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FARM & HOME SCIENCE

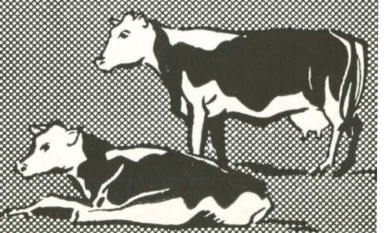
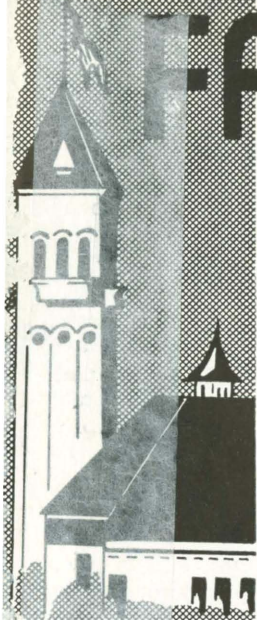
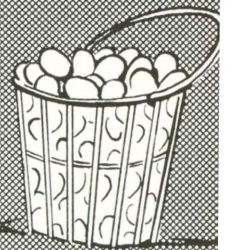
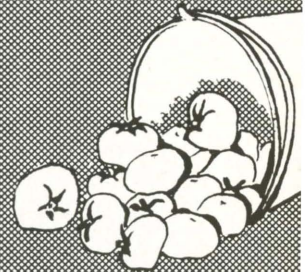
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September 1954

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Vending Offers New Market for Dairy Products

Increased channels of consumption will reduce dairy surpluses and improve health of American people

A. J. MORRIS
and GORDON HOPSON

pile, the extra production of 1954, and the predicted excess of 1955. The total surplus is the dairymen's problem. During the prewar period (1935-39) we consumed an average of 102 pounds more per capita than in 1953. To reach this per capita figure again will take effective advertising, education, new uses, better merchandising, and new outlets to balance production and consumption.

To increase sale "milk must be available—easy to buy—appetizingly cold for the consumer to drink. The greatest immediate sales opportunity for milk lies in increased *away from home* consumption." These are the conclusions of a study made by the Politz Agency for the American Dairy Association. Only 15 percent of the people drink milk away from home according to this survey.

This situation stimulates the use of vendors or dispensers to make milk more readily available outside the home. Vending of many types of products is increasing rapidly. According to a report from the National Automatic Merchandising Association, however, milk sales through



Office girls patronize vending machine in main hall of college administration building during their quarter hour rest period

INGREASED consumption to help remove the growing surplus of milk and dairy products, improve the nation's diet, and stabilize milk prices to the producer are the chief reasons for the dairy industry's seeking new paths for increased sales.

In 1953, 750 pounds of milk per person were produced in the United States. Of that amount we consumed 689 pounds per capita which left 70 pounds to be disposed of. Added to this per capita surplus is the present accumulated stock

Packages used in vending machines. The carton is preferred because it is disposable — third quart most popular size

Milk provides an excellent "pause" between meals at a girls dormitory. Here a small unit is serving 85 girls an average of 65 bottles a day

A. J. MORRIS is professor of dairy manufacturing and assistant dean of the School of Agriculture. GORDON HOPSON graduated in June in dairy manufacturing. He conducted the field work on the vending study. The study was supported by funds from the American Dairy Association.



vending machines amounted to only \$17,000,000 in comparison to the sales volume of \$1,405,000,000 for the entire vending business. The milk vending business has been slow to reach its capabilities for selling milk. There are fifty soft drink machines to every milk vendor.

The Utah Study

Many of the 12,000 milk vendors now being operated do not make money. Automatic vending to be most effective should produce a profit to the vendor operator and to the dairy. To find some of the factors involved in its successful operation, the Utah Agricultural Experiment Station conducted a study which included the observation of the operation of 54 vendors by three dairies located in Utah and southern Idaho.

Selection of Type and Size of Vendor

One of the first considerations in automatic vending is the selection of a machine. There are three types of indoor, coin-operated vendors: the automatic and the semi-automatic types which vend glass or carton packages, and a third, the automatic bulk vending machine which dispenses the milk from a can to a paper cup. This bulk vending type should prove economical but has not been universally permitted by boards of health up to the present.

In this study, observations were made on forty-four hand operated and ten automatic machines.

