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FARM & HOME SCIENCE



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Agricultural Outlook for 1947

Price of and Demand for Farm Products Will Probably Be Favorable
Although Not So High As in 1946

By W. PRESTON THOMAS

Dr. W. P. Thomas, head of the Department of Agricultural Economics, recently returned from Washington, D. C. where he attended the agricultural outlook conference. This report is based on information gained at this conference as well as on the study made in the state.

Demand

DURING 1947 both the total demand for farm products and prices received by farmers will probably average somewhat below 1946. Even with some reduction in demand it is expected that prices of farm products will remain relatively high when compared to pre-war levels. Prices paid by farmers for production and consumer commodities are predicted to average higher next year. With increased production costs and reduced receipts from marketing the net farm income for 1947 will likely be below 1946. Even with this situation the net farm income will still be favorable and not far below the wartime level. This will be especially true for efficient operators who are in a position and able to reduce costs through more efficient use of machinery, equipment and capital.

It is estimated by the United States Department of Agriculture and the Department of

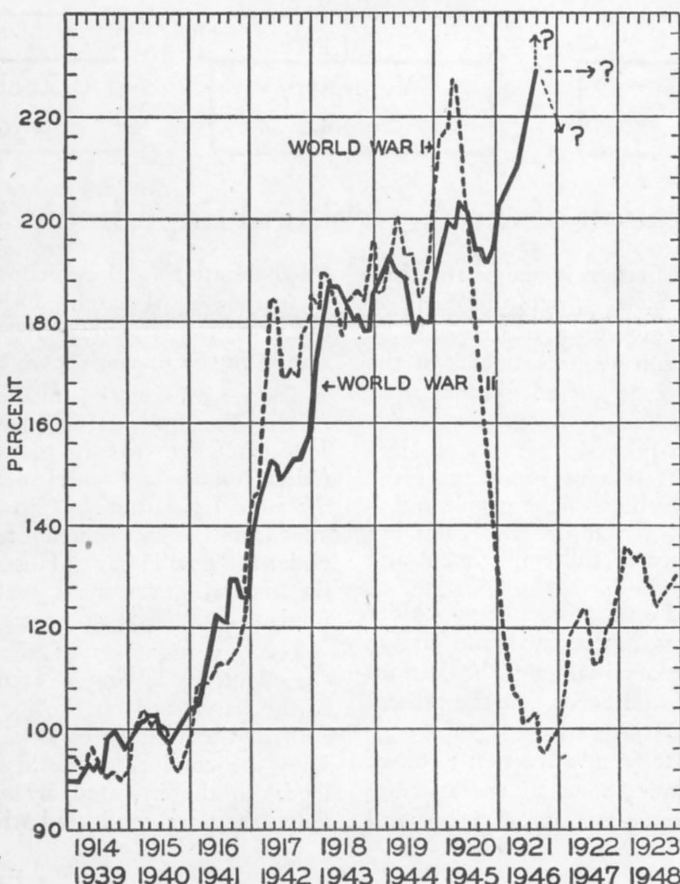
Commerce that the consumer income available will be higher for 1947 than for any preceding year. The present

civilian employment is 58 million or 2 million above the number employed at the peak of the war period.

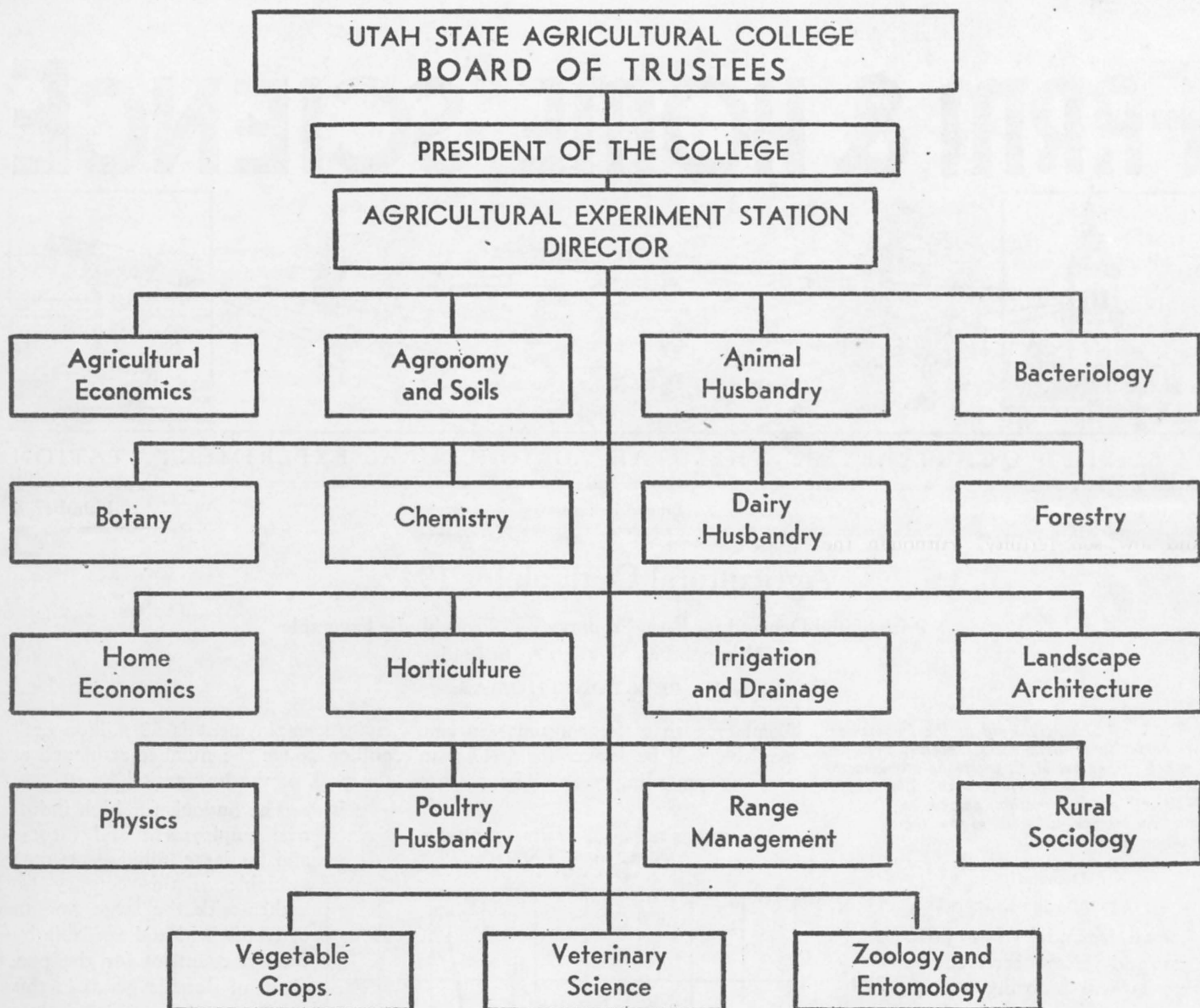
The outlook for high industrial employment and income and the large liquid assets now available in this country together with the large amount of credit held and available by foreign countries for the purchase of durable goods in this country are the major factors that will influence demands for goods including agricultural products for the next year.

The foreign demand for American goods is large, especially for durable goods, and is supported by an ample amount of funds. The dollar and gold resources of foreign countries are reported at approximately 28 billion dollars. This is in addition to the unused credit facilities of the Export Import Bank and the loan arranged by the International Bank, a total of 7.5 billion dollars, or a grand total of dollars, gold, and credit of about 30 billion dollars available for purchase of machinery and tools to rehabilitate the industries in these countries.

PRICES RECEIVED BY UTAH FARMERS
WORLD WARS I AND II
1935-39 = 100



(Continued on page 18)



Organization of the Agricultural Experiment Station

THE Agricultural Experiment Station is one of the three major divisions of the Utah State Agricultural College, the other two being the teaching division and the extension service. The Station works through 19 departments of the college, representing every school of the institution other than the School of Education.

The objectives of the research program are "to promote the efficient production and utilization of products of the soil as essential to the health and welfare of the people and to promote a sound and prosperous agriculture and rural life as indispensable to the maintenance of full employment and prosperity."

The research work is conducted on a project basis. Under each project a specific problem is investigated and station funds and personnel are apportioned among the various projects according to their nature and needs. At the present time work is being conducted on 91 projects.

Eighty-two staff members devote from a fraction to all of their time on the research program. Some of the staff are employed jointly by the teaching or extension divisions and

by the station, and consequently they spend but a part of their time in research. Other members are employed by the U. S. Department of Agriculture and cooperate with the station in the research investigations.

The research work is financed by federal, state, and private funds. The federal Hatch, Adams, Purnell, and Bankhead-Jones Acts provide approximately \$100,000 annually. The federal monies are supplemented by funds appropriated by the state legislature, by gifts from private agencies, and by sales from the experimental farms. When funds are available under the new Flanigan-Hope Act, the financial support from the federal government will be greatly increased. These funds, however, must be matched by the state.

The investigations of the Experiment Station are conducted in the laboratories and greenhouses on the campus, in the barns and on the experimental farms and orchards, both in the vicinity of Logan and scattered over the state. They are conducted on the range, in the mountain watersheds, in the irrigated areas, in the rural communities, in short, they are conducted wherever the problems exist.

Upper: A large current year's growth such as that in the top of this tree denotes a fertile soil and good management practices
Lower: Harvesting cherries from trees in orchard where the soil has been well fertilized

By D. W. THORNE
and A. L. STARK

THERE are about a quarter of a million sweet cherry trees in Utah, the most extensive variety being Lambert. The trees are usually planted on rather gravelly soils situated on upper valley slopes, where the quantity of irrigation water often is so limited that many trees show acute signs of drought during the latter part of the summer.

Other problems in sweet cherry production in Utah are frost damage, inadequate pollination, injury from insects, and low soil fertility. Although the Utah Agricultural Experiment Station has been studying all these problems, only the soil management phases will be discussed here.

In 1941 an experiment was begun to study soil management practices for Lambert cherries. The work was done cooperatively with Lee Jost in his large cherry orchard east of Kaysville, Davis County. The experiment was laid out in a solid block of Lambert cherries. Pollination was provided by grafting Tartarian, Black Orb, and Windsor variety cherries into the trees. Satisfactory pollination was not obtained, however, until the summer of 1945. The orchard had 9 years' growth at the beginning of the tests. The trees were spaced 35 feet apart. The orchard soil, which is a stony loam with numerous large rocks in the subsoil, was formed from a granitic type of formation occurring as ledges of gneiss above the valley. Irrigation water is usually plentiful for the orchard in the early spring, but in many years the stream practically dries up about the time the cherry crop is harvested.

The practices studied in the experiment included three cover crop practices: clean cultivation and weeds, winter vetch, and fall-planted barley or wheat. The clean cultivation practice consisted of disking the land thoroughly in the early spring, allowing some weed

Dr. D. W. Thorne is associate professor of agronomy. His research work is concerned with the fertility of irrigated soils. Dr. A. L. Stark was formerly associate professor of horticulture at this station. He is now connected with the Wasatch Chemical Company, Salt Lake City.



THE MANAGEMENT OF SWEET CHERRY ORCHARD SOILS

Fertilizers and Irrigation Water Important for Healthy Trees and High Yields

growth until the cherry crop was harvested and then disking occasionally to keep down weed growth the rest of the summer. For the vetch cover crop, hairy winter vetch was planted in the first part of September. It was allowed to grow until about the middle of June of the following year and then disked under. In some years, such as 1946 when the cherry crop ripened exceptionally early, the vetch was left on the land until after

the fruit crop was harvested. Both Winter Club barley and Cache wheat were tried on the small grain plots. Better survival of plants in the spring was found with the wheat than with the barley. The grain was disked under in early June. Tillage practices for the entire orchard were the same during the latter part of the summer.

