually the result of poor feeding, management or environment.

When the price of corn is near that of other grains it may be substituted for part of the other grains. For more detailed directions on feeding write for Mimeograph series 262—Feeding for egg production.

**Study On Vitamin Deficiencies in Sugar-Beet Molasses**

Each year in the state of Utah some 24,000 tons of beet molasses, a by-product of the sugar beet industry, are made available as a stock feed. This molasses contains about 50 percent sugar (sucrose) and should, therefore, be a good source of carbohydrate for fattening swine. Hogs weighing 100 pounds or more will make satisfactory and inexpensive gains on a ration of molasses 40 parts, barley 45 parts, tankage 8 parts, alfalfa meal 5 parts, salt 1 part, bone meal 1 part. Lighter hogs, however, develop a nervous disease when fed the above ration. There are periods during which muscular coordination is poor and the hogs stagger when they walk. Some animals continue to make weight gains while in this condition, but generally appetite is lost, the animals become thin, and death may follow.

Experimental work has been in progress since March, 1940, to determine just what deficiency is responsible for this disease of the hog. Once a cheap supplement is found, molasses will be less expensive than barley as a hog feed. To solve this problem, the missing factor or factors must be discovered. Consequently, in experiments, feeds are often used that are too expensive for economical swine production.

First it was necessary to find the general type of factor that was missing in the ration (i. e., mineral or vitamin). The symptoms suggested vitamin deficiency. In the preliminary work, elimination of known factors yielded some interesting results. Hogs were fed cod-liver oil in the disease-producing ration to determine if lack of vitamin A or D might be responsible. It was ineffective in curing the disease, and so vitamins A and D were eliminated.

Dried brewer’s yeast was fed as a supplement to a pen of hogs. When fed at a 5 percent level in the ration, the disease did not develop. This indicated that some member of the vitamin-B complex was involved.

Because the intoxicated condition closely simulated vitamin B₉ (thiamin) deficiency of the rat, wheat germ was fed to a pen of hogs at a fifteen percent level of the ration. This supplement did not prevent the nervous involvement. As wheat germ is rich in both vitamins B₉ and B₁₂ (riboflavin) these two members of the B complex were eliminated.

Nicotinic acid, another member of this group of vitamins, was fed without positive results. Still another of this group, pantothenic acid, did not prevent the disease.

As a check on vitamin B₆ (pyridoxin), cane molasses was fed to a group of light hogs instead of beet molasses. These hogs did not develop the disease. Cane molasses is not a single substance, but is a mixture

**Search Being Made for Supplement to be Used with Molasses for Hog Feeding**

By R. A. Rasmussen

of many compounds, so this does not conclusively show that lack of vitamin B₆ is responsible for this disease. It is known that cane molasses contains relatively large amounts of pantothenic acid, and it may contain other factors that have not as yet been recognized.

In another test, pure vitamin B₆ was tested. This compound did not prevent the disease. Also various mixtures of cane and beet molasses were studied with the hope that cane molasses would be an effective and cheap means of completing a beet molasses ration for the hog. Cane molasses was ineffective as 10 percent of the molasses of the ration, and did not give complete protection as 50 percent of the molasses in the ration.

In still another study, fresh cut green alfalfa hay was found to prevent the disease. Thus even young hogs on alfalfa pasture may be safely fed 40 percent of their ration as beet molasses.

An interesting, although inconclusive experiment was carried out with four female hogs from the same litter. Two of these females were reared on a beet molasses ration containing 5 percent yeast, while the two others received a similar ration without yeast. The two sows receiving the yeast farrowed 9 and 11 normal young, respectively, while the two not receiving yeast farrowed 4 and 5.

(Continued on page 4)

Farm and Home Science
The home vegetable garden, always a desirable and economical source of fresh wholesome food, has assumed an important place in the food plan for our nation. The government is asking for an increase of 25 percent in the number of gardens grown in Utah and along with this should come an increase in the usefulness of the garden as well. Planting a home garden and canning, preserving, freezing or storing a portion of the produce will not only mean a higher percentage of commercial canned goods that can go into national defense uses, but it will materially reduce the cost of living and improve family health. Many will grow gardens this year who have never done so in the past. This article attempts to point out a few important points that should be considered before planting.

The beginner may think that all there is to do about a garden is to sow his seed across the different beds some fine spring morning. Many people do this but it leads to a waste of ground, often making it impossible to plant all the crops wanted.

The Garden Plan
What the wise gardener does first is to prepare a plan of his year’s cropping. It would be well if all followed the same procedure, using a large sheet of paper and drawing a scale plan of the ground. The exact position and amount of space each of the crops is to occupy should be marked out including not only those to be planted in the spring, but those that are to follow the spring-sown vegetables. Thus the grower may have everything in its proper place and also have all of the crops he wishes to grow.

The home garden should be planned to produce a constant supply of high quality vegetables for as long a period as possible. In most parts of the state it should be possible to have some fresh vegetables from the first of May until the end of October. Yet most gardens have lost their usefulness by midsummer.

Extending Garden Usefulness
The length of time the gardens can be useful may be extended by storing part of the crop of those vegetables that will keep well under common storage. Such crops as beets, cabbage, carrots, celery, onions, parsnips, potatoes, pumpkins, squash, sweet potatoes, rutabagas and turnips may be stored for several months. It is well, then to provide more space for these crops than is needed for fresh consumption so that part of the crop may be kept for winter use.

The garden can also play an important part in the winter diet if part of the crop is processed by canning or freezing. Either method is a good way to conserve the over-supply which may occur at certain times of the season of such vegetables as asparagus, beans, broccoli, cauliflower, sweet corn, rhubarb, peas, and spinach. However, it is wise to plant additional amounts of these crops for processing.

Wide Variety of Vegetables Desirable
It is desirable for the gardener to include as large a variety of the different crops as possible. Too often only the more common vegetables are included and the lesser known are never planted. Most of these crops are not difficult to grow and would greatly enhance the value of the garden, and the variety in the diet.

Most careful consideration should be given to the selection of the best variety of each crop. New varieties are continually being offered to the public but until these have been tried one should hesitate to plant them. Nor should seeds be bought because of the picture on the package. Long before planting an approved list of varieties of the different crops should be obtained.6

1Those desiring a planting guide giving information on the varieties, the amount of seed required to plant a hundred-foot row, time of planting in field, hardness of crop, planting distance, depth of planting and the days to harvest each variety may obtain it by writing to the Vegetable Crops Department, Utah Agricultural Experiment Station, Logan.

A list of recommended varieties was published in Farm and Home Science, v. 2, no. 1, March 1941. Copies of this are still available and will be sent on request.

(Continued on page 15)
Three-Fold Purpose of College Teaching - Research - Extension

In the establishment of the land grant colleges, such as the Utah State Agricultural College, the fundamental motive was service to agriculture and rural people.

The College teaching work itself was organized for the purpose of training students to succeed in a rural environment. Without excluding scientific and classical studies, the agricultural colleges were charged with the responsibility of teaching such branches of learning as are related to agriculture and mechanic arts.

But the scope of the Agricultural College goes beyond the teaching of College students. The Agricultural Experiment Station was established simultaneously with the College itself to solve the problems of agriculture through scientific research. At a later date the Cooperative Extension work in Agriculture and Home Economics was organized to carry the results of experimental work and other useful information to the rural people throughout the state. It is the purpose of these two organizations within the Agricultural College to develop new information and to provide leadership that will make for a more efficient, prosperous and permanent agriculture and for the improvement of the rural home and rural life.

Hence the agricultural work at the College is organized on a broad basis. It not only provides for the training of youth for a career on the farm or in the professional fields of agricultural activity, but it also provides a service and leadership for the farm people throughout the state.