The type and size of the machine selected for a given location is guided by the following factors:

- The first cost of the machine may range from \$300 to \$850. The selection is associated with the amount of sales necessary to make a profit in any given location.
- The predicted volume of sales and the peak load for a location help to determine the type and size of machine to buy. The maximum number of people can be served with the large automatic vendor. When there is a rush on at any particular period, it is important to serve the crowd rapidly and yet not run out of milk. The automatic type is adapted to such a rush.
- Ease of cleaning, servicing, and operation. Simplicity of construction is desirable.
- The sanitary characteristics of the machine. The two types we studied

SUGGESTIONS FOR MILK VENDING

- Vendor milk sales are new sales. This new market is just beginning to be exploited and represents a potential equal to about one-third of the total market for milk today. Vendor machine milk is fresh, cold, available, and sanitary.
- The location of the vendor is of first importance to making profit. Locations must be continuously studied and vendors moved to a new site whenever they prove unprofitable. Vendors must be kept busy the year around. Vendors in schools may be moved to canneries or tourist locations during the summer vacation.
- Machines must be kept in repair and operating.
- Study peak loads and never let a machine run out of the product sold. The vendor is a "silent salesman" but when empty the silence is paralyzing. Vending requires more "know-how" than delivering.
- Costs are about 1½ cents per unit for delivery, servicing, clean up, repairing, depreciation, and interest.
- Where a vendor route is established, about 25 machines are required for efficient operation.
- Five vendors are a minimum for operation from a wholesale truck on a route serving stores.
- Appearance is important. On one location a vendor was repainted and suitable signs and posters displayed which brought an increase of 300 percent in sales. In a few locations posters did not stimulate increased sales.
- Deliveries and servicing should be made regularly each business day.

met board of health requirements. Prospective buyers should check both public health and 3A sanitary standards.

- The variety of products dispensed. The automatic vendor dispenses two varieties at a time while the hand operated machines may give

the customer a choice of three or four products.

- Frequency of deliveries. The size and type of machine should be selected so that when loaded the milk will last between deliveries. If business is too large for the supply to last between deliveries then it becomes necessary to furnish storage for an extra supply at the location. The vendor may be replenished by the owner of the location.
- The ability and attitude of the location owner are important. Often between deliveries servicing by the dairy is impractical. The location owner is often commissioned to be responsible for the sales through the vendor.
- Height and appearance of the machine often fit particular surroundings to advantage.
- Ease of operation and effectiveness of the coin changer.

It is difficult to get all the desirable characteristics in one machine and often one characteristic is purchased in a machine at the expense of another.

The Location Determines the Profits

Volume sold and profits in milk vending are dependent upon the location of the machine. It is often necessary to move it several times before finding a profitable spot.

The volume of sales in any location must be larger than the break-even point for the machine or no profit is realized. The minimum volume of sales required to pay the expenses of a machine will therefore determine the suitability of any location. The break-even point is determined by several factors such as type and size of machine, capital investment, operational costs, and number of machines operated. In this study the minimum number of sales per day or the break-even point averaged 70 units for the large automatic vendor, 50 units for the large semi-automatic, and 35 units for the small hand operated type.

Locations are not always determined by the number of persons in a vicinity, but rather on the habits and attitudes of the people, and the reason for their being in the area of the vendor. For example, in the main hall of a college administration building, more than 1,000 students pass the vendor located there every day and yet the sales are less than an average of 50 units per day through a machine

with a break-even point of 70. In comparison, in a girls' dormitory a small machine with a break-even point of 35 units is serving 85 girls an average of 65 bottles per day. In the first case the students were not interested in drinking milk in a busy corridor, while at the dorm the vendor is a "life saver" for the girls who fail to go to the cafeteria at regular mealtime. To them, cold milk from the vendor is an ideal in-between-meals snack.

A comparative difference in sales volume based on location is shown in table 1. The lowest sales were in dry goods stores. The range given shows that a number of locations are not profitable and are robbing from the earnings of the good locations to keep them going.

The possibility for profit in the best locations are shown by the data in table 2. Under average conditions found in industrial plants, office buildings, and military establishments, 200 people as a minimum should frequent a location to warrant installing a large automatic vendor. Usually half that number is desired to support a semi-automatic or hand operated machine. A few locations are proving profitable where there is an average population of 65 to 70.

All vendors in this study are owned by the dairies who pay to the owners of the locations from 1 to 3 cents per unit depending on the services rendered. One cent is the general commission paid when the dairy owns, services, and maintains the machine. If the location owner services the machines and pays for upkeep, then the milk is sold to him on a wholesale basis by the case.

Prices to Consumer

In this study the price per half pint was 7 to 10 cents while for the $\frac{1}{3}$ quart it was 10 cents. The ten cent charge was convenient and universally acceptable. The $\frac{1}{3}$ quart, because of the increased volume at 10 cents, is popular. Customers favor it for a dime over the half pint for 7 cents. In addition the even nickel or dime was more popular and convenient than the odd cent charge.