Five different fertilizer treatments
(Continued on page 14)

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More detailed information on the subjects discussed here can often be found in Station bulletins and circulars or may be had through correspondence.

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RESEARCH NEEDS

IN SPITE of the wide variety of subjects now under investigation at the Utah Station and the expansion of the program during the past biennium, there are still many pressing problems on which no research is being conducted at the present time because of insufficient funds and personnel. The question of the low hatchability of turkey eggs is one of increasing economic importance in the state. Utah now ranks sixth in the nation in turkey production, and the hatching of turkey poults is becoming an important industry. Yet only about 50 percent of the eggs hatch, thus greating the price of poults to the grower. A turkey breeding program is urgently needed and has been requested by the growers of the state in order that stock of desirable qualities may be developed.

Death losses of honey bees have been extremely heavy during the past few years, constituting a real threat to the security of this important industry. The causes of these losses have not been clearly determined and more intensive research is needed to investigate the various factors contributing to them. More funds are needed to devote to this problem, important both to beekeepers and fruitgrowers.

Fruit and vegetable production is becoming an increasingly important source of cash income on Utah farms. There are many problems connected with the production, marketing, and processing of these crops that need further study. The Utah celery crop is being threatened by both disease and insect pests, as is the potato crop. Research on both the diseases and pests of these crops is urgent.

EXTENSION OF RESEARCH SERVICE THROUGH AGREEMENTS WITH OUTSIDE AGENCIES

THROUGH cooperative agreements for research with federal, state, and private agencies the Station has been able greatly to extend its services in the solution of agricultural problems.

Federal cooperation with the station now provides over \$100,000 yearly and twenty-four trained specialists to the state to aid in the solution of local problems. The new alfalfa seed unit has brought seven scientists from various centers together for the investigation of problems connected with growing of alfalfa seed. These men include specialists on both insect pests and on beneficial insects, as well as on seed production and improvement.

The Irrigation Division of the Soil Conservation Service has three men stationed in Utah to study problems connected with irrigation, among which are canal lining, measurement of snow cover and runoff from mountain areas.

The Soils and Fertilizer Division of the U. S. Bureau of Plant Industry, Soils and Agricultural Engineering is

developing an extensive program in the state in soil management investigation in regard to the optimum amounts of water and fertilizers to produce the highest yields of superior crops.

For a number of years now federal men have cooperated in the breeding of superior, drought resistant, and better adapted varieties of grasses both for irrigated pastures, and for range seeding purposes. Other men have worked with Station staff members to produce superior wilt resistant cereals. The introduction of these new cereals alone has saved Utah farmers millions of dollars over the past decade.

Federal cooperation also covers the work in tomato breeding for wilt and curly top resistant varieties, in insect control of truck crop pests, in soil surveying and testing, in dairy and beef cattle breeding and management, in range seeding, and in various phases of agricultural economics.

In addition to the general funds for
(Continued on page 17)

Building Needs

Probably the greatest need of the Station at the present time is for office, laboratory, and greenhouse space. Because of the increased number of students the present space is overcrowded at a time when the research program should be expanded. Establishment of further cooperative research awaits additional room and laboratory space.

The only new building built for agriculture since 1920 is the small veterinary laboratory which at the present time is much too small to meet the needs of that single department.

If the building needs in agriculture are to be met adequately, they will require a large new building fully equipped with gas, electricity, steam, with dark rooms, a constant temperature room, and laboratories for physical and chemical analyses. In a well-planned building laboratories may be so grouped that expensive equipment can be pooled and used by a number of departments. Such a building would centralize for greater efficiency agriculture departments now scattered over the campus.

A small animal research laboratory where laboratory animals could be kept for use in the nutritional and other

types of research is also needed. This building should contain facilities for rats, guinea pigs, poultry, and other experimental animals.

Another need is for a plant industry service building to provide facilities for plant breeding materials, seed cleaning, storage of plant materials, cold storage rooms for fruits and vegetables, and space for apple sorting and packing equipment.

At present, there are no facilities for the housing of station trucks and farm machinery and tools. A storage shed for this type of equipment is badly needed.

Other building needs include a residence on the Horticultural Farm, a laboratory and dormitory building on the Davis County Farm, and buildings for machinery and other equipment on the Greenville and Forage Crops farms.

Many of the experimental lands need leveling for the most efficient use of irrigation water, and new irrigation facilities should be installed.

Besides these building needs, the Station also has need for much additional equipment to replace worn-out and out-of-date machines to facilitate the research work.

PATTERN OF DRY-FARMING PRACTICES IN INTERMOUNTAIN AREA SET BY WORK DONE AT NEPHI DRY LAND STATION

Crops, Crop Varieties, Rotation, Cropping, Tillage, Fertility, Rate of Seeding, Time of Seeding, Smut Treatment, Power Equipment, Basis of Wheat Prices, Maintaining Nitrogen and Organic Matter Supplies, Soil Moisture, All Questions Studied in Experiments Over a Forty-Three Year Period

By A. F. BRACKEN

THE NEPHI Dry Land Station was established by a special act of the State Legislature in 1903 along with five other farms for the purpose of determining the possibilities of farming without irrigation in Utah. Within a period of ten years the farm at Nephi was the only one remaining in operation. Since the Nephi farm was located in a large dry-farm area and centrally situated in the State, it was decided to increase the scope of the work there, attacking some of the basic problems of dry-land agriculture. This expansion included increasing the size of the farm from 40 acres to 103 acres in 1907 and inviting the federal government to participate in the work. This cooperative relationship between the state and federal government began in 1907 and terminated in 1920.

As an indication of the need for experimental work, pioneer dry farmers of the early 1900's can well remember that a considerable acreage of land was plowed for fallow in late spring and early summer. Moldboard plows were considered standard equipment, rates of seeding varied from 2 to 3 pecks per acre, frequent cultivation of plowed land was considered necessary to save moisture, spring harrowing of winter wheat stands was a common practice, and there was no definite information as to which varieties of wheats to plant.

Farmers, through observation, generally come to follow productive practices, but the trial and error method is slow. It is much less expensive of time and effort to have a clearing house which not only conducts trials but also spreads the information. Experiment stations are established for this purpose.

From 1903 to the present, a period of 43 years, a large number of projects have been studied at Nephi including crop varietal trials mainly with winter and spring wheats; rotation tests; cropping experiments; tillage tests; fertility trials with barnyard manure, green manures, and commercial fertilizers; rate and date of seeding winter wheat; comparison of different smut treatments; measurements of grain losses from combines and header-thresher outfits; testing the effect of delayed harvesting on quality of wheat; a determination of nitrogen losses from dry farm soils and recovery through growing alfalfa; and

studies determining the effect of various tillage and cropping practices on conservation of moisture and accumulation of nitrates.

Testing of Crops and Crop Varieties

A large number of crops and crop varieties have been tested at the Nephi Station including beans, peas, beets, flax, various forages, and varietal trials of such crops as potatoes, oats, corn, sorghum, barley, spring wheat, and winter wheat. Beans, peas, corn, and potatoes have been found profitable to grow in seasons of higher than normal spring rainfall, but the average yields of these crops over a period of years are not high enough to warrant planting each season. Beets, sorghum, and flax are not adapted to our dry farm areas. Neither spring nor winter oats competes well with winter barley and wheat. Trials of winter barley have shown that Bulgarian, the highest yielding variety, will produce as many pounds of grain to the acre as the highest yielding winter wheat.

A large number of spring wheat varieties have been tried at Nephi. Yields depend upon time of seeding. If planted in early March production approaches that of winter wheats but seeding is usually not possible before April. Average yields have been only slightly more than half those produced from winter wheats. Spring wheats, however, do have a place on dry farms in case of winter killing of fall planted wheat. Early Baart is the best variety.

Numerous winter wheat varieties gathered from all parts of the world have been tested. New varieties are

continually being added as unadapted ones are eliminated. Such fall seeded varieties as Goldcoin, Lofthouse, and Kofod were first grown on our dry farms. Turkey wheat varieties first introduced into Utah by the Nephi Station in 1907 and 1908, largely replaced the older grown varieties within a short period. Yields were not only higher but winter survival was more certain and milling quality was superior. In sections where smut is not a problem, Utah Kanred and Turkey 926 are suggested; for smut areas Wasatch or Cache are recommended.

Rotation Tests

A total of 27 rotations has been under trial at Nephi involving winter wheat, winter barley, oats, alfalfa, corn, potatoes, and peas in various cropping combinations. Winter wheat following the three row crops has produced average yields approximately 2 bushels less than wheat following fallow. The advisability of growing one of the row crops alternating with wheat, therefore, largely depends upon the returns. In seasons of higher than normal spring and summer rainfall yields would justify the practice, but under normal conditions it is questionable.

Cropping Experiments

The general system of cropping on western dry farms is now alternate wheat and fallow, but this practice was not universally followed earlier. Some farmers grew wheat continuously and, in certain marginal areas, it was considered that fallowing for two years with one crop was advisable. Results from tests at the Nephi Dry Land Station, from 1904 to 1946, inclusive, show that continuous cropping has produced a total crop of 446.5 bushels with an average acre yield of 10.3 bushels; alternate cropping, a total of 529.8 bushels with an average acre yield of 23.1 bushels; two crops and one fallow, a total of 488.0 bushels with an average acre yield of 16.8 bushels; and one crop with two fallow periods, a total of 337.2 bushels with an average acre yield of 24.7 bushels. These results show the definite advantage of alternate crop and fallow. A statistical study of alternate and continuous cropping indicates that wheat yields of the former system are being maintained but acre yields of the latter are significantly decreasing.

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The author, Professor Aaron F. Bracken, and his family, have just left the campus for Syria where he has accepted a position as agricultural adviser to the Syrian government. He has had charge of the Nephi Dry Farm Station since 1920.

Heads and Seed from Over-Wintered Lettuce

Fall Planting and Over-Wintering Offer Possibility for Commercial Production
Of Both Heads and Seed

By L. H. POLLARD and L. R. HAWTHORN

ALTHOUGH spring planting is considered a normal practice for most vegetable crops, preliminary tests at the Utah Station indicate that fall planting and over-wintering offer considerable possibility for commercial production of lettuce heads and seed. Under certain market conditions a grower may even be able to produce a crop of heads as well as seed, thus giving him returns from two crops with one planting. In the production of lettuce seed spring planting has often proved hazardous in Utah. This is because delays in planting in the spring from adverse weather conditions result in a crop maturing in late September or early October. At that time fall rains may seriously interfere with harvesting. Even under favorable conditions the seed crop of the spring-planted head lettuce is rarely ready for harvest before the first of September. With the over-wintering method there is a good possibility that even the slow bolting types

can be harvested in August in most years.

For several years over-wintering trials with lettuce have been conducted at Farmington in connection with the production of marketable heads in late spring or early summer. When the seed is planted in early September there is little difficulty in getting a good stand of lettuce the following year. Plants have been thinned as soon as they have begun to grow in the spring. In the 1945-46 crop season the experiment was enlarged in order to obtain some information on the heading quality of five lettuce varieties as well as to determine the possibility of using this method in the production of seed. The varieties included in the test were Imperial 44, 101, 152, 615, and Great Lakes. Plantings were made on September 7 and April 15 at Farmington and on September 8 at North Logan. Double-rowed plots with rows 22 inches apart were made at Farmington and single-rowed ones three feet apart at North Logan. A good stand was obtained in both locations. During the fall the plants grew to the three or four leaf stage having a height of about two inches at Farmington and an inch to an inch and a half at North Logan.