—R. H. W.

UTAH FARM OUTLOOK (Continued from page 1)

August 1939, just prior to the beginning of War II, Utah farm price index was also 101. During the first 27 months of War I, farm prices increased 36 points. During a similar period of War II, farm prices increased 37 points. While the increase in farm prices following the outbreak of these two wars has been about the same, retail prices have increased faster during War II than was the case during the first war. At the end of 27 months of War I, Utah farm products had a purchasing power of 111 percent of normal. At the end of this same period of the second war, the parity price or purchasing power of Utah farm prices was 96 percent of normal. In the last half of War I, prices rose rapidly. An attempt is going to be made by the federal government to regulate prices in order to prohibit them from going as high as they did during the last war. An effort is also going to be made to maintain price relationships so that various groups will not be injured or greatly benefited through high or low purchasing power.

After a period of restricted production because of loss of foreign markets and low industrial income, the farmers of America again have the opportunity for a full production program. Farmers like to produce, and dislike a restricted program. This attitude is a result of the nature of the farmer's business, which has been based upon an economy of abundance. In setting up the food production program for 1942, Secretary Wickard gave 3 reasons for the increased production: (1) the growing demand for more food to support people of the United States; (2) to meet the demands for food for our allies; (3) the need for adequate reserve supply as a safeguard against any future emergency that may arise.

With the exception of beef, wheat and possibly potatoes, the production goals set up for Utah for 1942 call for an increased production. In order to stimulate production, the federal government has not only set up definite production goals for certain commodities where large increases are requested, but has made certain commitments on price supporting programs for 1942. The Secretary of Agriculture has been authorized to support the prices of these commodities through purchase programs at a level which will give them at least 85 percent of parity.

Prices for beef, sheep, lambs, wool, dairy products, poultry, eggs, canning crops, truck crops, fruit, and sugar beets are expected to be as high or higher in 1942 than in 1941. For a number of these commodities the increased prices will result from special demands because of war conditions. The 1941 milk production was the highest on record, and the goal for 1942 is 13 percent above 1941. Numbers of beef cattle, dairy cattle, and sheep are approaching an all-time high. During normal times, the number of livestock at the peak would mean prices may soon decline. Even in war times it would seem advisable to be cautious about further expansion in numbers. The present period of prevailing high prices will be a favorable time to cull out poor or inferior stock and replace them with high producing animals.

Along with higher farm prices will come an increase in cost of production. Relative costs of labor and some supplies may be above prices received for farm products. Labor is going to be particularly scarce and high-priced. Enlistment and selective service, together with high wages in defense industries, are taking most of the young men from the farms. Higher net income on family farms will come to the family which can arrange to do most of the farm work, make efficient use of machinery, and cooperate with neighbors in use of labor and equipment. High farm prices and high wages also mean comparable high value for all labor performed on the farm by the farmer and his family.

With the present favorable outlook for water supply for the state, together with increased demand for agricultural products and increased prices, Utah's outlook for 1942 is favorable.

SUGAR-BEET MOLASSES (Continued from page 2)

young, respectively. These latter young showed a peculiar leg weakness and at times an intoxicated gait. All four sows were in poor condition at the time the young hogs were weaned (eight weeks of age).

Studies of the blood of intoxicated hogs have failed to show any abnormality. Microscopic studies of the spinal cord and sciatic nerve have revealed a degeneration called vacuolization. It would seem then that this deficiency disease acts on the nervous system.

At present, it is unsafe to feed young hogs (up to 100 pounds) even 15 percent of beet molasses in the ration unless they are on alfalfa pasture. Beet molasses can make up 40 percent of the ration of hogs weighing over 100 pounds. In this latter case, the hogs make considerably cheaper gains than do hogs fed barley instead of molasses. This is because of the relative cheapness of beet molasses.
Nutrition in the Defense Program

Along with Guns, Tanks, and Airplanes, The Maintenance of National Health and Morale is Essential to the World Effort

By CHRISTINE B. CLAYTON
Nutritionist for the Utah Defense Council

In the program of National Defense which is foremost in our minds today there are certain aspects of health which are serious enough to demand immediate attention. Recent dietary studies among large groups representative of the people of the United States, clinical studies among smaller groups, and the examination of men called up for military service show clearly that poor diets and malnourishment are widespread in this country. These conditions offer no ground for alarmist statements but they are evidence of a genuine weakness in the present national emergency and warrant national attention and concerted action.

In recent years startling advances have been made in scientific research in nutrition and there is now available indisputable evidence that food plays a major part in the health, emotional balance, spiritual courage, and mental functioning of human beings.

Along with guns, tanks, and airplanes we must consider the importance of keeping our people well. Wars are won or lost in modern warfare according to the health, courage, and morale of whole populations and their ability to exert themselves to the utmost. It is vastly important that our armed forces should be adequately fed but it is equally important that all defense workers, and all women and children who may not be included in war time occupations and industries be properly fed. Hungry people and ill people are a liability in any defense program. The future of the nation depends upon our ability to translate the scientific facts at our disposal into everyday practical measures.

The problem of improving the nutritional status of all the people of this great nation is a complex one. The problem must be considered from every point of view and this involves its medical, social, economic and psychological aspects.

No single agency can carry this responsibility. Rather, a coordinated plan must be developed in which various official and non-official agencies participate. In the present emergency impetus has been given to this movement by President Roosevelt who called the National Nutrition Conference in May 1941. As a result of this conference recommendations were made to the President embodying suggestions for the improvement of national health.

Paul V. McNutt, as chairman of the Federal Security Administration, has the responsibility for leadership in this program. Secretary of Agriculture Wickard has set up a program of "Food for Freedom" which is closely related to the nutritional program in that it has as its objective the provision of enough food of the right kinds to guarantee good nutrition for all the people of this entire country if they can get it and would eat it.

The big and burning questions of economics and the social situation as well as the psychological aspect of how to get people to eat foods which are "good for them" still remain to be solved.

The education of the general public in dietary requirements and their significance is being done chiefly by nutritionists and home economists in extension service and in class rooms. Those responsible for the promotion of normal nutrition in the community must not only possess clear insight concerning the theoretical aspects of their subject and the objectives of their work, but must also have imaginative minds and tenacity of purpose that will surmount all obstacles. The program must be developed on a continuous and long-time basis. The results will not be immediately measurable or even demonstrable in any concrete and specific manner.

The National Nutrition Program is gathering momentum on all fronts according to M. L. Wilson who is immediately in charge. In Utah the educational program in nutrition is swinging into action through the coordinated efforts of the members of the State Nutrition Council. The council is composed of professional workers as representatives of all agencies and organizations in Utah whose work includes nutrition and health.

This Council had been organized and was functioning in the state a year before

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Recent nutrition conferences have emphasized the inadequacy of the present supply of fruit and other protective foods in the diet of the American people. With increasing military consumption, and exports of fresh, dried, and canned fruits to our allies, with the transportation system — both railways and trucks — being taxed to capacity in hauling war materials, and with probable restriction of tin cans for commercial canning, it appears necessary not only that the production of fruit be increased, but that more of it be utilized and preserved at home.

Farmers and home gardeners could well increase their supplies of fruit for their own and neighborhood use, while consumers would do well to substitute more locally grown fruit in place of fruits shipped long distances. Such a program would not only conserve transportation facilities for the vital war necessities, but would leave more money in the pocketbooks of taxpayers for the purchase of war bonds.

There are several hundred thousand fruit trees in Utah that are not producing the quantity and quality of fruit possible for them to produce. Much of this potential fruit producing capacity is accounted for by the many thousands of fruit trees, especially apple trees, scattered throughout the irrigated parts of the state in home orchards and gardens which are unsprayed and consequently produce little good fruit. A goodly share of these trees is located in non-commercial districts where fruit is now being hauled in and sold through commercial channels at a substantial marketing cost.