Size and Type of Container

One dairy used glass bottles, one used paper containers, and the other dispensed both. In one area $\frac{1}{3}$ quarts was the only size vended while in other areas the $\frac{1}{2}$ pint was the common size employed.

The paper machines were preferred. There was loss through returns when

Table 1. Average number of unit sales per vendor per business day at different location (54 vendors)

Location	Average units sold daily	Range
High schools	78	35 - 126
Colleges	48	26 - 75
Industrial plants	74	30 - 132
Stores & office buildings	58	7 - 264
Military plants	52	10 - 108

Table 2. Average number of unit sales per business day for the best three vendors at each location

Location	Units dispensed				
	Milk	Chocolate	Orange	Buttermilk	Total
High schools	48	22	22	....	92
High schools *	*	43	44	....	87
Colleges	34	22	19	....	75
Industrial plants	43	49	24	12	128
Office buildings	48	32	32	11	123
Military plants	27	51	23	....	101

* In these high schools milk was served in the school lunch program and not through vendors

Table 3. The daily average sales of four products per vendor in different locations

Location	Average sales per vendor per business day				
	Milk	Chocolate	Buttermilk	Orange	Total
High schools	34	22	19	....	75
High schools*	10	35	0	33	78
Colleges	24	15	0	9	48
Industrial	26	28	7	13	74
Stores and office buildings	21	16	7	14	58
Military plants	13	26	2	11	52
Average daily sales for all vendors in the study	23	24	3.5	15	65

* Milk was also served in the school lunch program.

glass bottles were used, particularly when bottles were carried away from location at lunch time. Different locations show glass bottle losses from 1 to 10 percent. The inconvenience of handling bottles and the undesirable appearance of the cases to hold them are against this container. Small dairies, however, find it necessary to use glass.

The size of package has an effect on sales. The half pint package was preferred among store clerks and office employees while the larger package was popular with military and industrial locations. The third quart size made it possible to please more types of customers and give the dairy added efficiency by handling only one size unit.

In one college the half pint was dispensed at 10 cents. Then the size of unit was changed to one-third quart at same location and sold at the same price. There was a definite increase of 50 percent in sales for the first month after

the change. This was true of both chocolate and milk and the increase continued upward.

(Continued on page 69)

FARM AND HOME SCIENCE

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

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

Conflicting Federal, State, and Local Laws and Regulations Hinder Increased Use of Dairy Products

Numerous unnecessary restrictions to interstate movement of milk and dairy products exist

V. L. ISRAELSEN

THE DAIRY industry operates under the most varied, restrictive, and exacting requirements of any part of the agricultural industry. Regulations exist at the federal, state, city, and sometimes county level of government. Many of the regulations have little or nothing to do with sanitation. Perhaps most serious so far as interstate trade is concerned is the nonuniformity of requirements, standards, and procedures prescribed by state and municipal dairy codes. For example, Utah's particular combination of minimum requirements for milk fat and milk solids in grade A milk would satisfy the standards of only two out of the ten other Western States. In the Western States there are four legal standards for fat content of whipping cream, five for half and half, and three for coffee cream.

Regulations for frozen desserts offer an interesting example of complex and varied requirements. In the matter of composition such as milk fat, milk solids, bacteria count, weight per gallon of the frozen product, the United States Health Service has established no specific standards. Among the Western States no two have the same requirements for ice cream. There are four standards for the fat content of ice milk and for chocolate ice cream. The latter product meeting minimum Utah requirements would be unacceptable in Wyoming, Idaho, Nevada, Colorado, or New Mexico. Such diversity in requirements both restricts trade and increases costs.

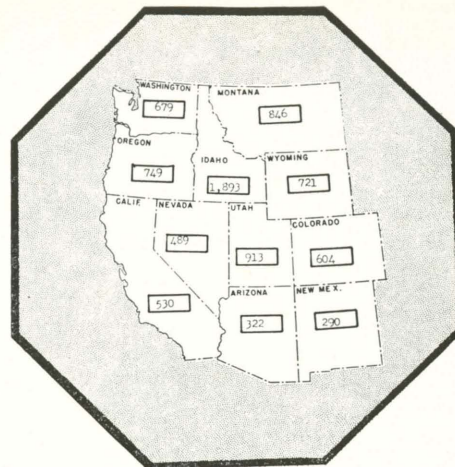
The results of the study referred to in this article have been published by the Arizona Agricultural Experiment Station as bulletin 255 entitled: "Barriers to the interstate movement of milk and dairy products in the eleven Western States." Copies are available at the Utah Station and will be supplied without cost on request. DR. V. L. ISRAELSEN, professor of agricultural economics of the Utah Station, is one of the authors.