There was little winter killing at Farmington, as is shown by the percentage of loss given in table 1. While some varieties showed a 25 percent loss, in no cases did this result in a poor stand because in all varieties there were many more plants than needed. At North Logan the losses appeared to be greater than at Farmington but even there fair stands were obtained. The greater losses at North Logan were thought to result from the smaller size of plants. Although they came through the winter, many plants were pushed out of the ground in late winter and early spring by alternate freezing and thawing. It seemed, too, that the smaller plants required a longer time to begin active growth in the spring. As soon as those that survived began to show signs of renewed growth they were thinned to 12 inches apart at both locations. In all plots enough plants remained so that few gaps existed. At Farmington a 10-20-0 fertilizer was applied at the rate of 300 pounds per acre at the time of the first cultivation in the spring. No fertilizer was applied at North Logan.

The heading of all varieties began during the last part of April and many were ready for market by the middle of

This article continues the report on cooperative vegetable seed investigations in Utah. A more general article by the same authors appeared in the September issue. Dr. Pollard is head of the Department of Vegetable Crops, Mr. Hawthorn is horticulturist, U. S. Bureau of Plant Industry, Soils, and Agricultural Engineering.

Fig. 1. Comparison of fall and spring planted lettuce at Farmington. Left: five varieties planted in early April 1946; right: same varieties planted in early September 1945. Picture taken in mid-July 1946



May. On the 31st of May the heads were cut off the plants in one row of each variety in each plot. The heads on the other row were split open to permit development of the seed stalk. In harvesting the heads the cut was made so that they would be marketable but at the same time allow a few basal leaves to remain on the plant. In cases where no head had as yet formed the plants were still cut in a similar manner.

In table 2 the heading percentage is based on the total number of plants in each variety whereas grading was based on those heads formed in the cut rows. In general Great Lakes, Imperial 44, and Imperial 152 showed the best production of heads for market. Of these three varieties Imperial 44 was somewhat less desirable because of the smaller size of heads. Great Lakes gave the highest percentage of no. 1 heads and the lowest percentage of culls; but its percentage of heading was lower than Imperial 44 and 152.

Seed stalk development of all varieties was more rapid where the heads were split open. However by harvest time the differences were no longer noticeable. In general 4 or 5 seed stalks were formed on the plants from which the heads were removed. These grew to the same height as the single central stems. This uniformity of height is shown in the accompanying photograph.

The spring-planted lettuce was not ready for seed harvest until September 4 for the Imperial varieties and September 19 for Great Lakes. In the fall planting at Farmington all of the Imperial strains were harvested on August 8 while the Great Lakes matured a week later. In the fall planting at North Logan the Imperial strains 101, 152, and 615 were harvested on August 17; Imperial 44 was ready on August 24; and Great Lakes finally matured on September 5. The harvesting operation consisted in cutting the plants off at the base and placing them in small piles. In all instances the crop was threshed 5 to 7 days after cutting.

Table 1. Survival and over-winter loss of lettuce planted at Farmington, September 7, 1945

Variety	Total no. of plants	No. winter-killed	Percent winter-killed
Imperial 44	1769	239	13.5
Imperial 101	1579	405	25.6
Imperial 152	2772	328	11.8
Imperial 615	1830	460	25.1
Great Lakes	2202	421	19.1

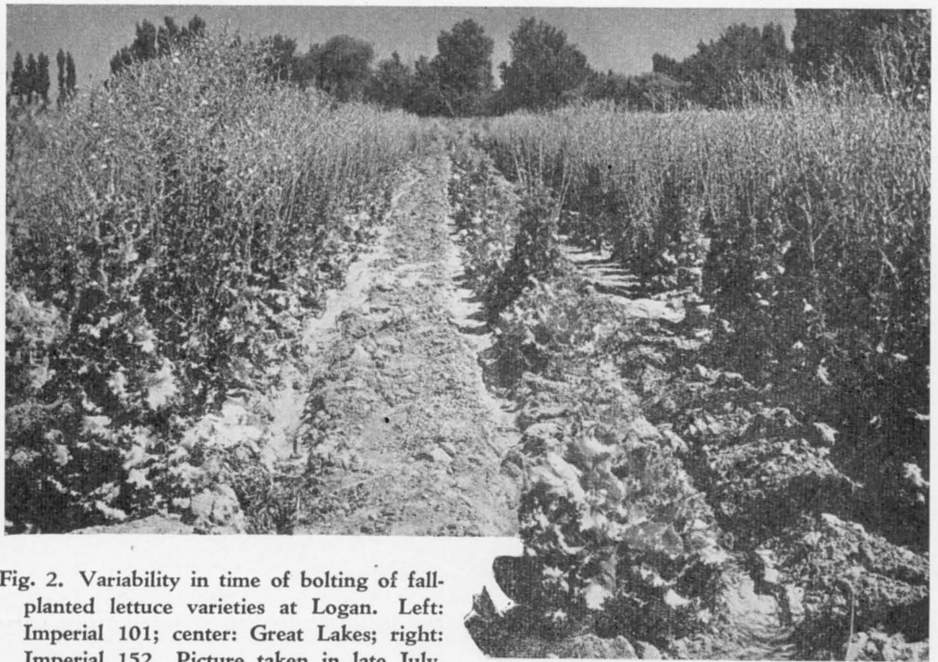


Fig. 2. Variability in time of bolting of fall-planted lettuce varieties at Logan. Left: Imperial 101; center: Great Lakes; right: Imperial 152. Picture taken in late July, 1946

The yield of seed from the various plantings is given in table 3. While the data for one year are not conclusive, they do show that there is little difference in the average yield of seed from the plots where the heads were removed from those in which the heads were split open. In this first year's results it should be noted that in varieties having a strong seed stalk, such as Imperial 615 and Imperial 101, the yield was reduced where the head had been removed, whereas in the varieties Imperial 44 and Great Lakes which have a weaker seed stalk the yield was slightly increased. Whether this trend will be supported by future tests remains to be seen, but if it is, this factor may have considerable importance. The yield of the fall-planted material was greater in most cases than that planted in the spring.

The results of the one year's study of seed production in over-wintering lettuce gives at least an indication of the value of this method in Utah. Certainly with a slow-bolting type such as Great Lakes this method appears essential if

seed is to be grown successfully in northern Utah. While a normal summer growing season may be sufficiently long for most other varieties there are other factors in favor of the over-wintering method in the production of lettuce seed of any variety. When the lettuce is over-wintered, thinning can usually be done as early as most growers would be able to plant their crop in the spring, thus eliminating competition for labor later when the sugar beet crop needs thinning. Furthermore, harvesting can be done in August when the weather is usually more favorable. In addition to these advantages this method permits better roguing of the fields at the time when the heads are normally harvested for market than is usually possible from the spring-planted lettuce.

As yet, enough work has not been done on the removal of the heads to determine its relative value in seed production. However, if this method proves advantageous it will supply an additional reason for over-wintering because a grower may, in some localities, have a sales outlet for the heads. It is doubtful whether this method would be normally advisable for the spring-planted lettuce as it would probably delay seed maturity.

The success or failure of the over-wintering of lettuce is dependent upon various cultural practices. From past experience it has been found that the time of planting will greatly influence the ability of the plants to over-winter. If a lettuce plant is too large or too

(Continued on page 17)



Columbia first cross yearlings and lambs from experimental flocks

Sheep Management and Breeding Studies Reviewed

Columbia First Cross Lambs Have More Open Faces, Smoother Bodies, More Desirable Mutton Conformation, Are in Better Condition at Weaning Time, Have Wool Of Longer Staple Than Rambouillet First Cross Lambs

The first annual field day to review progress of the project on the improvement of range sheep and sheep management practices on southern Utah ranges was held at the Branch Agricultural College Valley Farm, Cedar City, on October 30, 1946. Dr. H. Wayne Driggs, director of the B.A.C., spoke briefly on the research and teaching programs of the college in relation to the welfare of the livestock industry. The results of two years' work were presented by exhibits and discussion by the project leaders, Dr. T. Donald Bell, assistant professor of animal husbandry, and Dr. Louis L. Madsen, head, Department of Animal Husbandry, Utah State Agricultural College. The project is sponsored by the Utah Agricultural Experiment Station in cooperation with the Branch Agricultural College, the U. S. Bureau of Land Management, and the Intermountain Forest and Range Experiment Station.

The article here is a summary of the preliminary data presented at that time, compiled by Dr. T. D. Bell and Dr. L. L. Madsen.

THE objectives of the range sheep breeding and management study initiated two years ago at the Branch Agricultural College at Cedar City may be briefly stated as follows: (1) to determine the feasibility of developing a superior flock of sheep having smooth body, open face, long staple, and producing a high fleece weight of clean wool and a large market lamb by starting with a herd of white-faced range ewes of average quality and through the use of high quality rams; (2) to study the comparative value and adaptability of high quality Rambouillet and white face crossbred sheep for southern Utah range conditions; (3) to study the factors affecting the percentage

lamb crop and determine the feasibility of increasing this percentage under range conditions; and (4) to determine the practicability and economic value of good spring and fall farm pastures and supplemental feeds during fall, winter, or spring months in the range sheep enterprise.

The project is set up as a unique range-farm enterprise that probably cannot be duplicated anywhere in the United States. The Valley farm, consisting of 760 acres, together with about 3000 acres of summer range land located about 15 miles east of Cedar City was purchased, and an allotment of about 15 sections of winter range land located at Modena, about 50 miles to the west, was obtained through cooperation of the U. S. Bureau of Land Management. About 900 yearling white face range ewes were purchased for the experimental program in 1944. These ewes were divided into two groups of approximately equal size and quality with one

group being bred to Rambouillet rams of desired type, i.e. large smooth bodied rams with open faces, and having long staple, and heavy fleece weight. The other group was bred to Columbia rams of improved type. After the first year the breeding groups were alternated. The two breeding groups are managed under similar conditions during the breeding season and then they are combined following breeding to insure uniform treatment. Briefly, the year-around program consists of breeding on the farm beginning November 1, grazing on the winter range until early March, shearing before shed lambing on the farm, ewes and lambs taken to summer range about mid-June, and lambs weaned and returned to the farm about September 15, with the ewes returning about one month later.

Numerous production records have been taken. The most important of these are (1) lambing percentages and pounds and characteristics of lambs

Table 1. Comparative lambing and weaning performance during 1945 and 1946

	Range ewes bred	Ewes alive at lambing	Lambs born percent	Lambs docked percent	Lambs weaned percent	Avg. wt. of lambs weaned lbs.	Lbs lamb p'duced per ewe at weaning lbs.	Lambs graded fat percent
1945								
Columbia first cross	442	439	86.7	74.9	60.8	79.5	48.33	19.1
Rambouillet first cross	447	400	91.7	77.2	65.7	75.8	49.80	4.6
1946								
Columbia first cross	400	395	106.6	102.3	82.8	88.4	73.19	52.1
Rambouillet first cross	400	396	125.0	112.4	92.9	85.3	79.14	24.9

produced by each ewe, (2) pounds, staple length, shrinkage and grade of wool produced by each breeding ewe and yearling, (3) performance of farm and range-fed ewe lambs, (4) nursing qualities and longevity of ewes, (5) miscellaneous studies on pasture and feed lot fattening, trailing and hauling studies and carcass qualities of market lambs produced, and (6) general adaptability of the Rambouillet and crossbred types of sheep to southern Utah range conditions.

Preliminary data were presented for Rambouillet and Columbia first cross yearlings and lambs born in 1945 and 1946, respectively. Data on lambs born and weaned based on number of ewes bred and alive at lambing time are given in table 1.

During both years of the study the Columbia first cross lambs have averaged about 3 to 4 pounds heavier at weaning than the Rambouillet first cross lambs. A larger percentage of the Columbia cross bred lambs have also been graded "fat" by a commercial buyer each year. However, the percentage of lambs born and weaned and, therefore, the pounds of lamb produced per ewe was higher for the Rambouillet first cross lambs.

Lambs from both groups were weighed at intervals on the summer range. Both groups made rapid gains during the first 50 days but gains became slower after that time. Little or no gain was recorded for the lambs from early in September to weaning time.