While these non-commercial trees also need pruning, fertilizing, and thinning of the fruit in "on" years, the principal problem is getting them sprayed. In some cases, sprayers used for commercial orchards in the district might be able to spray all of the home orchard trees if the communities were organized for this purpose. Where some sprayers are available, but are not adequate to do the job as at present equipped, it should be possible to double or treble the number of trees that could be sprayed with each machine by mounting it on a truck or trailer to increase mobility, by providing an auxiliary water tank truck, wagon, or trailer to save time lost in refilling, and by equipping the outfits with lights for night spraying.

Where spray outfits are not now available, other sources of machines might be tapped. There are many old machines now idle that have been replaced or gone out of service when orchards were pulled out which might be put in shape again, powered by reconditioned automobile motors.

Results in the renovation and spraying of old apple orchards in the vicinity of Logan show that high quality fruit can be produced the first season that spraying and care is given, providing there has been an adequate set of blossom buds the previous summer. In most cases, if blossoming was heavy last year and a good set of fruit remained until midsummer or later, the crop will be too scanty to pay for its care this coming season, since nearly all such neglected trees are biennial bearers.

Commercial Production Can Be Increased

Large numbers of commercial orchards are also not producing to the limit. Principal reasons lie in lack of control of pests which cause huge losses, both in amounts and quality of fruit, and in soil management methods, which reduce fruit yields and size because of moisture or nitrogen deficiency.

Among the pests of the apple and pear, the codling moth and the orchard mites or red spider are the principal offenders which still cause heavy losses. The development of new spray mixtures and techniques which make possible heavy deposits of an oily film of lead arsenate which doubles or quadruples the control obtained with the arsenical alone, now makes possible the attainment of a high standard of control in which the loss from worms can be reduced to less than 5 percent with three to five applications.

Of the cover spray mixtures used last year at the Experiment Station, the kerosene-soap-lead mixture, and a commercial oil base adhesive added to lead arsenate to improve spread and deposit, gave the best results. With kerosene obtainable for 20 cents a gallon or less, as compared to a cost of 50 to 60 cents a gallon for summer spray oil, the economy of the kerosene-soap-lead mixture is evident. Because of the volatility of the kerosene, this mixture can be used in the early second brood sprays without unduly complicating spray residue removal, where similar use of the heavy summer or dormant weight oils often leads to serious difficulties in washing the fruit. Details on the use of the kerosene-soap-lead mixture can be obtained by writing the Station.

In the stone fruits, the peach twig borer and the peach root borer still cause much damage. The former makes the fruit gummy or wormy, while the latter is a "fifth columnist" who bores quietly just below the surface of the ground, destroying the communications between branches and roots, and starving the latter. Better spraying in the pink or shuckfall spray, together with a lead spray when the first brood emerges in early June appears to be the best defense against the twig borer. Certainly more of our peach, apricot, and prune acreage should be protected from root borer damage by the use of the new ethylene dichloride fumigant which can easily be applied.

Check Injury to Buds and Wood Before Pruning

Recent observations by Dr. A. L. Stark indicate considerable bud killing in peaches from the low temperatures during the past two months. Peach growers would do well to check carefully the percentage of live buds on their trees, before pruning them, since normal pruning may greatly reduce the yield if a considerable proportion of the buds are frozen. Under
favorable conditions from 5 to 10 percent of the blossoms are needed to set a good crop. If 75 percent or more of the buds are injured, no pruning should be done. Buds of apricots, sweet cherries, and Japanese type plums such as Satsuma should likewise be checked on before pruning.

If the wood or cambium of the trees shows browning (called blackheart injury) the trees should not be pruned at all, since studies made by Abell at this Station following the freeze in 1925 proved that unpruned peach trees recover better than those that are pruned. Young trees which made a vigorous growth last season are most likely to have been injured in the wood.

Some modification of orchard management practices should be considered to increase the amount and quality of the crop this year. If the orchard is in a heavy sod, especially one with much bluegrass or orchard grass, breaking it with a tractor disk or shallow plowing and cultivating during the spring and early summer to kill out grass and weeds, followed by reseeding to a legume sod crop such as alfalfa, sweet clover, or hairy vetch later will usually increase vigor, leaf surface, size and yield of fruit. If the orchard has a good stand of alfalfa or sweet clover, light cultivation with springtooth or disk once or twice in the spring to cut out weeds and grass and loosen the soil will give the trees more nitrogen and moisture, without destroying the cover.

Growers should use all the manure, including poultry manure and litter, obtainable. Good results have been obtained in the Station orchards at Logan by mulching with manure under the branches where it is difficult to cultivate. Much of the soluble nutrients are leached into the soil by melting snows and rains, and the roots come up into the manure mulch to feed. Strawy manures and poultry litter are especially suited to this use.

Where manures are not available in adequate quantity, they should be supplemented with inorganic nitrogen applications. Practically all sod orchards should be given nitrogen fertilizer unless heavily manured. Five pounds of ammonium sulfate per tree is the standard amount for good sized apple trees in legume sod; for large apple trees in grass sod this amount could well be doubled. In sod orchards, the sulfate of ammonia should be spread by hand under the branches. Where tests have shown that the cover crop responds to phosphorus, superphosphate should be added to improve growth of the legumes in the cover crop and so indirectly fertilize the trees.

Berry Production Can Be Increased Quickly

Production of strawberries and raspberries, fruit high in nutritional value as well as appetite appeal, can be increased quickly, both by better care of present plantings and by new plantings. Fertilization with manure and/or ammonium sulfate now, with cultivation and hoeing to remove weeds and grass when the ground dries, should open the program. Raspberries should be pruned lightly this year in order to save the early berries which grow from the tips of the canes. If the canes are winter injured, prune back to green wood. Use pots, wire, and string to support canes if they bend over with fruit when left long. Spray with wettable sulfur to control red spider before berries become large. Cultivate frequently before the fruit ripens to control weeds, water often during harvest, and as frequently as needed after harvest to keep the new canes growing vigorously.

New plantings of strawberries can be made to fruit this year as well as next, by using the new improved everbearing varieties, which will start fruiting in August on plants set in March and April with good care. Kasuga's new Twentieth Century appears to be the best of these new everbearers, although Berri Supreme (P. W. Mammoth) and Green Mountain are also desirable for home use. More berries will also be needed next year; so increased new plantings of Marshall, Red Heart, Dorsett, Fairfax or Catskill could well be made for the June 1942 crop. Plants should come from patches free from root weevil and crown rot.

While new plantings of raspberries will fruit only lightly next year, demand is increasing and more plantings should be made for home use as well as for sale. Planters should plant only the better varieties, not just any plants they can get from a neighbor. Cuthbert is good for warmer upland locations where peaches do well, but elsewhere the hardier Taylor, Newburgh, and Latham should be preferred. Taylor and Newburgh are both large, heavy yielding new sorts from New York which appear promising. Latham, originally from Minnesota is the hardest, and should be preferred in colder valleys. The new Indian Summer everbearing from the New York Experiment Station is a large early berry which also bears a good crop on the ends of the new canes in September and October. The berries are softer than the other varieties named, but should be good for home use because of earliness and fall fruiting. Certified plants of raspberries should be purchased, free from root weevil, crown gall, and mosaic disease.