Physical plant and equipment requirements to produce high quality grade A milk in one state are frequently unacceptable in another. To ship A grade milk into a neighboring state may require extensive building modification for dairymen wishing to reach the out-of-state market. When their plants are finished they may meet the requirements of the importing state but fail to comply with those of the home state.

Both dairy farmers and processors often complain that they are "inspected to death." Inspectors may be from the federal, state, or local level. One state requires 23 inspections a year for dairy processing plants and 6 for dairy farms. Two states fix no number of inspections but provide "as often as practicable." Industry people report that inspectors from one level often countermand the orders issued by inspectors representing other jurisdictions. This frequently happens in the case of a state inspector following his predecessor. Instances were reported where a given state refused to accept out-of-state inspections, yet declined to send their personnel out-of-state to make inspections. Under these circumstances no license could be issued. There is considerable confusion and dissatisfaction over both the duplication in inspectional service and with the manner in which inspections are carried out. Of 27 applications from out-of-state producers to sell milk, one state granted 14 and denied 13.

Promotional Sales Campaign Not Enough

Suggestions to solve the growing problems of dairy surpluses have come from many sources. Large sums are being spent for advertising dairy products. The American Dairy Association and the National Dairy Council are sponsoring



Per capita milk production in the eleven western states in 1952, (United States average 733 pounds)

vigorous sales promotion campaigns to stimulate consumption. In spite of all these advertising and sales promotion programs, the government during June, under the price support program, purchased a near record volume of butter, cheese, and non-fat dried milk. Butter purchase alone amounted to more than 65 million pounds or in excess of 2,150,000 pounds each day.

The primary purpose of these campaigns seems to be directed toward increasing consumption of fluid and whole milk products. Butter consumption per capita has declined drastically in the past ten or twelve years. The public has apparently found in oleomargarine an acceptable substitute for butter with a substantial saving in cost. As long as the existing price differential between these two products remains, there is no present indication of any substantial swing back to the use of butter on the American table. Any substantial increase in consumption of dairy products will no doubt occur in fluid milk and semi-perishable items as ice cream, frozen desserts, and soft cheese.

Created Barriers Restrict Consumption

With the dairy industry confronted with large and growing surpluses there is need to search out those areas where there are artificial restrictions that may curtail consumption of dairy products. Such was the purpose of a cooperative regional study by the Arizona and Utah Agricultural Experiment Stations. This study was concerned primarily with the laws, rules, and regulations, and administrative practices which interfere with the free and unrestricted movement of milk and its derivatives across state lines. This, of course, refers to milk and its

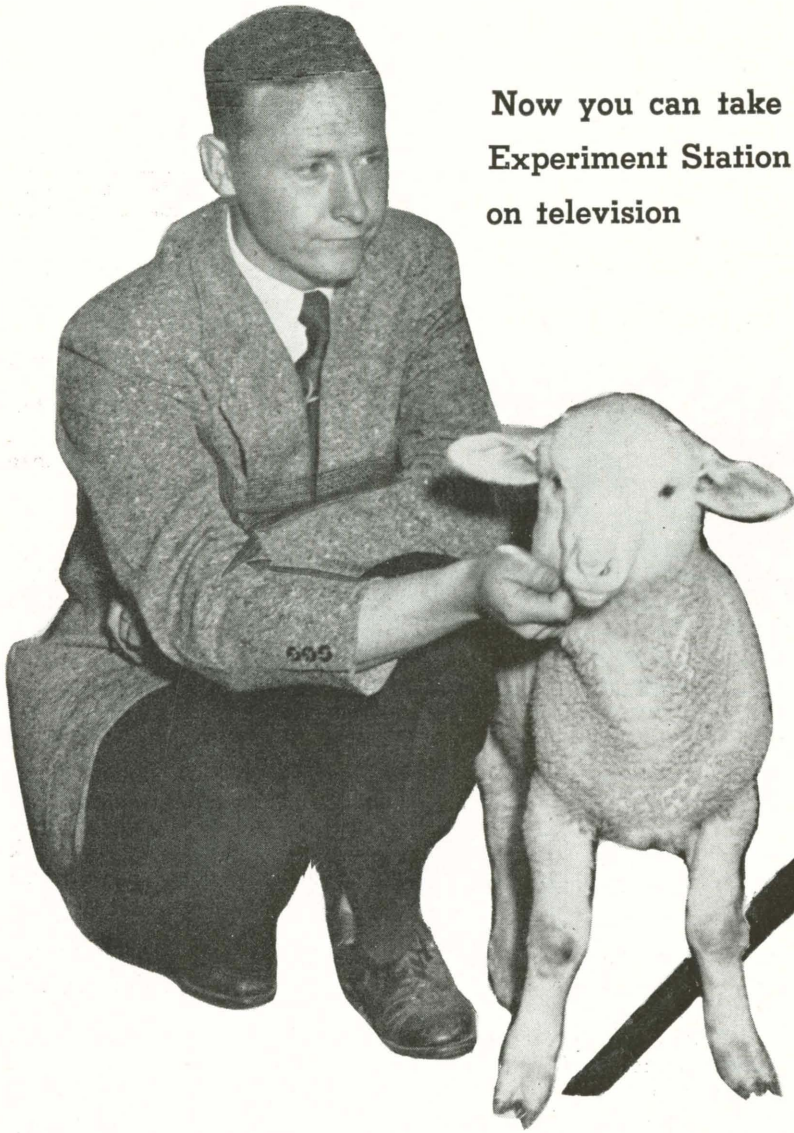
(Continued on page 67)