At weaning time each year one group of lambs has been hauled to the Valley farm by truck and a comparable group has been trailed. Trucking the lambs has not reduced the shrinkage over trailing for the comparatively short distance of 15 miles from the range to the farm.

Each year as the lambs are assembled on the farm they are scored individually for face covering, body and neck folds,

Table 2. Comparative body weights and wool production of farm and range-fed ewe lambs

Management	Rambouillet—first cross				Columbia—first cross			
	Live weight		Wool		Live weight		Wool	
	Mar. 6	July 19	Grease	Staple	Mar. 6	July 19	Grease	Staple
Farm fed	96.3	108.8	9.08	2.53	99.5	114.2	10.50	2.56
Range fed	82.5	99.5	7.95	1.93	87.6	106.6	9.32	2.45
Difference in farm fed lambs	13.9	9.3	1.13	.60	11.9	7.6	1.18	.11

Table 3. Wool information (1946 clip)

	Grease wt.	Shrinkage core estimate	Staple length	Percentage grade distribution			
				Fine	1/2 blood	3/8 blood	1/4 blood
	pounds	percent	inches	percent			
Range ewes bred to Columbia rams (310 day crop)	9.9	64.5	1.9	48.3	43.7	7.9	0
Range ewes bred to Rambouillet rams (310 day crop)	9.7	63.5	1.9	43.3	47.9	8.6	0
Rambouillet lambs first cross—farm fed	9.0	60.6	2.5	55.5	42.5	1.8	0
Rambouillet lambs first cross—range fed	7.9	61.7	1.9	62.5	37.5	0.0	0
Columbia first cross lambs—farm fed	10.0	62.5	2.5	4.1	31.2	58.3	6.2
Columbia first cross lambs—range fed	9.3	63.9	2.4	6.8	50.0	39.6	3.4

and condition. Staple length of fleece is measured. Results to date indicate that the Columbia first cross lambs have more open faces, smoother bodies, more desirable mutton conformation, are in higher condition at weaning time and have wool of longer staple.

Shipping and slaughter data were also presented on grass fat lambs directly from the range and from pasture fattening trials. In general both types of lambs have had about the same shrinkage to market when shipped to Los Angeles, but the Columbia first cross lambs have usually killed out a higher proportion of choice carcasses than the Rambouillet first cross lambs.

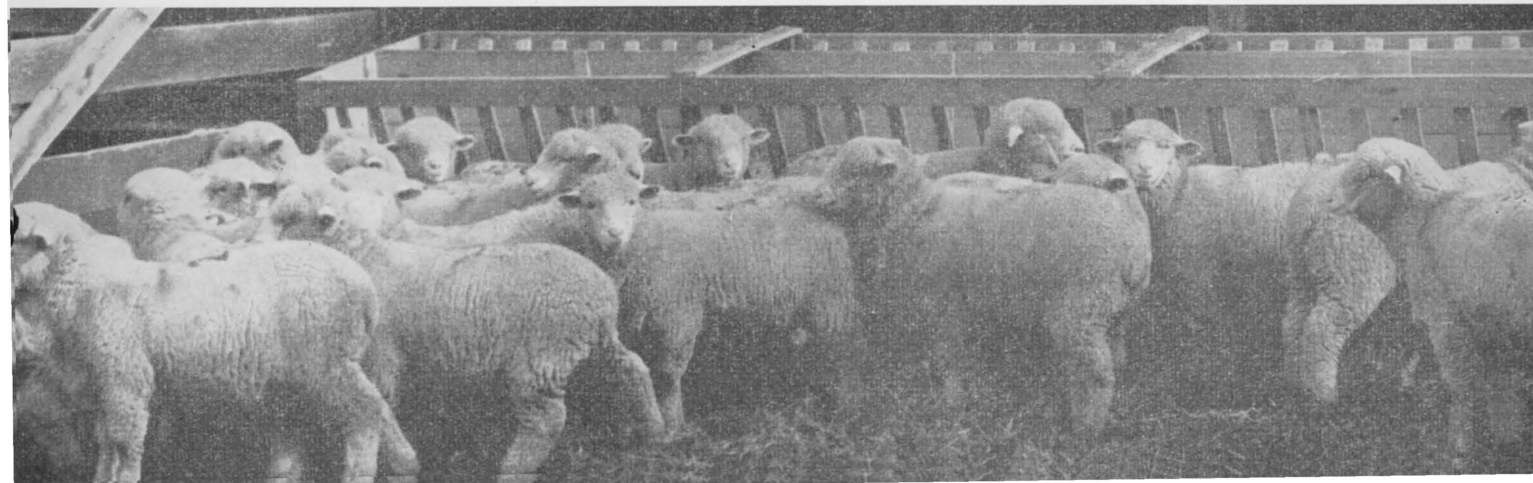
Preliminary results were also present-

ed on a study planned to determine the effect of the method of wintering ewe lambs on their future productive ability. One group was fed on the farm beginning November 26 and a comparable group was trailed with the herd to the winter range. All the lambs were weighed on March 6 after the herd had been brought in from the winter range. They were shorn on March 25. On July 19, 1946, just preceding movement to the summer range, all of the individuals, now yearlings, were weighed again.

The comparative body weights and grease wool weights are summarized in table 2.

(Continued on page 15)

Rambouillet first cross yearlings and lambs from experimental flocks



Research Findings Offer Solutions for Many Farm Problems

Brief Summaries of Outstanding Results Show Scope of Investigations
Now in Progress at Experiment Station

DURING the past two years material advances have been made in the research program of the Utah Agricultural Experiment Station. The compilation of the biennial report provides a time for inventorying the various phases of Station work, evaluating the results and realigning the program to meet the changing needs of agriculture. While it is impossible because of space limitations to report the progress on each of the ninety-one projects on which research is being conducted at the present time, some of the more outstanding accomplishments of the past biennium are reported briefly in this article.

Farm Labor Requirements

Studies on the labor requirements for agricultural production in Utah have made available to farmers and labor administrators in the state the amount of labor required for each county, for each crop, and for each kind of livestock. The study showed that there were about 400,000 man months of labor

needed last year, and that of this amount 75,000 man months were not available in the areas needing labor, but had to be imported.

Superior Pasture Mixtures

Experimental studies on pasture grasses begun two years ago in cooperation with the Department of Agriculture indicate the possibilities of more productive grass and legume mixtures for irrigated land. Red clover was found to be especially valuable for its high yield the first year. High yielding mixtures contained either brome, orchard, or tall fescue with red clover, ladino clover, or alfalfa as the legume. In contrast, Kentucky bluegrass, meadow fescue, meadow foxtail or perennial rye, strawberry clover or any of the sources of white clover as the predominant species or any of these in combination showed relatively low yields.

Ladino clover appears to be the most desirable perennial legume for rotation pastures. It is highly palatable, recovers

quickly after grazing and appears to be aggressive enough to maintain itself in mixtures with such species as brome and orchard. In the tests it exceeded white clover in yield by 70 percent the first season and 30 percent the second.

Alfalfa Seed Yields Increased With DDT

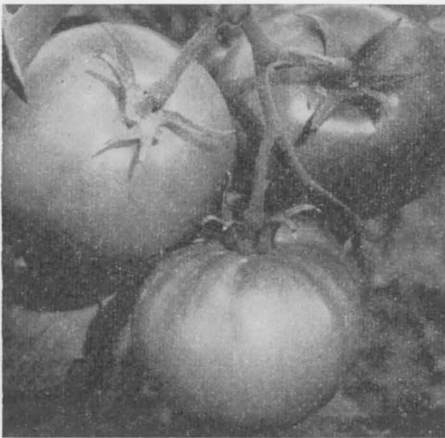
Alfalfa seed plots at the Utah Station dusted with DDT to control lygus bugs produced 400 pounds of seed per acre. Commercial fields dusted with DDT produced from 200 to 300 pounds of seed per acre, while adjacent fields not dusted produced less than 100 pounds.

In 1925 Utah produced approximately 26 million pounds of seed. In 1944 the state produced only 16 percent of the 1925 crop. The average yield in 1925 was 382 pounds per acre; in 1945, 60 pounds per acre.

Cooperative research with the U. S. Department of Agriculture to find the cause or causes of these decreased yields has shown the increase of lygus bugs in the fields to be an important factor. Until DDT became available, no insecticide had been found that would control these insects at a cost that was economically feasible. During the last two years tests with DDT have demonstrated that this insecticide offers promise of greatly increased production of seed through the control of lygus bugs.

Alfalfa Meal in Turkey Feeding

Experimental work at the Utah Station has shown that turkeys fed up to 35 percent alfalfa meal in the ration made as great gains in weight, showed no higher mortality, graded as high, and consumed no more feed per pound of gain than birds fed on rations containing



smaller percentages of alfalfa meal. And these gains were made at considerably less cost.

Alfalfa meal usually sells in this area for approximately 1 cent per pound less than grain. Birds fed mashes containing a high percentage of alfalfa meal eat less mash per pound of gain and more grain. As the mash is more expensive than the grain, this is another saving. In total, there is an approximate saving of 35 to 50 cents per bird in feed cost. In a flock of 3,000 birds, the average for the state, the savings would amount to from \$1,050 to \$1,500.

Vitamin Studies With Vegetables

Increase in the maturity of peas as shown by starch content and tenderometer reading caused a gradual decrease in ascorbic acid content of fresh peas and in carotene content of frozen peas in studies conducted at the Utah Station. Canned peas retained an average of 40 percent of their ascorbic acid content; frozen peas retained 68 percent. Thiamine values showed a slight increase with increased maturity. Riboflavin values were not influenced by stage of maturity.

A loss in ascorbic acid content of approximately 10 percent occurred during the six minutes required for shredding cabbage. Holding the cabbage at room temperature in an uncovered bowl, or in the refrigerator in a covered container for periods up to 1½ hours did not make any marked difference in the ascorbic acid content. The cabbage kept in the refrigerator was superior in quality and flavor.

Vitamin Studies With Lamb

In a study of the effect of various factors, including freezing and cooking procedures, on the nutritive value of lamb, experiments have shown that pan

broiling results in a loss of approximately one-third of the thiamine. The loss resulting from freezing was slight. Similar results were obtained on lamburger.

Close Spacing Factor In High Carrot Seed Yields

Close spacing of either stecklings or seed in the production of carrot seed was found by the Utah Station to be one of the main factors in high seed yield. Thinning of seed-to-seed carrots is expensive and reduces acre yield.

Harvesting and Storage of Onions

Studies on the harvesting and storage of onions show that onions topped before pulling kept as well as those pulled and then topped. The first method makes it possible for the onions to be lifted from the ground with a plow, thus reducing the hand labor involved.

When packed loosely in small crates with extra slats nailed on the bottom to allow ventilation and stored in a place where air can be blown in, the spoilage was reduced materially.

Fertilizers Increase Yields of Dry-Land Wheat

Winter wheat responds to nitrogen fertilizer by increased yields or higher protein content, or both, depending on location. This has been shown by tests conducted in the dry-land wheat producing areas of the state. With present prices the dry-land farmer should find it profitable to use commercial fertilizer on his wheat land.

Fertilizers Increase Cherry Yields

Results from use of commercial fertilizers in cherry orchards confirm those already reported for peach orchard soils. Where no fertilizer was used a sample plot of 18 trees produced 2,517 pounds of cherries; with treble superphosphate

the yield was 3,173 pounds; with farm manure, 3,308 pounds; ammonium sulfate, 3,776 pounds; ammonium sulfate and treble superphosphate, 4,065 pounds.