Fruit trees can be useful as well as ornamental: A much prized crabapple tree ornamenting house and terrace in Cottonwood. With proper spraying, pruning, and fertilization, such trees can contribute to Food for Freedom by supplying the family with luscious home grown fruit.
Curly Top, the Most Serious Menace to Tomato Production in Utah

Attempts Being Made to Control the Disease By Development of Cultural Practices that Will Aid. and By Breeding of Resistant Varieties

Curly top, also known as western yellow blight is the most serious tomato disease in Utah. The disease has appeared in a severe form ten times (1917, 1919, 1924, 1926, 1930, 1931, 1934, 1935, 1937, 1940) and in a mild form four times (1925, 1928, 1936, 1938) during the past twenty-five years, resulting in a loss, based on the market value of the crops that were harvested, of approximately $2,000,000 to the farmers of the state and of approximately $10,000,000 to the industry as a whole. The disease was especially serious during the past decade when five severe and two mild epidemics occurred, and there has been grave concern regarding the ability of the tomato industry to survive. The frequent reoccurrence of the disease has already forced the virtual abandonment of the crop in certain excellent tomato-producing areas.

Curly top is caused by a virus which is carried from diseased to healthy plants by the sugar beet leafhopper, (Eutettix tenellus Baker) a native of the sagebrush-saltbush-shadscale waste lands of the arid west. The insect thrives throughout the great southwestern desert and has extended its breeding grounds northward in eastern Utah and western Colorado to the Uinta Mountains and through western Utah and eastern Nevada and the great Snake River Valley of southern Idaho into the arid stretches of eastern Oregon and Washington and then southward through the Sacramento and San Joaquin valleys of California. These expansive desert breeding grounds maintain an insect population that is a constant threat to cultivated crops grown within or near the region. Utah's tomato-producing district is fringed by excellent insect breeding grounds at Little Mountain and Promontory Point north of the Great Salt Lake; Tooele, Rush and Skull valleys south of the Great Salt Lake, and the West Mountain and Mosida Valley areas west of Utah Lake.

The insects overwinter and produce early spring broods in the desert breeding areas upon perennial desert brush and winter annuals such as red-stem filaree, or stark's bill (Erodium cicutarium L'Her.), tumble mustard (Nolta altissima (L.) Britt.), the green or tansy mustard (Sophia filipes (Gray) Heller), blister cress (Cheirinissa repanda (L.) Link), pepper grass (Lepidium perfoliatum L. and L. desentriflorum Schrad.) and the flaxweed (Sphodria sophia (L.) Britt.). The insects mature as they mature into patches of summer breeding hosts such as Russian-thistle (Salsola pestifera Nels.) and red-scale (Atriplex rosea L.) on the desert and in the cultivated areas where they also breed upon the sugar beet (Beta vulgaris), spinach (Spinacia oleracea), mustards (Brassica spp.), blister cress (Cheirinissa spp.), pepper grass (Lepidium spp.), whitlow grass (Draba spp.), tansy mustards (Sophia spp.), and saltbushes (Atriplex spp.) and feed upon a great variety of weeds and crop plants. This migration is hastened by the drying of the desert host plants.

During the fall, when the vegetation in the cultivated areas matures, the insects

At approximately the same time the leafhopper begins to migrate into the fields from the desert breeding grounds and upon the amount of virus and host material that is present in the fields upon which the insects may breed during the season. It follows, therefore, that any environmental condition that will influence the overwintering of the insect and of the virus host plants will influence the severity of disease development. If a large number of virus-carrying insects pass into the winter upon favorable host plant material on the desert, if the winter is mild and favors the survival of large numbers of insects, if the spring is early, warm and favorable for plant and insect growth, and if there are few parasites to feed upon the insects, then large populations of insects will develop to migrate into cultivated areas and feed upon susceptible crop plants. A reversion of any one of these conditions will result in a reduction in the number of insects in the spring migration, and if several of the conditions are unfavorable, the number of virus-carrying insects will be so small that no serious damage will occur.

Curly Top Control
The control of curly top is of vital importance to the tomato industry in Utah. Heavy losses to both the growers and the canners may be avoided and a manageable production schedule achieved if the disease could be brought under control. Insect populations may be greatly reduced by a rehabilitation of the range breeding areas which would result in a reduction in breeding host plants such as filaree, tansy

Farm and Home Science
Russian thistle, for March 1942

and tumbling mustard, red cale, and hosts of the insect and of the virus that further by the removal of the many weed community activity. It would be useless grow along roadsides, fence lines and ditch banks in cultivated area by cooperative ing up his own field and roadsides if his for the occasional individual farmer to at­ could be expected only from organized community weed eradication projects.

Department of Agriculture is following i adopted, the plants may be paced at Experiment Station and the United States development of cultural practice that will hild or by doubling the number of plants per hill, or both. This may be done either by reducing the di tance between hills or by doubling the number of plants per hill, or both. If double hill planting is adopted, the plants may be spaced at opposite sides of the shovel hole or about six inches apart with some apparent advan­ Close spacing of tomato plants has reduced the percentage of curly top in in­fected field plots from 4.4 to 30.0 percent and increased the yield from 2.9 to 9.6 tons per acre.

Close spacing increases proportionally the cost of planting the tomato crop, but the increased costs pay large dividends in years of severe epidemics and may be considered a good form of insurance in years when the disease is not important. To make this plan function to best advantage, however, a system of forecasting the prob­ability of an epidemic before the begin­ning of the planting season should be de­veloped.

Experimental work is in progress on the development of a practical method of planting tomato seed directly into the field where the crop is to be grown. This process is known as direct seeding, and if it can be developed, the cost of planting fields with the close spacing pattern for disease control will be reduced materially.

Resistance to Curly Top in Tomato Varieties

Some progress has been made in the development of a variety of tomato that will resist the disease, but there is still a long way to go before a resistant variety that will qualify for commercial use can be released. A fifteen-acre trial ground is maintained at Hurricane where large numbers of single plant selections of strains, varieties and species are tested for resistance to the disease. A 2.5 acre test plot is maintained in the tomato-producing area at Hooper where the behavior of promising selections made on the Hurri­cane trial grounds is tested.

During the past ten years, 1,444 single plant selections from fields destroyed by the disease in 1930, approximately 1,250 varieties and strains of wild, novelty and commercial tomatoes (Lycopersicon esculentum, Mill.), seven species of tomato belonging to the green-fruited subgenus Eriopersicon, and over 300 inter-varietal and inter-specific crosses have been tested for resistance to the disease at Hurricane.

None of the 1,444 selections showed any resistance and only a few of the wild varieties from Mexico, South America, and Burma and of the novelty varieties such as the dwarf, the pear and the peach displayed a weak but promising degree of resistance. Selections from these wild and novelty types with a behavior record 95 to 99 percent disease on the Hurricane trial grounds develop from a trace to 20 percent disease under conditions of vary­ing infestation that produced from 25 to 80 percent infection in the Stone variety at the Hooper test plots.

Three tomato species of the subgenus Eriopersicon, e. i., L. glandulosum C. H. Mul., L. peruvianum var. dentatum, Dun., and L. Peruvianum var. bunifusum C. H. Mul., have displayed a very marked resis­tance to the disease at Hurricane and no evident disease at Hooper or in other parts of northern Utah.

Less than one dozen of the 300 hybrid progenies involving various combinations of wild, novelty and commercial tomato have exhibited any apparent resistance to the disease. The most promising selections that have been made to date are from a Stone by Red Peach (novelty) cross that developed 99.3 percent disease at Hurri­cane where Stone is completely destroyed and 6 to 21 percent at Hooper where Stone developed 24.5 percent disease. Se­lections from this cross bearing fruit three and one-half to four inches in diameter were made at Hurricane in 1941.

(Continued on page 11)
Weeds exact a greater toll of the nation's food crop than disease and insect pests combined. They rob the farmer of profit and the nation of food through lowered crop yields, soil depletion and high control costs. They compete with crop plants for food and water, and when there is not enough for both, the weeds are the ones to survive because of their greater vigor.