SEE IT ON

Television...

Now you can take a look at
Experiment Station research
on television

ELDON DRAKE



Station's Rambouillet improvement work was a highlight in television series. Future programs will carry research results into thousands of homes in the Intermountain Area

FARM FOLKS in Utah and surrounding states are getting a good look at Utah Agricultural Experiment Station research these days through the medium of television. And reports indicate they like what they're seeing.

In a series of television shows presented over KSL-TV and KTVT in

DR. ELDON DRAKE spends part of his time in news writing and television production work for the Experiment Station. The remainder is spent in teaching. Dr. Drake is a graduate of USAC and Iowa State College. He joined the staff in the fall of 1951.

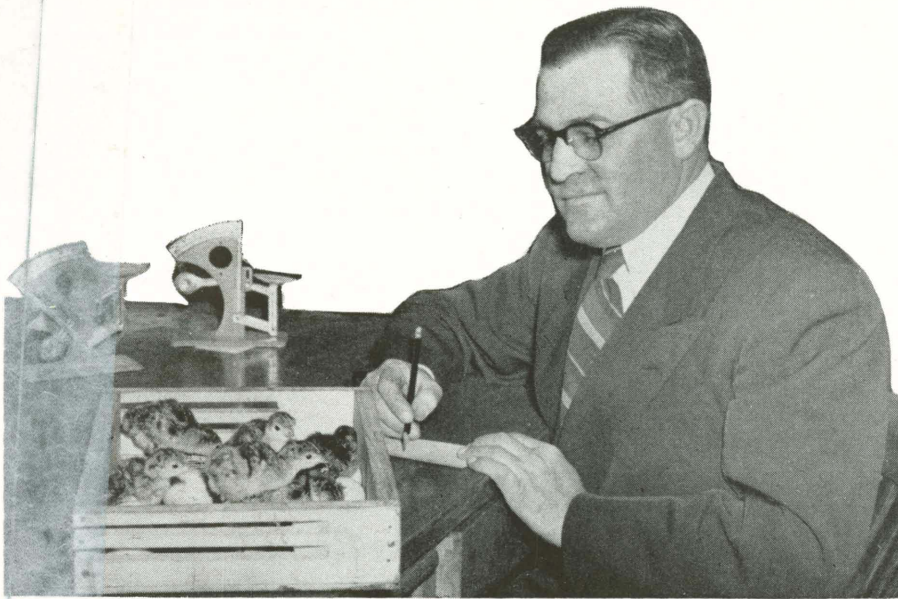
Salt Lake City, the latest in agricultural information at the college is being beamed into thousands of farm and city homes. Pioneering the college's first venture in television production has been a cooperative effort of Station, Extension, and Residence teaching staff members. For most, it has been their initial contact with live television production.

The current farm television series is also a "first" for the two commercial stations in Salt Lake City. Never before have truckloads of sheep, swine, dairy cattle, and poultry been moved into these

production studios on such a large scale. The agricultural and fish and wildlife programs at Utah State have been literally transported to Salt Lake City each week to give television viewers a first-hand picture of research and departmental work.

RFD-5

The KSL-TV series has been a weekly 20-minute production beamed to the farm and home under the title of "RFD-5." With Tom Bradshaw of the KSL staff as master of ceremonies, the program fea-



Dr. Carroll I. Draper, poultry department head, appeared on many telecasts. Here he selects turkey poults for use on the poultry show which introduced the college's ANIMAL FAIR, a KTVT production. Incubators, brooders, laying pens, and . . . barbecued chicken, told the story of poultry research at USAC

tures farm facts from departments on campus. Programs have given up-to-date information on insect control, home beautification, farm safety, animal nutrition, farm machinery repair, egg and broiler production, and other topics. Helpful tips on gardening, care of lawns and trees, home safety, and landscaping have been presented for city and suburban viewers.