Thiamine Higher in Dry Land Than Irrigated Wheat

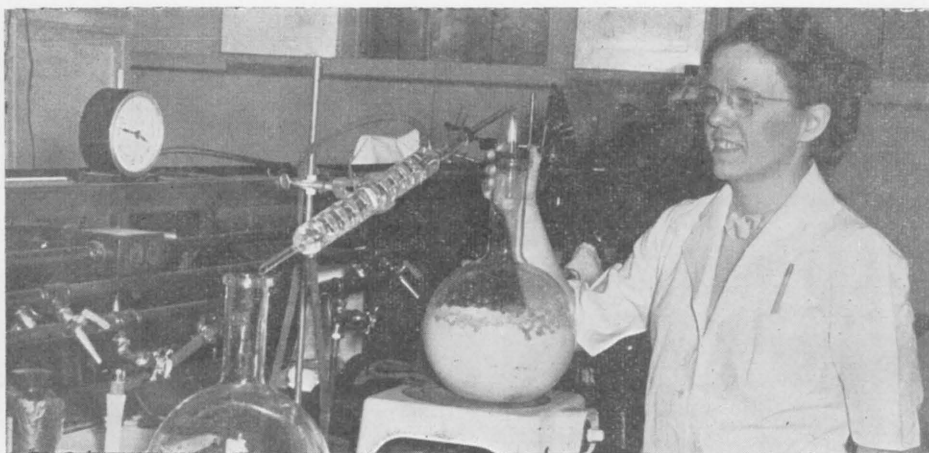
Studies at the Utah Station have shown that the thiamine content of dry farm wheat is considerably higher than that of irrigated wheat. These studies also showed that flour may be kept for from six to twelve months without appreciable loss of thiamine.

Basic Information In Controls Of Virus Diseases In Stone Fruits Worked Out

Work is progressing on the study of virus diseases of stone fruits. For the first time the virus in western "X" red leaf chokecherry has been transmitted to the peach and the western "X" virus in the peach transmitted successfully to the chokecherry. The same virus in the chokecherry has again been transmitted to sweet and sour cherry on mahaleb roots producing a wilt and decline type of disease. These results indicate that the virus producing wilt and decline in the cherry on mahaleb root is the same as the one producing western "X" in the peach. This information is basic to the working out of control measures.

Better Educated Youth Leave State

A study of migration in Utah shows that it is the better educated younger youth who are leaving the state for better opportunities elsewhere. Of the youth who stayed at home 9.6 percent was in the professional and semi-professional classes, while of those who left the state 17.4 percent was in these classes. More individuals in the age groups 19, 20, and 21 left the state than any other age groups. These groups repre-





sented 35.6 percent of those migrating from the state.

Since the 1910 census net migration from Utah has increased steadily. In 1910 it was only 1,259; in 1940 it was 91,688. Of these numbers, the largest percentage is from the rural areas where opportunities for employment are fewer.

DDT Effective In Thrips Control In Onions

In cooperative experiments with the U. S. Department of Agriculture on the control of thrips in onion seed fields with DDT, plots treated with 10 percent DDT yielded 300 pounds of cleaned seed per acre compared with 92 pounds on undusted plots. The dust was applied twice with a hand duster at the rate of 30 pounds per acre. The first application was made after the seed stalks had formed buds, and the second two weeks later after the buds had opened, but before blooming had begun.

This work not only demonstrated the effectiveness of DDT in thrips control, but has shown these insects to be a major factor in decreased onion seed yields.

Seeding Spring-Fall Ranges

Utah has great need for improved spring-fall range land to balance the winter and summer range in the year-round management of range livestock. Because of the vast acreage of this land now occupied by sagebrush and cheatgrass, means of eradicating these plants and replacing them by more valuable grasses are of statewide interest. Experiments on this problem by the Utah Station have shown that seeding success was much greater on heavily disked sagebrush or burned sagebrush land than with any other treatment. The greatest success of seeding with the

minimum of cost was obtained by burning sagebrush and drilling grass in the spring following burning. Excellent stands were obtained from *Poa bulbosa*, slender wheatgrass, and smooth brome-grass. Of the new species tried, the following gave promise in the order named: *Agropyron trichophorum*, *Agropyron elongatum*, and *Agropyron intermedium*.

Effect of Herbage Removal on Wheatgrass

In studies on the effect of herbage removal on the growth physiology and yield of bunchgrass, the Utah Station found that generally early spring clipping was less harmful than late spring clipping. Chemical analyses showed rapid decrease in forage value of the plants as the season progressed. It was found that wheatgrass fully grazed at the end of its growing period was often killed after only one season of grazing.

Where wheatgrass is grazed in the summer and fall it will likely necessitate protein and phosphorus supplement for the most satisfactory results. Lignin content and lignin to cellulose ratio both suggest that wheatgrass range is a poor source of nutrition after the spring growing period.

New Irrigation Projects

Data collected on proposals for new irrigation projects in Utah show that 1,387,050 acres of land are involved. Of this land, 593,850 acres are now irrigated but need supplemental water. The balance, or 793,200 acres, is not now irrigated. If all this land is irrigated, it is estimated that approximately 5,830 new farms could be established. However information indicates that less than 2 percent of the land area is in proposals that have been sufficiently in-

vestigated and found feasible for immediate development. About 56 percent of the land area is in proposals that need further investigation to determine their feasibility.

The acreage of land for proposed development by drainage basins is as follows: Weber River - Utah Lake, 389,700; Green River, 341,000; Sevier River, 319,100; Bear River, 242,150; Colorado River, 77,900; and Virgin River, 17,200.

Trend Toward Marketing Utah Products in California

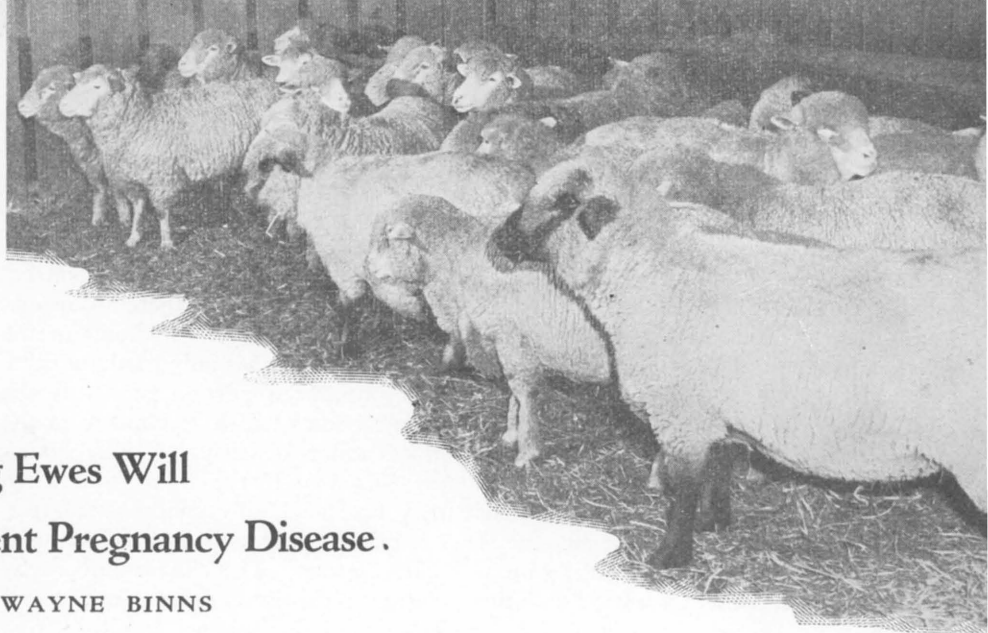
A study of where Utah farm products are marketed shows a definite trend toward shipping to west coast markets rather than east. While agricultural production has increased in California it has not kept pace with the population increase, thus opening up opportunities for Utah to market her surplus farm products on the California market which is much closer than the eastern markets, and consequently these products can be moved there at much lower cost with less spoilage. Such products as meat animals, most livestock products, feed grains, late potatoes, and canning vegetables, except tomatoes, are not produced in sufficient quantities in California to meet the market needs. Because of the differences in the time of maturity of certain crops and other factors that give rise to trade, California also imports considerable quantities of certain products that it also exports. These opportunities can be developed more fully by Utah producers by better grading, packing and selling methods.

Changes in Pea Grading Recommended

A study of the harvesting practices on yield and quality of canning peas has established several factors of economic importance. The present commercial systems of grading have been found to differ and the returns per acre realized by the grower are far from the same under the different grading methods. On an acre basis all present systems of grading and paying have been found to encourage the marketing of low quality peas. A high correlation has been determined between the tenderness of peas and the starch content and both are suitable indices of quality. The vitamin C content of canning peas was found to decrease as the peas passed the prime stage of maturity. On the basis of this work canneries of Utah have agreed to raise

(Continued on page 16)

No Other Farm Animal Produces More in a Short Time Than the Ewe Carrying Twins. She Should Be Fed Accordingly



Adequate Feeding Of Breeding Ewes Will Prevent Pregnancy Disease.

By WAYNE BINNS

PREGNANCY disease of ewes is one of the more important sheep diseases in Utah and results in high economic losses to sheepmen each year. It is difficult to estimate the annual loss, but it averages 5 percent, and in some flocks it reaches 10 percent or higher. At the present value of sheep, the loss amounts to about \$100,000 annually.

Ewes from four to six years of age and carrying more than one lamb are more commonly affected. Twinning is more common in ewes of this age and they usually lack some of the vigor and strength of younger ewes. Only on rare occasions have the symptoms been reported in young pregnant ewes. Usually the ewes are in the fourth or fifth month of pregnancy when the disease occurs. A ration inadequate to support the demands made upon the system through the gestation period, especially during the last two months, is the pri-

Dr. Wayne Binns is head of the Department of Veterinary Science.

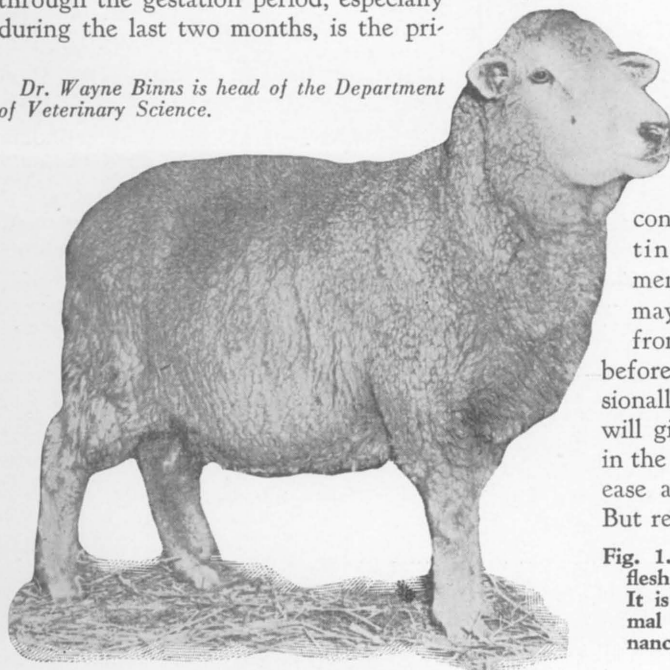


Fig. 1. An aged ewe, thin in flesh, and heavy with lamb. It is usually this type of animal that suffers from pregnancy disease

mary cause of this disease. For many years it was thought that lack of exercise was one of the contributing causes, but in 1942 studies reported by O. M. Muth and J. M. Shaw of the Oregon Agricultural Experiment Station showed this not to be true.

Symptoms of the Disease

The onset of the disease is gradual; the first noticeable symptoms are the refusal of feed and water. The affected individual will be found standing by itself away from the rest of the herd for long periods of time, grinding its teeth and twitching its ears. In 12 to 24 hours the animal becomes depressed and pays no attention to persons approaching and may show marked nervous disturbance, such as walking in a circle, standing with its head pressed against some object in the pen or turned to one side. The animal soon loses control of its legs and goes down on its side. Its head may be pulled to one side and it may remain quiet in a comatose condition or show continual walking movements with its legs. It may remain in this state from two to several days before finally dying. Occasionally the affected animal will give birth to her lambs in the early stages of the disease and gradually recover. But recovery in the advance

stages of the disease is rare and the occasional animal that does get well gives little or no milk and is unable to support her lambs. The blood, urine, milk, and saliva from affected individuals show the presence of ketone bodies of which acetone is the principal one.