The average cost of controlling weeds in farm crops in Utah is estimated as follows:

- In corn: $4 to $6 per acre
- In sugar beets: $7 to $9 per acre
- In potatoes: $8 to $10 per acre
- In truck crops: $12 to $20 per acre

Weeds Increase the Cost of Marketing

Weeds increase the cost of marketing a crop. It is estimated that in 1923 the spring-wheat farmers of North Dakota, South Dakota, Minnesota, and Montana produced nearly 12,000,000 bushels of screenings in the wheat crop. This material is known commercially as dockage. It consists largely of weed seeds. It costs the farmers of the four states more than $675,000 to thresh this dockage. It took over 13,890 cars to haul it to market with a freight charge amounting to $800,000. This loss does not take into account the loss in acre yield as the result of weeds growing with the crop.

According to data obtained on the grain graded at Logan during this same period, the farmers of Utah produced 161,805 bushels of dockage in the wheat crop. The heavy expense for handling, shipping, and marketing is all borne by the farmer. The decrease in value of the wheat crop in Utah, owing to the presence of weed seeds and other foreign material, is estimated to be at least a quarter of a million dollars.

Weeds Increasing In Utah

In spite of the program of control and eradication, certain noxious weeds are still on the increase in Utah according to recent surveys. There are 320,460 acres of land infested with noxious weeds. Wild morning-glory infests 72,432 acres, cocklebur 56,209 acres, and whitetop 45,253 acres.

It has been estimated that the reduction in yields in Utah from weeds in farm pastures amounts to $38,697 a year in the grain crop to $547,000, in the hay crops.

(1) Hemlock growing at Logan (2) Morning-glory growing in a beet field, Carbon County (3) Cocklebur growing near Roosevelt (4) Clean cultivation for weed control in Salt Lake County. This has proved the most economical and effective means of control on large areas (5) Leafy spurge (6) Russian knapweed and wheat near Cornish (7) Indian hemp growing in an alfalfa field at Logan (8) Perennial sow thistle (9) Whitetop has overrun an alfalfa field

Farm and Home Science
THE MENACE OF WEEDS
Weeds Steal the Farmers' Profits by Reducing Quality and Quantity of Crops Produced

By R. J. Evans

The area which has been clean fallowed would to plant 14 weed per square foot. This means, for example, that one pound of black mustard seed may be sold in one hundred pound of sugar beet to 27.3

Under the State Weed Eradication and the AAA programs definite progress is being made in eradicating noxious weeds on limited areas and turning the land back to the farmer in condition for cropping. These areas which have been clean fallowed for two or more years have produced marked increases in crop yields. There are cases where such land has produced 20 tons of sugar beets to the acre while adjacent infested land has yielded only 10 tons an acre.

However, when returned to cultivation these lands must be seeded to row crops and a vigilant program of control of new weed seedlings followed.

From data on the best means of noxious weed eradication collected by the Agricultural Experiment Station over many years, it can be concluded that clean cultivation of the land from one to three years is the cheapest and most effective and feasible means of eradication on large areas. Use of chemicals such as sodium chlorate, atrazine, and carbon bisulphide are effective and economical for weed control on small areas, such as fence rows and places where it is difficult to cultivate.

A concerted effort must be made by all farmers in the state if the serious menace of weeds to crop production is to be brought and kept under control. Both the AAA and the State Weed Eradication programs have been planned to assist farmers in ridding their land of noxious weeds. It now becomes a patriotic duty for them to adopt every possible means to increase and maintain high crop production.

### TOTAL ACREAGE OF NOXIOUS WEEDS IN UTAH

<table>
<thead>
<tr>
<th>Common name of weed</th>
<th>Scientific name</th>
<th>1940 Total acreage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wild morning-glory</td>
<td>Convolvulus arvensis</td>
<td>72,432</td>
</tr>
<tr>
<td>Cocklebur</td>
<td>Xanthium orientale</td>
<td>56,202</td>
</tr>
<tr>
<td>Whitetop</td>
<td>Lepidium Draba</td>
<td>45,253</td>
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<tr>
<td>Poverty weed</td>
<td>Iva axillaris</td>
<td>45,037</td>
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<tr>
<td>Whorled milkweed</td>
<td>Osclepias galiioides</td>
<td>24,836</td>
</tr>
<tr>
<td>Bull thistle</td>
<td>Cirsium lanceolatum</td>
<td>23,792</td>
</tr>
<tr>
<td>Burdock</td>
<td>Arctium lappa</td>
<td>11,133</td>
</tr>
<tr>
<td>Plantain</td>
<td>Plantago spp.</td>
<td>8,254</td>
</tr>
<tr>
<td>Canada thistle</td>
<td>Cirsium arvense</td>
<td>5,681</td>
</tr>
<tr>
<td>Puncture vine</td>
<td>Tribulus terrestris</td>
<td>5,525</td>
</tr>
<tr>
<td>Black nightshade</td>
<td>Solanum nigrum</td>
<td>4,707</td>
</tr>
<tr>
<td>Perennial groundcherry</td>
<td>Lysilis longifolia</td>
<td>4,400</td>
</tr>
<tr>
<td>Alfalfa dodder</td>
<td>Cucusta spp.</td>
<td>4,301</td>
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<tr>
<td>Quackgrass</td>
<td>Agropyron repens</td>
<td>3,947</td>
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<tr>
<td>Perennial sow thistle</td>
<td>Sonchus arvensis</td>
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<tr>
<td>Russian knapweed</td>
<td>Centarea pecris</td>
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<tr>
<td>Bermuda grass</td>
<td>Cynodon Dactylon</td>
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<tr>
<td>Poison hemlock</td>
<td>Coninum maculatum</td>
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</tr>
<tr>
<td>Perennial ragweed</td>
<td>Ambrosia psilotachya</td>
<td>221</td>
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<tr>
<td>Blue flowering lettuce</td>
<td>Lactuca pulchella</td>
<td>94</td>
</tr>
<tr>
<td>Leafy spurge</td>
<td>Euphorbia Esula</td>
<td>12</td>
</tr>
</tbody>
</table>

Total: 320,460

Curly Top in Tomatoes (Continued from page 9)

The problem of developing resistance to the disease is a highly complicated one because so many factors, such as reactions to temperature, humidity and available nutrients, plant transpiration rate, photosynthetic activities, translocation of nutrients, hydrogen-ion concentration of cell sap, and the age, vigor, and structure of the plant, influence the expression of the phenomenon in the tomato. When the additional genetic factors that play a part in the development of size, color and quality in the tomato fruit are considered, the problem becomes extremely complex. All of these factors must appear together in the proper combination within the inherited make-up of an individual plant before it will express the desired degree of resistance and quality. That individual plant may be literally "one in a million." It is a recognized fact that if ten factors are involved in a desired combination between two parents, those ten factors will appear in the right combination in only one plant of a progeny of 1,048,576. It is evident, therefore, that large populations of hybrid material must be grown before the individual that is wanted may be found.

Eleven inter-specific crosses within the Eriopersicon group developed from 33 to 80 percent curly top in the replicated plantings at Hurricane under the same conditions in which resistant strains of L. esculentum Mill. develop from 88 to 100 percent disease. These expressions of disease resistance are much greater than any that have been found in intervarietal hybrids of L. esculentum Mill. Hybrids of these with resistant strains of the species of Eriopersicon may show considerable resistance when progenies in sufficient numbers are available for testing. A hybrid of wild L. esculentum Mill. with L. hirsutum H. B. K. developed 46.7 percent disease at Hurricane. The showing of this hybrid would indicate that hybrids of resistant strains of Eriopersicon with L. esculentum Mill. may hold considerable promise, providing hybrid sterility can be overcome and seed can be obtained. Results from this line of attack, while definitely promising, cannot be expected for some time because of the complex nature of the problems involved and the absence of information on the nature of the resistance possessed by the species of Eriopersicon.