The production committee responsible for the KSL series includes G. Alvin Carpenter, Gladys Harrison, and Eldon Drake. RFD No. 5 is now in its second year of production.

Animal Fair

"Animal Fair," the college's production on KTVT, is a relative newcomer in farm television fare. A one-hour program, Animal Fair was introduced to the TV audience, Saturday, April 17. It has been presented weekly during the Saturday noonhour.

Major objective of the KTVT series is to present education and entertainment "animal-wise" to farm and city folk alike. And the program's been doing just that! Sheep, poultry, swine, dairy cattle, game fish and waterfowl . . . yes, even bees and other insects have the their day on Animal Fair. Films, pictures, and live specimens have made the program popular with a wide range of age groups in the KTVT audience.

Animal Fair is produced by the college production staff including Burrell F. Hansen, chairman, Elwood Shaffer, and Eldon Drake. The over-all production committee on television policy is composed of Carl Frischknecht, chairman,

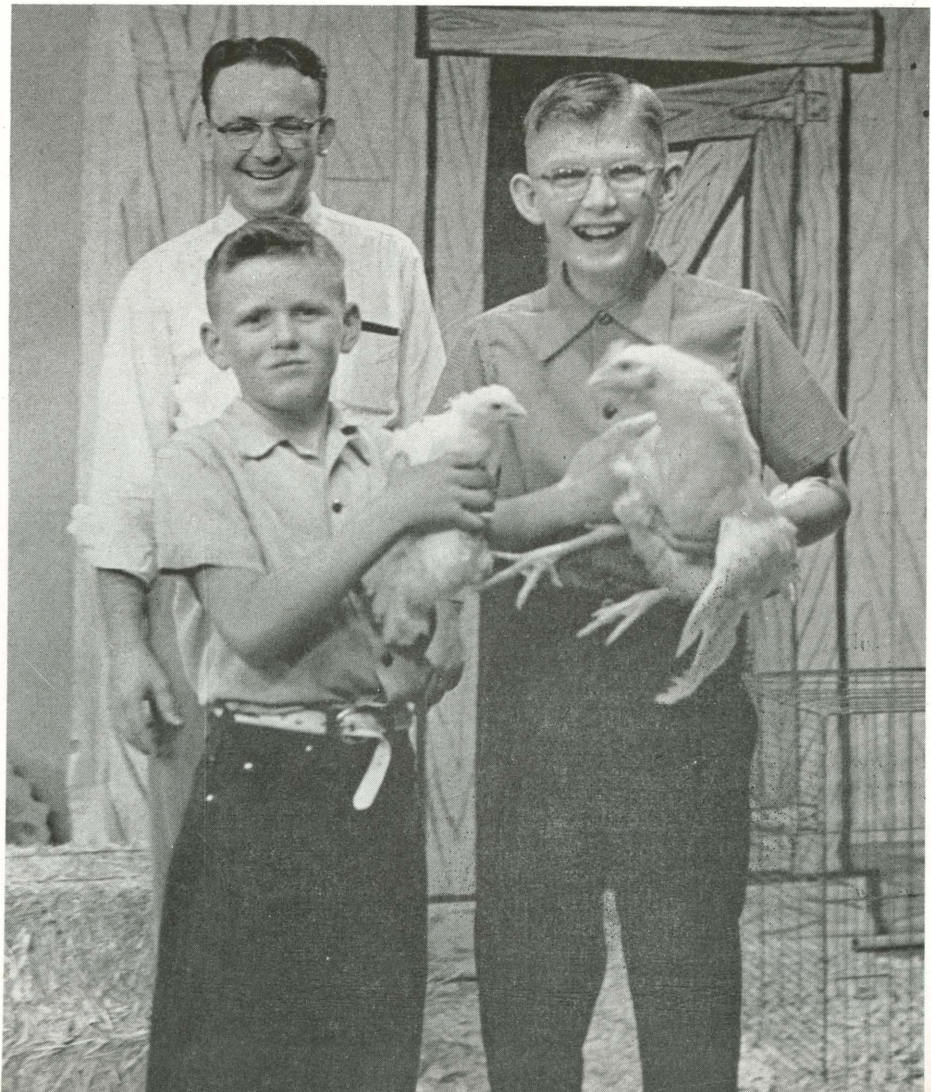
Larry S. Cole, Wendell B. Anderson, Carlton Culmsee, Burrell F. Hansen, and LeRoy A. Blaser.