Fig. 2. Group of pregnant ewes in feed lot on alfalfa hay and grain ration to prevent loss from pregnancy disease

The postmortem findings on ewes that have died from this disease invariably show two or more lambs on examination and a marked yellow coloration of the liver, called fatty degeneration.

Prevention of the Disease

In the early stages of pregnancy disease when the animal begins to show ketone bodies in the blood and urine, and before marked external symptoms appear, the administration of sugar solutions, corn syrup, or molasses has been beneficial. In the advance stages treatment is of little value.

Prevention of the disease lies not in administering medicinal agents to the susceptible animals, but in proper feeding of adequate rations to all pregnant ewes during the gestation period.

Preventive measures should begin when sheepmen pick out the ewes for breeding stock. Only strong, vigorous ewes that will be good feeders should be kept. These animals should then receive all the good quality alfalfa hay they will clean up, which will be from 3½ to 4½ pounds per head per day, and one-third pound of grain per head daily. During the last two months of the gestation period the grain ration should be increased to ½ pound per

head daily. Plenty of feeding space should be provided so all animals can get up to the manger at the same time without crowding. A detailed discussion of the feeding problems of sheep is found in the 1939 yearbook of agriculture, **Food and life**. Clean, fresh water and coarse ground iodized salt should be available at all times. Each ewe will consume about one-half ounce of ground salt a day, which is important to stimulate water consumption, which in turn insures proper digestion of food and elimination of waste products. Without a sufficient water intake, the amount of dry feed consumed will be greatly limited even though there is a good quantity and quality offered.

Animals on the above type of ration should show a 12 to 15 pound monthly gain in body weight. To insure that their sheep are making proper gains, sheepmen should weigh certain individuals each month, and if the gain in body weight is not being made, the ration and feeding conditions should be changed so as to insure the proper gain.

The weight of the uterus and its contents at lambing time in a 100 pound ewe is about 25 pounds. If the total gain in weight for the last two months of the gestation period does not increase at least this amount in the ewe carrying twins, she will be forced to draw upon her body reserves and will be in danger of contracting pregnancy disease.

Physiological Processes in Pregnancy

It is difficult to realize the importance of proper feeding of pregnant ewes without first having some understanding of the physiological process involved in pregnancy. Pregnancy is a critical period for the ewe. In addition to nourishing her own body including the fleece, she is furnishing food for the development of the unborn lamb. During the last two months of the gestation period, the developing lambs grow rapidly and exert heavy demands upon the ewe. If she does not get the necessary food requirements to satisfy the demands made upon her system, she must utilize her own fat, and before the fat can be completely utilized in her body, carbohydrates must be present. The carbohydrates that are taken into the body in excess of the amount necessary for maintenance are stored in the liver and body tissues in the form of glycogen. When the carbohydrate supply is insufficient in the feed to meet the body require-

ments, the stored glycogen is broken down and used as energy-producing materials for the body as an aid in the metabolism of fat, and it also assists in eliminating poisonous substances. But the stored supply of glycogen soon becomes exhausted when there are insufficient amounts of carbohydrates in the ration and the fat is only partly utilized. The un-utilized portion of fat is the ketone bodies which accumulate in the blood and body tissues. These bodies are poisonous to the animal and when they become highly concentrated they cause the symptoms observed in pregnancy disease. The exhaustion of glycogen in the liver causes replacement by fat and this inhibits the liver from eliminating the poisonous ketone bodies and results in the poisoning of the animal and causes the yellow coloration of the liver found on postmortem examination.

There is no other farm animal that is expected to produce more in such a short time than a ewe carrying two or more lambs, so she should be fed accordingly.

NEW PUBLICATION

Bul. 325. An economic study of sheep production in southwestern Utah, by D. A. Broadbent, G. T. Blanch, and W. P. Thomas. Department of Agricultural Economics. 64 p.

This publication reports an economic analysis of the range sheep enterprise in Washington, Iron, and Beaver Counties. The various factors which make for success or failure of the sheep enterprise are discussed. The profits to the average operator amounted to \$2.38 per ewe in 1939-41, but in 1945 there was a loss of 39 cents.

This bulletin may be obtained on request from the Utah Agricultural Experiment Station, Logan.

CHERRY ORCHARD SOILS

(Continued from page 3)

were applied to the soil around pairs of trees within each cover crop treatment. The fertilizer treatments included ammonium sulfate, 3 pounds per tree; treble superphosphate, 3 pounds per tree; ammonium sulfate and treble superphosphate combined; farm manure at a rate of about 10 tons per acre; and control trees without fertilizer. The experiment was repeated at three different locations in the orchard. The ammonium sulfate and farm manure were applied broadcast about each tree as far out as the drip of the branches. The treatments were made in early spring before blossom time and were disked into the ground. The phosphate was placed in small pockets in holes opened up with a spade about each tree.

At harvest time the cherries from each experimental tree were weighed and graded. Notes were also taken on the color of the fruit and the general appearance of each tree. During the winter dormant period, measurements were made on the circumference of each tree trunk and the length of growth made by terminal branches during the previous summer. The average yield and grade of fruit and the average yearly terminal branch growth under each treatment are shown in table 1.

From the yield data and the observations the following conclusions have been drawn:

1. The yield of cherries and the growth of the trees responded well to fertilizers containing nitrogen. Cherry yields were increased almost a ton and a half per acre from an application of three pounds of ammonium sulfate per tree. The cost of fertilizer for the 50 trees per acre would be about \$3.60. The nitrogen fertilized trees had a dark green

Table 1. The yield and size of Lambert cherries and average annual growth of terminal branches on trees under different fertilizer and cover crop treatments (Lee Jost Orchard, Kaysville, Utah; pounds per acre — 50 trees)

Fertilizer	Avg. yield per acre	Fruit over 1" drain	Growth of branches per year
	<i>lbs.</i>	<i>percent</i>	<i>inches</i>
No fertilizer	7,390	73	9.0
Ammonium sulfate, 3 lbs./tree	10,194	69	10.3
Treble superphosphate, 3 lbs./tree	8,221	66	9.5
Ammonium sulfate and treble superphosphate combined	11,300	58	11.0
Farm manure, 10 tons per acre	9,196	80	9.4
Clean cultivation	9,430	68	9.7
Vetch green manure	10,118	67	10.0
Barley green manure	8,540	72	9.7

healthy appearance and made a good growth each year.

2. The trees did not seem to respond appreciably to treble superphosphate alone. The average yield was a little greater than with the untreated trees but the difference was so small that it could be the result of natural differences in the trees rather than to response to fertilizer treatment. The phosphate treated trees had a light green color similar to that of the unfertilized trees.

3. Highest yields were obtained from the combination treatment of ammonium sulfate and treble superphosphate. The increase was about two tons per acre from fertilizer costing \$7.55. The trees had a dark green healthy color and made better growth than trees receiving other treatments.

4. The farm manure treatment did not result in as high yields as nitrogen alone. Soil analysis for nitrate nitrogen at monthly intervals during the summer indicated that the lower response to manure is probably because it did not supply adequate amounts of available nitrogen. This conclusion is supported by the smaller annual growth of manure treated trees than those receiving ammonium sulfate, and by other experiments with farm manure as a fertilizer. The manure treated trees had a good color, though not as dark as those receiving ammonium sulfate.

5. The unfertilized trees produced less than any of the fertilized trees. The foliage had a light green color, and the tree growth was less than with the other treatments. It became apparent that sweet cherry orchards will decline rapidly if the soil is not maintained at a high state of fertility.

6. Yield and growth of terminal branches slightly favored the use of vetch over weeds and clean cultivation or small grains. Such results agree with the fact that vetch is a legume and so is able to increase the supply of nitrogen in the soil by utilizing part of that in the air.

7. The size of the cherries generally decreased as the yield increased. Consequently, the increased yields from the various treatments resulted more from a greater number of harvested cherries per tree than from increased cherry size. Farm manure was the only treatment that gave an average cherry size greater than no treatment. In this case, about half of the difference in yield between trees receiving manure and those not fertilized could be accounted

for on the basis of increased fruit size, was from larger numbers of fruit per tree and the remaining half of the increase tree.

Cherry Orchard Soil Management Suggestions

From these studies and observations, the following suggestions are offered for the management of sweet cherry orchard soils:

Fertilize sweet cherry trees with one half to one pound of available nitrogen fertilizer per tree each year. This requires three to five pounds of ammonium sulfate or two to three pounds of ammonium nitrate.

The addition of a phosphate fertilizer in combination with the nitrogen fertilizer may further increase yields and tree growth beyond that induced by the nitrogen fertilizer alone. About 1 to 1½ pounds of available phosphoric acid per tree every second year is suggested. This should be applied in any brand of superphosphate fertilizer. Three pounds of treble superphosphate (43%) or six to eight pounds of single superphosphate (18 to 20%) would be satisfactory.

A mixed fertilizer containing both nitrogen and phosphate may be more convenient and desirable to use than the single carriers if the price per pound of plant food is reasonable. Amounts to apply can be calculated from the above suggested rates. For example, ammonium phosphate (16-20-0) at a rate of 4 to 6 pounds per tree should be adequate.

Commercial fertilizers containing phosphate should be placed into the soil deep enough to be readily reached by tree roots. A fertilizer drill is best. The placement should be 4 to 6 inches deep, or as deep as placement can be made without injuring the roots. If fertilizer placement equipment is not available, broadcast the material on the soil surface and disk into the ground. Fertilizer should be placed in the vicinity of the area where the irrigation furrows are to be located. The fertilizer should be applied in early spring before blossom time.

Farm manure should be applied to cherry orchards wherever it is available. It furnishes plant food and organic matter and gives the soil a good tilth. If an average application of farm manure is applied, commercial fertilizer should also be used at about one half of the rates suggested for orchard land not receiving manure. It is recommended that unless ample manure is available to apply fifteen tons or more to orchards each year, additional nitrogen be supplied in commercial fertilizers. Where manure is applied the commercial nitrogen application should be about half that recommended where no manure is available. It is also important to work manure into the soil immediately after distribution so that its content of nitrogen will be conserved.

Cover crops should be grown where sufficient water is available to support them. A legume crop which can be disked under early in the summer is recommended. Vetch and sweet clover have been found satisfactory. Other crops such as Austrian winter peas may also be used.

Cherry trees should not be neglected each year after the crop is harvested. If any water can be made available irrigations should be continued throughout the season so that the trees do not suffer from drought.

SHEEP STUDIES

(Continued from page 9)

Results on comparative wool weights, shrinkage estimates by the coring method, staple length, and grade distribution are given in table 3.

As might be expected, the Columbia first cross yearlings sheared more grease wool with a longer staple than the Ram-

bouillet first cross yearlings. The Columbia crosses had coarser wool with most of the fleeces grading ½ blood and ⅜ blood. Virtually all of the Rambouillet first cross yearlings had fleeces grading fine and ½ blood.

These studies are being continued for the purpose of standardizing as much as possible sheep breeding and management practices in Utah.

DRY-FARMING PRACTICES

(Continued from page 5)

Tillage Tests

Deep fall or spring plowing, frequent harrowing of fallow land, and harrowing of growing wheat were considered essential to successful dry farming 35 years ago. Spring plowing to a depth of 5 or 6 inches with a large one-way disk and maintaining a rough unharrowed surface during the summer have been found to give as high yields as a deeply plowed fallow frequently tilled. But more important, these newer practices tend to decrease erosion. Harrowing of growing wheat decreased yields.