Early developments in the control of curly top may combine the use of partially resistant strains of tomato in a closely spaced field planting plan with standard cultural practices that will maintain maximum vigor and productivity.
THE WESTERN REGIONAL RESEARCH LABORATORY

The Director of This New Laboratory Describes the Organization and Objectives of the Research Work Dealing with New Uses for Apples, Alfalfa, Fruits, Potatoes, Poultry Products and By-products, Vegetables and Wheat

By T. L. SWENSON, Director,
Western Regional Research Laboratory

The Western Regional Research Laboratory, located at Albany, California, is but one of four such laboratories, forming a new part of the U. S. Department of Agriculture, that are being administered by the Bureau of Agricultural Chemistry and Engineering under the leadership of Dr. Henry G. Knight, chief of that Bureau. This laboratory will serve the eleven western states and has been assigned the following seven commodities: apples, alfalfa, fruits, potatoes, poultry products and by-products, vegetables, and wheat.

The primary purpose of agricultural effort always has been, and no doubt always will be, the production of food and clothing. The first requirement is that a sufficient amount of suitable raw materials be produced so that there is enough available to feed and clothe everyone. This is in itself a difficult task, particularly when we look into the future and try to arrange present production so that we do not deplete soil resources too much. This first requirement of adequate production, both for present and future needs, has dictated that a large part of agricultural research must be directed toward ways of increasing or maintaining our capacity to produce. Some of the more important activities that come to mind in connection with production research are the introduction of new crops or animals, improvements in varieties or breeds, better cultural practices, and the control of diseases and insect pests.

The production of adequate supplies of raw materials, however, is not the only agricultural problem requiring research. Because of world-wide economic conditions and other complex factors that are difficult to control, there is a chronic overproduction of some farm products. This overproduction results in low prices and an accumulation of huge surplus stocks. Some of the more obvious and well known examples are wheat, cotton, and tobacco. Agriculture has come a long way during the last decade in controlling and managing these surpluses by planned production and marketing, but even so there still is a surplus problem, and no doubt there always will be, for it is only a matter of common prudence to provide reasonable margin of safety in production to guard against drought, crop diseases, and other uncontrolled factors causing lower yields. Seasonal surpluses also occur in the more perishable commodities such as fruits and vegetables. In general this type of surplus does not attract as much attention because it does not accumulate in the form of stored materials. Nevertheless, such surpluses are just as tragic for the producer. Another type of surplus that might be overlooked in a casual estimate of the situation is the large amount of low grade, dull and waste material that is present in almost every crop.

The presence of these surpluses and waste materials coupled with an unsatisfactory economic situation in our agricultural industry just before the present emergency led to renewed consideration of what could be done. One of the more obvious possibilities is to utilize these surpluses and waste materials for industrial purposes. There already are many instances of the successful use of agricultural products as industrial raw materials. For example, furfural from oat hulls, adhesives and sizing from starch, glue and plastics from milk, and drying oils from flaxseed and soybeans. It seems likely that there are many more such possible uses as yet undiscovered or incompletely exploited.

Industry has found that systematic research for new and improved products pays dividends out of all proportion to its cost. For a number of years it has become increasingly apparent that agriculture also must devote more attention to the technology of utilizing farm products.

In any event, whatever the considerations were, Congress authorized and directed the Secretary of Agriculture to establish four regional research laboratories for the purpose of conducting "... researches into and to develop new scientific, chemical and technical uses and new and extended markets and outlets for farm commodities and products and by-products thereof. Such research and development shall be devoted primarily to those farm commodities in which there are regular or seasonal surpluses ..."

As previously mentioned the Western
Laboratory has been assigned seven highly diversified agricultural products or groups of products for its attention. The organization of the research staff who handle these various products is established on a functional basis rather than on a commodity basis. In other words, instead of having an alfalfa man, a fruit man, and a wheat man as such, there are six research divisions: biochemical, engineering and development, commodity by-products, commodity processing, protein, and a physico-chemical and analytical division, whose interest may be briefly outlined as follows:

Laboratory Divisions

The Biochemical Division deals largely with certain types of changes and degradations that are well known to occur in stored agricultural commodities. These changes take place because the commodities are products of Mother Nature and, as such, are in reality living tissues subject to certain transformations that occur in all living matter. If we are to control the quality of our stored agricultural products for any length of time—and in a national emergency this becomes increasingly important—it is necessary that the mechanism of these actions be understood if proper control methods or treatments are to be developed. This division is also interested in determining something of the possibilities for and the development of methods which will permit the isolation and recovery of active biologic principles such as vitamins with a view to seeking out new industrial uses or expanding their present usage. Another important phase of the work of this division is the development of a rapid and economic method for making compost of the various wastes for which other economic uses cannot be developed.

The Commodity By-products Division is concerned with investigations on the vegetable and kernel oils, fats and waxes indigenous to the commodities assigned to the laboratory. Other lines of work contemplated for this division are the utilization of pectin, the recovery and increased usage of essential oils, and the development of methods for the recovery of true fruit flavors for use in the beverage and fountain trade.

The present work on the freezing preservation of fruits and vegetables will be expanded and will be pursued by the Commodity Processing Division. This is a continuation and expansion of the work that has been conducted in the Seattle laboratory. In fact, considerable work is now being done in this important field in cooperation with the Utah Agricultural Experiment Station. In addition to work on fruits and vegetables, poultry products are also receiving some consideration.

Of fundamental importance to any chemical program is the Physico-chemical and Analytical Division in which various commodities and their components are presented for analyses. This division is applying all of the modern chemical and physical working tools such as the spectrophotograph, x-ray and ultracentrifuge to such problems as the determination of molecular weight or molecular orientation of wheat protein or its components. It is also conducting fundamental studies of the size and structure of the ultimate particles, molecules and other subdivisions of the more important crop constituents. The use of highly specialized electrical measurements are also being considered in relation to certain biochemical changes wherein the whole pea, bean, etc., are being studied to determine the extent of change taking place within the biological system as it functions naturally.

Alfalfa and wheat are among the important protein-bearing products of this region. Work on this constituent is supervised by the Protein Division. This group is searching for possible uses for the protein material occurring in the commodities assigned to the Western Laboratory. The potentialities of these proteins for making plastics, fibers, adhesives, coatings, finishes, sizes, etc., are being carefully explored.

Engineering and Development Division

Probably the most unique feature of the organization is the inclusion of an Engineering and Development Division. The work of this unit is the transposition of laboratory or "test-tube" research to a semi-production scale by means of a pilot-plant and other engineering facilities with which the laboratory is equipped. Here various semi-commercial plants or processes can be built up or torn down, thus testing the commercial possibilities for any given product or process. Economic factors and considerations are also receiving the careful attention of the Engineering and Development Division.

As a result of organizing the laboratory divisions on a functional, rather than on a commodity basis, it is apparent that each division may have occasion to work with any or all of the assigned commodities, depending entirely on the general composition of the particular product in which there is an interest. This means that the divisional programs will be interrelated and highly coordinated.

Now something about the laboratory building—the physical plant that has been designed to house these research activities. The buildings for the four regional laboratories are similar in design, differing only in exterior treatments and structural features necessitated by their locations. Following is a brief description of the Western Laboratory:

The building, which was designed as a center for carrying on chemical, engineering, and biological research by a staff of approximately two hundred people, is a U-shaped structure of three stories and basement. Offices, library, and conference rooms occupy the 209-foot base of the U, which is the front of the building. One of the 307-foot wings houses research laboratories which are being equipped for chemical, biological, physical and other related scientific work. The other 307-foot wing contains a few control laboratories, but mainly provides space for large experimental engineering equipment and a modern fruit, vegetable and poultry processing and freezing plant.