Problems of New Venture

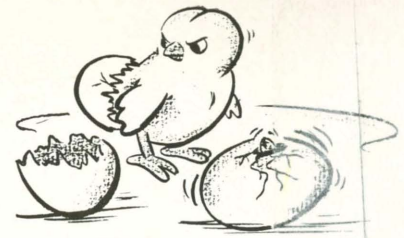
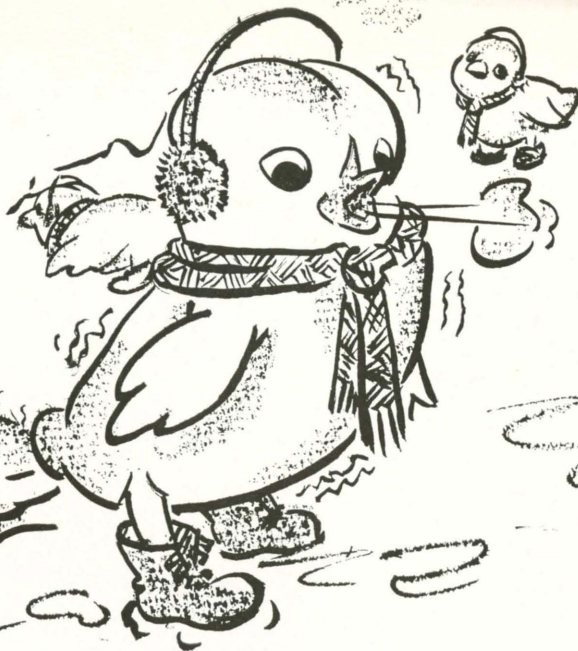
The college's venture into television production, even on the present limited basis, has not been without its problems. Major obstacles include a limited production staff, lack of rehearsal facilities on the Logan campus, limited budget, and the great distance programs must be transported to Salt Lake City. These problems have restricted the type of program offered . . . the type that farm people in Utah would like to see.

In time, these problems can be resolved. Better program scheduling, greater variety in program content, and all-around higher quality in production will be the result. Through the medium of television the College and Experiment Station will be better able to tell the story of research to patrons throughout the Intermountain Region.

CHICKEN OF TOMORROW contest was a feature of college television series. Experiment Station, Extension Service, and teaching personnel cooperatively told the story of poultry, from the egg to the mature bird



Winter chicks
bring greater
returns



To increase your profits

Raise

Winter Chicks

EARNEST M. MORRISON

THE AVERAGE poultry raiser of a 5,000 hen flock in Utah may increase his earnings 18 percent or \$100 a month by starting his chicks in December or even November rather than in March or April.

Here is the story:

Of the many things that influence profits in egg production, some are within the operator's control and others are not. Seasonal patterns in production and price as they exist in this area are good examples. Some of these the individual producer can control. Others are beyond his control. These patterns have a major influence on the economic return he receives.

Most poultrymen who have been in the egg business for any length of time will have noticed some of these variations. Sometime during any year the number of hens on hand reaches a high point with the laying houses filled to capacity. Later the numbers thin out and the house is only partially filled. He will remember that at certain times he has many eggs to gather, clean, case, and sell while at other times he has few.

This he has noted is not alone because of the number of hens he owns but because they lay at heavier rates at some times of the year. He also knows that the eggs he sells bring higher prices at some times of the year than at others. He has no doubt also noted that at times the prices received for large eggs seem to be high in relation to those received for medium or small eggs. At other times the opposite is true. Of course, he knows that for a while when a pullet begins to lay she produces small eggs, later medium eggs, and still later large eggs. He has also noticed from his experience in selling

cull hens that the price moves up at some seasons and down at others. Most of these conditions are outside of his control.

Anyone interested in studying production statistics in recent times will find these facts about Utah's egg production: For the five year period 1947-1951, inclusive:

- The number of laying hens was highest in December, decreased to August and increased to December.
- The seasonal rate of lay was greatest in May and declined to a low in November.