Fertility Trials

The fertility tests at the Nephi Station include application of barnyard manure, plowing under wheat and peas for green manure, and treatment with nitrogen and phosphate fertilizers. Barnyard manure in amounts of 5 to 10 tons per acre applied in alternate years or every 4 years has increased wheat yields as well as quality 20 percent. Peas plowed under at various stages of growth have not increased yields above wheat alternating with fallow but have added 2 to 3 points to the protein content of the wheat. Phosphate has had no effect on yield or quality of grain, but use of nitrogen fertilizers such as ammonium sulfate and sodium nitrate has shown marked increases in both yield and quality of wheat.

Miscellaneous Tests

In the early period of dry farming the rate of seeding ranged between 2 to 3 pecks per acre. When conditions were favorable for germination good results were obtained but many times the low yields were obtained from plantings adequate stands. Tests on rates of seeding varying from 2 to 8 pecks, inclusive, seeded at two week intervals from July 15 to November 1, inclusive, were conducted at Nephi. The results showed a progressive increase in yield with increased rates up to 5 pecks with no decrease for the heavier rates. Seeding rates have, therefore, become standardized at 5 to 6 pecks to an acre.

In time-of-seeding tests, the highest yields were obtained from plantings made from September 15 to October 1. In dry falls later plantings produced highest yields.

Treating wheat for smut with either formalin or copper sulfate was formerly the only method of control. Many

farmers, however, got bad results with these treatments especially with formalin. The Nephi Station introduced the use of copper carbonate after finding that seed treated with this disinfectant dust produced significantly higher yields than that treated with either of the other two compounds.

When combines first came into general use it was considered by many operators that while this machine reduced the cost and time of harvesting grain, losses when compared to the header-thresher combination were much higher. A study of this problem showed that the loss from combines was approximately 1 percent with more than 4 percent from header-thresher outfits.

Up until a few years ago the price paid for hard red wheat varied on the basis of weight per bushel and color of grain. As an actual example, a farmer cut half his field before storm, the other half after. The first wheat cut weighed 60 pounds per bushel and graded dark hard, the wheat harvested after the storm weighed 58 pounds and graded hard red. The difference in price amounted to 25 cents a bushel. It was found at the Nephi Station that wheat which had bleached through being wet by rain milled out just as well as that harvested before a storm, with no reduction in quality for bread making. Milling wheat now is largely purchased on the basis of protein content.

Maintaining the nitrogen and organic matter supplies of our dry farms is a problem of major concern. Tests show that the loss of nitrogen in Juab Valley soils has amounted to 18 percent, and in Cache Valley dry land soils 20 percent. The loss of organic matter in each case was slightly more, thus showing a narrowing of the carbon-nitrogen ratio under crop conditions. In Cache Valley approximately one-fourth of the dry-farm land produces alfalfa. A comparison of wheat, virgin, and alfalfa land shows that on land which has produced alfalfa for approximately 5 years, 38 percent of the nitrogen lost is recovered, and on land which has produced alfalfa for 10 years or more 62.5 percent of the nitrogen lost is recovered. As a result of this added nitrogen, wheat yields and protein content of grain are maintained at a higher level for several years, although there is a gradual reduction with time.

Superimposed upon many of the tests at the Nephi Dry Land Station was a study of soil moisture. In tillage trials

it was found that depth of plowing, frequent harrowing of fallow, or no tillage of fallow had little or no influence on moisture stored provided weeds were kept under control. Time of spring plowing, however, had a marked influence on amount of soil moisture accumulated. It decreased with lateness of spring plowing in somewhat the same ratio that wheat yields decreased. Over the period of a crop-fallow cycle it was found that only 32 percent of the rainfall was stored as soil moisture; the other 68 percent was lost by evaporation and runoff, with a small portion moving down beyond the reach of plant roots.

In a study involving both soil moisture and nitrates it was found that delayed spring plowing not only reduced the moisture supply but the amounts of nitric nitrogen as well. Most of the available nitrogen accumulated during the fallow period was used up by the time winter wheat began to ripen. During the fallow period accumulation of nitric nitrogen largely occurred in the latter part of the summer even though moisture conditions were more favorable earlier. Most of the available nitrogen found at the end of the summer period in fallow was located the following spring but at lower depths. The close relationship between nitrates and yield indicated that the amount of available nitrogen had predictive value as to the production of the succeeding crop, the higher the nitrate content the higher the yield.

Thus the work at Nephi Dry Land Station has covered many of the problems of dry-land agriculture. And as evidence that it has set the pattern for better dry farming most of the practices of good husbandry now followed by dry farmers of the intermountain area originated at this Station.

RESEARCH FINDINGS

(Continued from page 12)

the price to the farmer of best quality peas as much as \$28.00 per ton.

Fertilizers Influence Yield and Maturity of Tomatoes

In Utah there are many tons of tomatoes grown for canning. However, the seasons are short and frequently the early frosts take much of the crop. An early tomato that is a high yielder is desirable. A part of this problem is for the plant breeders, but fertility also influences the yield, maturity, and quality of the tomato. From fertilizer trials con-

ducted in the tomato-producing areas of the state the following conclusions seem justified: 1. That tomatoes respond to phosphate fertilizer applications, the increase in yield often being several tons. 2. Phosphate has little or no influence unless placed at a depth of 3 to 5 inches in the soil. 3. Manure is an excellent fertilizer for tomatoes when applied in light applications supplemented with phosphate. 4. Nitrogen fertilizers alone encourage extensive vine growth and many large fruits but these fruits are slow in maturing and are more frequently taken by frost. This undesirable influence is further aggravated when the crop follows alfalfa. 5. Commercial nitrogen fertilizers used in moderate rates with phosphate increase yields on soil of low fertility.

During the postwar period successful farmers must neither show relaxation in their fight against nonfertility, erosion, disease, insect pests, nor will there be less need for research to find new varieties, new methods, more farm by-products, better means for preservation and storage, and the solution to a host of other problems. Consequently the Utah Agricultural Experiment Station will continue to the limit of its resources to study the problems that face Utah farmers.

OVER-WINTERED LETTUCE

(Continued from page 7)

small it is more subject to winter injury than one of medium size (about 2 to 2½ inches tall). Plants smaller than this are usually pushed out of the ground by alternate freezing and thawing in the spring, while larger plants may be killed by the freezing or rotting of the succulent root and crown.

Good drainage is also important. Low places where water will accumulate generally show a higher percentage of

winter killing. Even plants growing in small depressions will show this same condition. In planting it is well to sow on the edge of the bed and then the water will drain away from the plant. Walking on the seeded bed is definitely to be avoided.

While no research has been conducted on fertilizer requirements of overwintered lettuce it has been observed that more rapid growth is made where a nitrogen and phosphorus fertilizer is applied at the time of the first cultivation in the spring. A recommended application would probably be about 300 or 400 pounds per acre of a 10-20-0 fertilizer.

AGREEMENTS WITH OUTSIDE AGENCIES

(Continued from page 4)

the support of the Station, various state departments and agencies also contribute to the support of Station research. The Department of Publicity and Industrial Development is aiding in the drainage district survey, the State Department of Agriculture in the weed control program, the State Engineer's Office in the snow surveying work.

Private concerns who have an interest in furthering the solution of perplexing agricultural problems have given funds for research that could not otherwise be undertaken.

Swift and Company has contributed funds for the study of nutritional deficiencies in range forage and the supplementary feeding of livestock. A substantial gift from Sears-Roebuck Foundation has made possible the initiation of a beef cattle breeding project to develop lines of beef cattle that show improved characteristics in rate and economy of gain, in fertility, in nursing ability, in longevity, and in carcass quality. Gifts from the Amalgamated and the Utah-Idaho Sugar Companies are aiding to finance a project to determine the varying effect of soil moisture stresses, fertility levels, and density of stand on production of sugar from sugar beets. The Sugar-Beet Development Foundation has supplied funds for a study of mechanical thinning, cross blocking, and the tools to employ in growing sugar beets with a minimum of labor. Funds from the Kennecott Copper Company are being used for research on the value of copper and copper tailings as fertiliz-

Table 3. Yield of re-cleaned lettuce seed grown at Farmington and North Logan, 1945-46

Variety	Yield in lbs. per acre			
	Farmington		Logan	
	Fall planting	Spring planting	Fall planting	
	Heads cut off	Heads split open		
Imperial 44	257	226	136	127
Imperial 101	283	330	310	495
Imperial 152	246	272	186	279
Imperial 615	355	383	214	319
Great Lakes	154	137	*	97
Average	259	270		263

* Seed not harvested in time for inclusion

Table 2. Numbers and market grade of fall-planted lettuce varieties at Farmington, 1945-46

Variety	Heading percentage	Market grade of heads											
		No. 1		No. 2				Culls					
		Wt. in lbs.		Wt. in lbs.				Wt. in lbs.					
		No.*	Percent-age	Total	Per head	No.*	Percent-age	Total	Per head	No.*	Percent-age	Total	Per head
Imperial 44	84.4	51	41.4	59.50	1.16	35	28.4	27.25	.78	37	30.0	13.75	.33
Imperial 101	37.7	8	18.2	14.00	1.75	10	22.7	8.75	.75	26	59.1	17.50	.67
Imperial 152	75.3	34	31.8	42.50	1.25	35	32.7	26.75	.76	38	35.5	20.50	.54
Imperial 615	50.4	10	18.5	13.75	1.37	15	27.7	13.00	.87	29	53.7	22.50	.77
Great Lakes	65.1	38	48.7	52.00	1.37	17	21.8	11.50	.68	23	29.5	10.75	.46

* Total from four 45-foot rows (replications)

ers, and also in plant and animal nutrition. Still other private companies and local and state organizations give financial and other support to research projects.

The Station serves as a coordinating agency for the effective and efficient promotion of the research work and this outside aid implements the Station program through financial assistance and through the assignment of trained specialists who spend their time in the investigation of pressing problems which threaten the stability of Utah Agriculture.

Arrangements have been made for the purchase of the Dairy Experimental Farm from the Cronquist estate. This farm has been leased by the Station for the past thirty years.

Dr. R. J. Evans, head; Dr. D. W. Thorne, associate professor; H. B. Peterson, G. B. Stoker, assistant professors, Department of Agronomy and Soils; William Bennett, extension agronomist; Dr. Wesley Keller and Dr. O. J. Kelley of the U. S. Bureau of Plant Industry, Soils, and Agricultural Engineering, attended the meetings of the American Society of Agronomy held in Omaha, Nebraska, during the third week in November. Dr. R. H. Walker, director, also attended and was one of the speakers in the general meeting. Dr. D. W. Thorne read a paper in the Soils Section. Dr. Thorne, Dr. Peterson, and Dr. Kelley were all appointed to national committees.

Dr. Delbert A. Greenwood joined the Station staff October 1 as professor of chemistry. Dr. Greenwood has been connected with the University of Chicago for a number of years. Dr. Greenwood took his A.B. degree at B.Y.U., did graduate work at Iowa State College, and got his Ph.D. at the University of Chicago in biological chemistry.

Paper for this issue was ordered in April. As it has not yet arrived, it is necessary to use an inferior paper.

With college enrollment above prewar levels, and a considerable number of graduate students, it has been possible to appoint 10 graduate assistants to help with the research program. These assistants include Emer E. Broadbent and Glen T. Nelson, agricultural economics; Lloyd E. Meldrum, animal husbandry; Eldon G. Hansen, irrigation; Walter H. Gardner, physics; Reed S. Roberts, entomology; Farres H. Nyman and Martell S. Cooper, poultry husbandry; Lisle R. Green and Clyde Cook, range management.

Professor D. W. Pittman, who has spent the past eight months in China as technical adviser to a company interested in developing sugar beet production in that country, will return to the campus early this month.

AGRICULTURAL SITUATION

(Continued from page 1)

Although consumer income may average more in 1947 than in the preceding year, the increase may not be reflected in the increased demand for farm products that would be expected under normal conditions. The drastic curtailment of manufactured goods during the war and the postwar periods has created tremendous demands for these commodities. The large influx of these commodities expected on the market at higher prices will likely absorb the greater part of the increased purchasing power. The expenditure for durable goods for next year will be large, while the purchase of non-durable goods including farm products may not be increased.