Service shops and special low temperature research rooms are located in the basement. Construction is fireproof throughout. Steam is generated in a small separate power plant, designed to assure smokeless combustion of gas or oil. The building is of monolithic concrete, earthquake-resistant design. The surrounding grounds are being landscaped with ample provision for parking space for automobiles.

In conclusion, it should be remembered that research is a long-range program and although there are hopes and reasonable expectations of achieving some helpful results reasonably soon, it will be some time before the maximum effect is apparent. Results of research are cumulative, that is, each step forward, each new use developed, and each bit of knowledge systematically acquired is thereafter permanently available for the benefit of all. In this fact lies the value of research and it is, no doubt, the secret of the phenomenal advances that have been made in our industrial development.

U. S. A. C. AND B. A. C. CONTRIBUTE TO THE IMPROVEMENT OF BEEF CATTLE

This year the Utah State Agricultural College at Logan will continue to use as their herd sire Advance Domino 3d, the Hereford bull purchased by Sears Roebuck and Company and contributed to the Utah Horse and Cattle Growers Association for the improvement of beef cattle in Utah. It is expected that sons of this outstanding breeding bull will be made available to breeders throughout the state as they become old enough. An effort will be made to measure the capacity of these bulls to produce offspring that are themselves capable of siring quality beef economically. The second Hereford sire, W. H. R. Puritan 8th. owned by U. S. A. C. is being placed at the Branch Agricultural College, Cedar City, for use there.
LIVER FLUKE CAUSES SERIOUS LOSSES TO SHEEP AND CATTLE IN THE INTERMOUNTAIN STATES

The liver fluke, Fasciola hepatica, is a common parasite of sheep and cattle in the Intermountain Region, and is widely distributed over the world. This parasite also has been reported from a wide variety of mammals other than ruminants, including man.

The parasite, which was first described in 1379, belongs to a rather large group of invertebrate animals known as trematodes. The adult fluke is flat and leaf-like, brownish in color, and from \( \frac{1}{4} \) to 1\( \frac{1}{2} \) inches in length. The usual habitat of this fluke is the liver where it occurs in the large bile ducts, although it may occasionally be found in other locations.

**Life History**

The life history of the liver fluke was worked out independently by English and German investigators in 1882, and was the first to be solved for any trematode. This life history is quite complex, involving a molluscan intermediate host and a mammalian final or definitive host. Briefly this life history is as follows: The adult flukes in the bile ducts lay large numbers of eggs which pass into the intestine with the bile and out of the host animal in the feces. The egg, which is microscopic in size, under proper conditions of temperature and moisture undergoes embryonation and a larva develops in about 9 to 15 days. Under favorable conditions of temperature, moisture, and light, the egg hatches, liberating the larva which is known as a miracidium. This larva is a ciliated, free-living organism that is capable of swimming and remaining alive for approximately 24 hours.

In order for it to continue its existence as a stage in the life cycle of the parasite, the miracidium must penetrate into a suitable snail intermediate host. When this occurs, the miracidium is transformed into a sac-like larva or sporocyst that produces a number of more highly developed larvae known as rediae. Each mother redia produces other larvae similar to itself that are known as daughter rediae; the latter distribute themselves in the liver and other parts of the snail. The number of rediae that may ultimately develop in a snail following the penetration of a single miracidium has recently been determined to be as high as 415. The daughter redia does not produce larvae similar to itself as in the case of the mother redia, but gives rise to minute tadpole-shaped larvae known as cercariae. Recent investigations revealed that from a snail infected with a single this route they penetrate the liver capsule and reside in the liver tissue for a time; here they live on blood, migrate slowly, and increase in size. While migrating through the liver tissue, the young flukes cause extensive injury and affect the general health of the host animal.

After the larval fluke has grown considerably or has spent a given period of time in the liver pulp, it enters a small bile duct, migrates to one of the larger ducts, and grows to maturity. In the bile ducts the food requirements of the fluke appear to change and instead of living on blood as it does while in the liver tissue, it now obtains its nourishment from such substances as may be obtained from the bile or from the walls of the bile ducts.

**Extent of Loss**

The extent of loss that livestock raisers in the Intermountain States sustain as a result of this parasite has not been accurately determined. However, some idea of the loss may be obtained if one considers that at the Logan, Utah, abattoir, 867 out of 2,164 cattle livers were condemned because of liver flukes. These condemnations represented more than 9,500 pounds of liver, conservatively worth more than $1,100, or an amount almost sufficient to cover the slaughterings costs. No figures are available on the other losses in cattle, such as weight losses or interference with milk production, or in sheep from stunting and deaths.

**Methods of Control**

Methods advocated for controlling liver flukes are drainage of low, wet areas where the snail intermediate hosts breed or by poisoning the snails through the use of chemicals such as copper sulfate or blue-stone. These methods are practical in areas where irrigation is not essential for maintaining pastures or for the raising of crops. Realizing that these practices are not entirely practicable in the Intermountain States, the Federal Bureau of Animal Industry established at the Utah Agricultural Experiment Station a laboratory for the study of the various aspects of the fluke problem. The work thus far has been directed largely to determining the species of molluscs serving as intermediate hosts and their life histories and ecology, in order to discover possible methods of snail control or eradication which would be practicable under Intermountain conditions. While a considerable amount of information has already been obtained, there still remain many problems to be investigated before methods of control more practical than those now advocated can be recommended.
VEGETABLES FOR VICTORY
(Continued from page 3)

Wherever possible perennial crops should be grown. A garden is not complete without a small bed of asparagus and rhubarb. These crops can be harvested early in the spring, and both are valuable in the diet. It is not difficult to start these plants and if the beds are properly cared for the plants will last for years. The plants may be obtained from most nursery companies. When buying asparagus plants it is important to insist upon one year crowns as they will give better results than two year old crowns. It is well to put the perennials along the edge of the garden where they will not be in the way of plowing.

Garden Arrangement

In planning the garden it is well to arrange the vegetables so that those having similar requirements of culture and growing time will be put together. In that way vegetables requiring more water can have it without doing harm to the other crops. Short season crops should also be grouped thereby eliminating the possibility of damaging the long growing crops when the quicker growing ones are harvested. It also enables the grower better to prepare his ground for another planting after a short season crop has been removed. Very often some of the low growing crops are shaded by the taller ones. This can easily be avoided by planting the taller crops together.

Many growers have complained because they are unable to get a good stand of carrots, parsnips, and parsley. These crops are rather slow in germinating and the ground usually dries out before they come up. A good stand of any of these crops can be procured by keeping the top of the soil moist until germination takes place.

Usually it is not desirable to attempt the production of celery in home gardens. However, this crop can be grown well if planted in rows 20 inches apart and each plant 8 inches apart in the row. It is better to plant 3 short rows than one long one. The celery may be blanched by putting paper around each plant. In order to get a good crop the plants should be transplanted into the ground by the first of June or earlier. Celery requires frequent irrigation, and two light applications of a nitrogenous fertilizer during the growing season are beneficial.

Soil Fertility Essential

High fertility and frequent tillage are essential to a good garden. Plots should receive liberal applications of manure. Well rotted manure is to be preferred but fresh manure may be used if plowing is done early. Usually the use of treble superphosphate at the rate of one-half to three-fourths of a pound for each one hundred square feet, in addition to the manure, will be found beneficial.