The foreign demand for farm products for next year is likely to be somewhat smaller. The factors influencing expenditures are a contraction of relief shipments, improvement in agricultural production in European countries, and the expenditure of the dollar and liquid assets of foreign countries for durable goods or non-agricultural commodities. With restriction in expansion of do-

Table 1. Index of prices paid producers for farm products in Utah for all commodities for various periods (1935-39=100)

Year	Month	Index
1914	August	91
1918	November	184
1920	May	228
1921	June	101
1929	March	144
1932	August	60
1939	September	100
1942	December	161
1945	August	202
1946	August	229

Table 2. Index of land values in Utah and the percentage change for various periods* (1935-39=100)

Year	Index	Percentage change		Percent
		from	to	
1914	112			
1918	139	1914	1918	an increase of 24
1923	151	1914	1923	an increase of 35
1933	95	1923	1933	a decrease of 37
1939	101	1933	1939	an increase of 6
1946	190†	1939	1946	an increase of 88

* Source—Bureau of Agricultural Economics

† Estimated by author

mestic demands for farm products and a reduction in foreign shipments, the combined demands for agricultural products are likely to average lower in 1947 than in 1946.

If there is a large agricultural production in 1947 and if the local and foreign demands are reduced, farmers may expect lower prices next fall. On the other hand if relief agencies are given adequate financial support and a liberal government farm relief program continues during 1947 any surplus agricultural products will probably be exported. European and Asiatic countries can and will easily use all of the food and fiber we can ship to them, provided it is on a relief basis.

If our exports of food and fiber during 1947 to foreign countries are largely on a cash basis, there will be a large curtailment in the amount taken. The policy of American people toward the farm relief program during 1947 will be a major factor in determining the demand and the prices of agricultural products in this country.

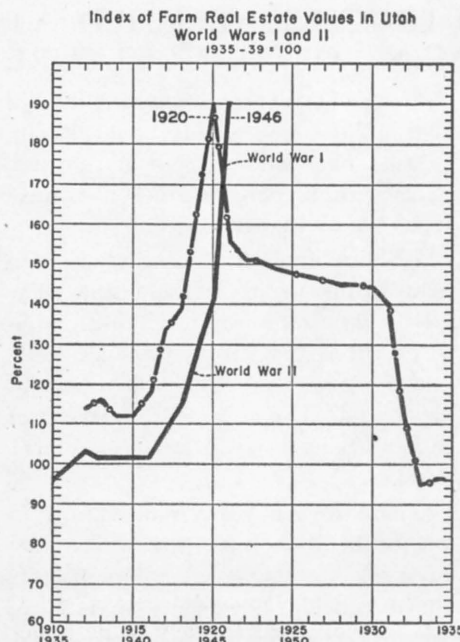
If there is a large agricultural production in this country during 1947, if foreign shipments are reduced, and if consumption in this country is curtailed, then a rather severe reduction in prices of agricultural products may be expected. However, the commitments of the government to support prices on "basic" and "Steagall" commodities at 90 percent of parity should still maintain farm prices of supported commodities at a relatively favorable level when compared to prewar prices, but considerably below present rates.

Production

During 1947 food supplies for civilian consumption are expected to con-

tinue at the high level reached in 1946. Food consumption per capita in the United States in 1946 averaged about 15 percent above the prewar level of 1935-39. This high level of consumption and the large amount of food exported were made possible by the record crop production in 1946 and the decline in amount of food for military use. Total food consumption next year may not be as high as in 1946, but as exports will be smaller, the amount available for use by civilians in this country should be larger. Indications are there will be shortages of some commodities and an over supply of others. No significant change from 1946 is expected in the supply and the consumption of total meats, chickens, turkeys, vegetable fats and oils, vegetables, deciduous fruits, canned fruit juices and potatoes. The supply of eggs, fresh vegetables and fluid milk may be somewhat smaller. On the other hand the supply of butter, evaporated milk, cheese, lard, citrus fruits, canned and frozen fruits, flour, sugar and fish will probably be larger in 1947 than in 1946.

In making recommendations to the United States Department of Agriculture on an agricultural program for 1947 in Utah, the staff from the college and federal agencies took into consideration the nature, adaptability, and limitations of Utah's agricultural resources; the national and international demands for agricultural products, and the adjustments that may be necessary to meet rapidly changing economic conditions in the near future. It was fully recognized that there is at present, and that there may continue for the immediate future, a large demand for food and fiber; also that the demand for different agricultural commodities may vary greatly and that there may be a decline in all agricultural prices, even before the 1947 production is disposed of by the farmer. At the present time, however, the world is badly in need of food and fiber and indications are that the demand for agricultural products during 1947 will be relatively favorable. With this outlook the agricultural production program which was suggested to the federal government for the state of Utah for 1947 was relatively large. A suggested reduction in the acreage of potatoes, wheat and oats and in numbers of beef cattle and horses was made where it was thought that production was already too high for



Utah conditions, or that the demand may decline for the particular commodity, or that the resources may not be available, or could be used to better advantage in some other line of production. Increases were recommended in acreages of barley, hay, corn, and sugar beets, and in numbers of sheep.

The agricultural program for Utah for 1947 recommended by the staff of the college and the federal agencies was used by the United States Department of Agriculture in setting up goals for the state for next year.

Prices, Farm Income and Land Values

It is expected that the general price level will average higher during the first part of 1947 than 1946 but may move downward the latter part of the year. The upward trend in the price of industrial commodities is likely to continue until the supply more nearly balances the large demand. A much better supply-demand relationship for industrial commodities will likely develop in 1947.

In August, 1946, the index of prices received by Utah farmers advanced to a new record of 229 (1935-39=100) (table 1 and fig. 1). This price index was 13 percent above the index for the same month in 1945 and was one point higher than the peak attained in May, 1920. Although prices of farm products during the first part of next year may average about the 1946 level, prices during the latter half of 1947, when next year's crops come onto the market, may average below prices received in 1946.

During the immediate period following all major wars price inflation has occurred. The inflation following the past war has followed the same pattern as that in other postwar periods. Inflation is here, prices are high and when the adjustment will come, or the degree of adjustment, no one can predict exactly. However, judging from periods following other major wars the next two years may be a critical period for agriculture. During this inflationary and price adjustment period it will be difficult for the Utah farmer to keep his business in an economic position whereby changes can be easily made, when both production and price adjustments become necessary.

The yearly cash receipts from farming in Utah have varied from \$26,000,000 in 1932, to \$117,000,000 in 1945. It is estimated that the 1946 farm income for the state will equal or perhaps be above the income for 1945. In 1945 the farm income was 160 percent above the 1939 level and 350 percent above 1932.

Land values in Utah have followed farm prices during the inflationary period. The index of land values in 1939 was 101 and the value of 1946 is estimated at 88 percent above the prewar level (table 2 and fig. 2).

An Economic Program for Farmers

The year 1947 will be a period when farmers should take advantage of relatively high prices and save funds to be used to develop and reorganize the physical features of the farm plant when materials are available and when they may be obtained at lower costs. Utah farmers should proceed in a cautious manner by planning the farm business or program on a short-time basis. It is a time to take advantage of the relatively favorable price level for agricultural products without making long-time commitments or major adjustments. The immediate future is the time to produce, to sell, and to pay off indebtedness or save the profits for a more opportune time to improve the farm plant, and to plan for a period when an adjustment in prices will be made.

It is the time for farmers and their families to plan to maintain their inheritance in the farm. Farmers in Utah are now mainly out of debt and have rights to land, water, and a good location. They should build them into a profitable farm business and into a family institution.

LEGUME SEED RESEARCH UNIT ESTABLISHED AT LOGAN BY U. S. DEPARTMENT OF AGRICULTURE

A LEGUME SEED research station for the investigation of problems connected with the production of alfalfa and other forage crop seed is being established in Logan in connection with the Utah Agricultural Experiment Station by the Bureaus of Entomology and Plant Quarantine and Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture.

Seven scientists from various parts of the country have been assigned by the Department of Agriculture to the Logan Station to work on problems connected with legume seed crop production. These seven men are F. E. Todd, G. E. Bohart, and another man not yet appointed from the Division of Bee Culture, who will work on pollinating insects, including honey and wild bees; F. V. Lieberman and S. K. Snow, from the Division of Cereal and Forage Insect Investigations, who will work on destructive insects of these crops; Dr. J. W. Carlson and M. W. Pedersen, from the Division of Forage Crops and Diseases, who will study seed production and improvement problems. Both the Department of Agriculture and the Utah Station recognize that an integrated approach on beneficial and destructive insects and plant problems is essential to a solution of the alfalfa seed production problem.

The importance of alfalfa and clover seed crops in the state combined with the outstanding work already done on causes of reduced alfalfa seed yields at the Utah Station by Dr. John W. Carlson, Charles J. Sorenson and others, resulted in the establishment of this research unit in Logan.

In 1925, the state was producing a 22 million dollar alfalfa seed crop, mostly in the Uinta Basin and the Millard County areas. Farmers were raising over six bushels of seed per acre. Since then yields have declined to less than one bushel per acre, due to causes unknown or only partly understood.

Scientists at the Utah Station and other places have been studying the problem for some time, and significant progress has been made toward its solution. This past year, the Utah Station published results of work done cooperatively with the U. S. Department of Agriculture, by John W. Carlson and

Professor C. J. Sorenson, which showed that alfalfa seed yields could be increased over 600 percent by dusting fields with 10 percent DDT to control lygus bugs and other insects.

Practical application has already been made of these experimental results. The 1946 alfalfa seed crop in Utah promises to be the largest on record since 1928, and is estimated at 8,800,000 pounds of clean seed. This is largely the result of rather general application of DDT dusts.

There are still many ramifications of the problem, however, that have not been solved, such as when best to apply the insecticide, how many applications are necessary for adequate protection, how can bees and other beneficial insects be protected, and how important are they in alfalfa pollination. Progress has been made, but still greater progress is promised by the more extended cooperative studies that will be possible with the enlarged facilities offered by the new research unit at Logan. In this unit it will be possible not only to apply the specialized training and experience of the seven scientists to specific phases of the problem, but it will allow for the integration of the separate findings in reference to the whole problem. This approach enhances the value of each study through recognizing its contribution to the body of facts that are expected in the end to benefit the grower by making seed production less hazardous and seed supplies more abundant.

The establishment of the unit at Logan has been made possible through increased funds for legume seed production problems appropriated by the last Congress because of the acute shortage of legume seed.

Utah State Nutrition Institute Organized

THE Utah State Agricultural College and the Agricultural Experiment Station have recognized a need for some time to organize their scientific personnel and physical resources to facilitate research on subjects involving several closely related fields. In recognition of the importance of nutrition in all of its aspects to the welfare of the people of Utah steps were recently taken by President Franklin S. Harris and Director R. H. Walker to organize the Utah State Institute of Nutrition. Members of the group include key personnel from the departments of Agronomy and Soils; Animal, Dairy, and Poultry Husbandry; Chemistry; Foods and Nutrition; Zoology, Entomology, and Physiology; Range Management; Vegetable Crops; and Veterinary Science. Dr. Louis L. Madsen, head of the Department of Animal Husbandry, was chosen to act as chairman of the Institute.

The function of the Institute will be to coordinate research in the broad field of nutrition starting with the interrelationships of soil to the composition and nutritive value of feeds and foods and application of this information to the complex problem of nutrition of farm animals and man. This organization has the unique feature of being able to determine many nutrients and study their relation to normal nutrition and disease simultaneously which would be impossible if the personnel and departments concerned were working independently. Further advantage will come through the pooling of existing laboratory facilities and joint purchase and use of additional equipment. Adequate support and cooperation in the development of research facilities will also serve to make the teaching more effective both on the undergraduate and graduate level at the college.

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