Special attention should be given to cultivation and weeding. A hard surface crust should not be allowed to form, and the tillage should be often enough to control all of the weeds. While fall plowing of heavy soil is preferred, spring plowing is satisfactory if done early.

Succession Planting

Succession planting should be practiced whenever possible. Such crops as beets, endive, lettuce, peas, radishes, and spinach can be harvested in time to allow for a planting of beans, beets, Chinese cabbage, endive, lettuce, radishes and spinach, as well as other vegetables for fall consumption. The time of harvest of the spring planted crops will determine the crops which will follow.

To briefly summarize the suggestions on home gardens: A good gardener should first prepare a plan of his garden for the year. In doing this he should consider crops to plant, varieties of each crop, and the amount of space allotted to each crop. A fertile seedbed should be prepared and the vegetables planted at the proper time. Then, after planting, the crop should be given good care so that it will produce vegetables of high quality.

<table>
<thead>
<tr>
<th>SUGGESTED PLAN FOR SMALL HOME GARDEN—30x50 FEET</th>
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<tbody>
<tr>
<td>Asparagus</td>
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<tr>
<td>Lettuce</td>
</tr>
<tr>
<td>Spinach followed by cucumbers and bush squash</td>
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<tr>
<td>Kohlrabi</td>
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<tr>
<td>Kohlrabi</td>
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<tr>
<td>Swiss chard</td>
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<tr>
<td>Carrots</td>
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<tr>
<td>Parsnips</td>
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<tr>
<td>Early peas followed by beets and Chinese cabbage</td>
</tr>
<tr>
<td>Late peas followed by lettuce</td>
</tr>
<tr>
<td>Snap beans followed by turnips and radishes</td>
</tr>
<tr>
<td>Cabbage</td>
</tr>
<tr>
<td>Sprouting broccoli</td>
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<tr>
<td>Tomatoes (staked)</td>
</tr>
<tr>
<td>Peppers</td>
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<td>Pole beans</td>
</tr>
<tr>
<td>Tomatoes</td>
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<tr>
<td>Early sweet corn</td>
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<tr>
<td>Late sweet corn</td>
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NUTRITION IN DEFENSE
(Continued from page 5)

the national call to organize came from the Bureau of Home Economics.

The program of work planned by the Utah Council for the immediate situation consists chiefly of the extension of known facts concerning nutrition and the demonstration of reliable food practices throughout the state. This is to be done through the training of additional leaders to supplement the small number of professionally trained nutrition workers in Utah. Discussion panels, classes in nutrition, cooking demonstrations, and the demonstration of food preservation practices form a large part of the program which can be done by these volunteer leaders.

During January three Refresher Courses in Nutrition were held at the three major institutions. Home economists were invited to join these courses and to volunteer their services for community activities. The response was excellent and about one hundred and fifty women were trained to carry on this lay leadership in nutrition. These leaders will function chiefly through the nutrition part of the Civilian Defense Committee in the local and state program. This is part of the national plan for the use of local volunteer leaders. Many of these leaders already belong to church and community organizations through which they can serve as teachers and leaders in this field.

If such a program can be sustained over a long period of time there seems no reason to doubt that with the use of our modern knowledge of nutrition we can build a better and a stronger race, with greater resistance to disease, greater average length of life and greater average mental powers.

Dr. V. L. Israelsen, research assistant professor of agricultural economics, accepted a position with the Interstate Commerce Commission with headquarters in Washington, D. C.
I
n February this year there arrived on the College campus a Shorthorn herd bull, two cows and two calves. These have come from the distinguished Willow Bank Stock Farm of James Douglas and Sons, Caledonia, Ontario, Canada. At Willow Bank the great Browndale was used and died. His famous son, Browndale Count, was used in this herd for two years and later in the Edellyn Farm herd of T. E. Wilson, Wilson, Illinois, and has recently been acclaimed the breed's "greatest improver of the past 20 years." Willow Bank Stock Farm was established in 1855 and has probably contributed more outstanding herd sires that have actually improved Shorthorn cattle in the herds of Canada and the United States than any other single farm.

The red Shorthorn bull, Brawith Diadem (one year) that will head the College herd, is by Brawith Guard, whose sire Brawith Boy (Imp.) is the only Scottish Highland champion ever to come to America. Brawith Boy was grand champion at Toronto, London, and the English Royal in 1933. Brawith Guard is of the Myrtle family and has produced so many of the good cattle of Edellyn Farm. Brawith Diadem is out of Rosewood Beauty, daughter of Lady Rosewood 8th, the great show cow of the James Douglas and Sons herd, Grand Champion for 2 years at Toronto. It was with a heifer from this same family that the Douglasses won at Chicago in 1940.

With the shipment came two cows, one Mayflower Rose 2d (5 years, roan) by Glenburn Alladin and out of a cow by Robinwood Chief. This cow has been re-bred to Larbert Templar (Imp.), present herd sire for Douglasses. This cow has with her a red bull calf by Brawith Cadet, which bull's half-brother by Larbert Templar (Imp.) was junior and reserve grand champion this past year at Toronto and sold for $1800.

The second cow, Lady Rose, (3 years, red) is by Luster's Guard, also by Robinwood Chief, son of Browndale Seal. Lady Rose is out of Lady May by Glenburn Alladin. She has been rebred to Brawith Cadet.

In addition to the above, there is a heifer calf out of Rosebud 6th by Larbert Templar (Imp.), whose daughter Eliza 34th, topped the Russell-Douglas-Gray sale (1941) at $1500. A second daughter of this bull at the same sale brought $1050. These cattle, together with two good cows already at the College, should make the nucleus of a quality Shorthorn herd.

Larbert Templar (Imp.) 229853. Dark roan, by Crugleton Reservist, the Caesares Cup winner at the Scottish Highland Show in 1895. Dam a strong show cow in Scotland. Present herd sire for Jas. Douglas & Sons' Willowbank Stock Farm, and sire of U.S.A.C. heifer B. A. C. ENLARGES LIVESTOCK PROGRAM

With the assistance of Safeway Stores, the Branch Agricultural College has found it possible to initiate a cattle feeding project with 40 Hereford heifers. These are divided into 4 lots receiving, respectively, (1) alfalfa hay and barley, (2) alfalfa, barley and molasses, (3) alfalfa, barley, molasses and corn silage and (4) alfalfa, barley and corn silage.

A few head of beef are fed out on each of several places in southwestern Utah nearly every year. This venture should throw some light on the advisability of importing some feed for such purposes.

John Christensen, assistant professor of animal husbandry, is in immediate charge of the project.

B. A. C. ADDS HEREFORD HERD

In January a group of Hereford cattle were put together for the establishment of a breeding herd at the Branch Agricultural College, Cedar City. This project was made possible through the contributions of the State Banker's Association, The Bank of Southern Utah, Cedar City, South Salt Lake Yards, Wasatch Livestock Loan, Safeway Stores and the following Utah Hereford breeders: Hyrum Winterton of Kamas, Charles Redd, LaSal, Lehi Jones, Cedar City, and Byron Hauley, Richfield. Thus, the B. A. C. will have additional teaching facilities and be able to contribute to the production of good breeding cattle in this area.

A Utah State Agricultural College Corriedale ram fleece was awarded reserve grand championship prize at the Wool Show of the Chicago International Livestock Exhibition. This same fleece also won prizes as the Champion Purebred Fleece and the First Corriedale Ram Fleece. All five fleeces entered in the Show by the College won prizes. The fleeces were from a Rambouillet ram and ewe, a Corriedale ram and two Corriedale ewes.

Max Beal, research assistant professor of agricultural marketing, has accepted a position with the California State Board of Agriculture as marketing specialist, and left this institution on the 15th of February for Sacramento.

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