Table 1. Gross receipts, cost of production, and labor earning per 100 pullets in Utah by date of hatching (avg. of 1947-1951)

Month of hatch	Sale of eggs by size-price* differential	Cost of feed† (82 lbs.)	Flock depreciation‡	Overhead and misc.§	Total cost except labor	Labor earnings
	dollars	dollars	dollars	dollars	dollars	dollars
Jan. 1.	668.78	379	129.48	67	575.48	93.30
Feb. 1.	663.96	379	132.43	67	578.43	85.53
Mar. 1.	655.85	379	130.14	67	576.14	79.71
Apr. 1.	648.08	379	132.10	67	578.10	69.98
May 1.	640.87	379	135.38	67	581.38	59.49
June 1.	642.91	379	134.07	67	580.07	62.84
July 1.	649.25	379	136.04	67	582.04	67.21
Aug. 1.	653.52	379	133.74	67	579.74	73.78
Sept. 1	659.18	379	134.40	67	580.40	78.78
Oct. 1.	664.10	379	126.53	67	572.53	91.57
Nov. 1.	668.15	379	126.53	67	572.53	95.62
Dec. 1.	669.32	379	125.54	67	571.54	97.78

Additional information on this subject is contained in Utah Station circular 143, "Seasonal variation in production and price as it affects profits from egg production," by Earnest M. Morrison and Roice H. Anderson of the Department of Agricultural Economics. This publication may be obtained free on request. PROFESSOR MORRISON has spent the summer in study at the University of Illinois.

* Based on the pattern of egg laying reported for the Third California Random Sample Egg Laying Test, 1952, and the average paying price by size for 1947-1951 reported by Utah Poultry & Farmers Cooperative.

† 60 percent mash 40 percent scratch. Based on USDA Agricultural prices.

‡ Cost of the pullet at \$2.00 minus the value of the cull hen at 4 lbs. at monthly price of fowl. A death loss of 18 percent has been assumed.

§ Assumed to be about 14 percent of total cost based on survey data of the Department of Agricultural Economics and includes interest on capital invested and miscellaneous supplies.

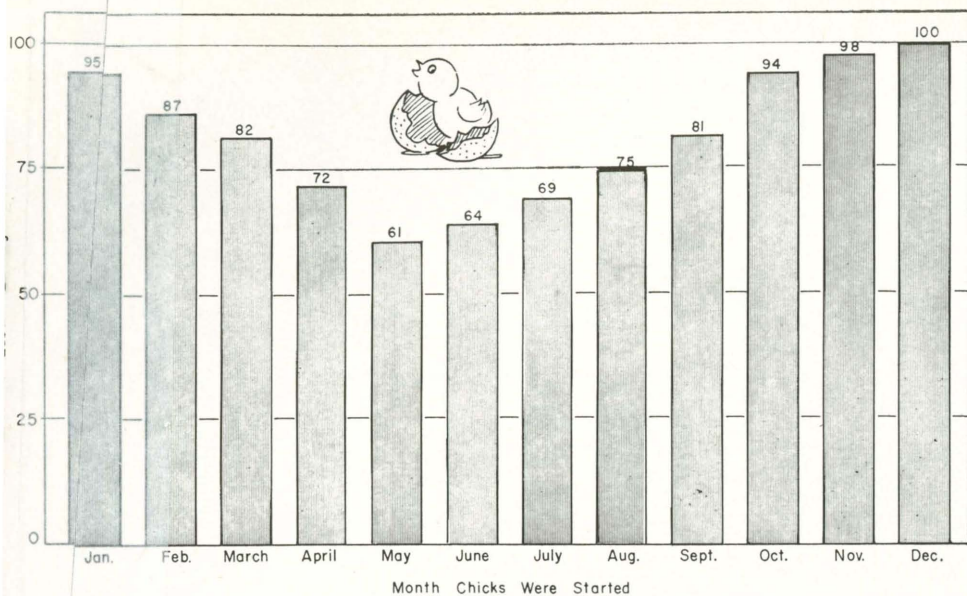


Fig. 1. Relative level of labor earnings from laying flock replacements started the first of each month (December = 100)

- Total production of eggs was highest in March, April, and May and lowest in September, October, and November.

- Price received by Utah producers for eggs was lowest in March and raised to a high in September where it remained relatively stable until January.

- While the prices of large and medium eggs closely follow average price of eggs the price advantage for large eggs was greatest in September, October, November, and December. Price advantage for medium and small eggs was greatest in February and March.

- Most of the small and medium size eggs were laid by the time a pullet was nine months old.

- Even though the price of cull hens does not vary greatly the most advantageous price was in March, April, and May.

Now for the logical question for any producer to ask, Is there a system of management that a producer can follow to make the best of conditions he can not change and also get the greatest monetary reward for his efforts? The answer is yes. His best management practice with any given set of facilities will have these qualities.

- He will produce the largest number of eggs possible when the price is highest. A good pullet flock in their ninth month of production by September will fill this requirement.

- He will produce as many large eggs as possible when their price advantage is greatest. This is the period from September to December.

- He will produce the necessary small and medium eggs when their price

For September 1954

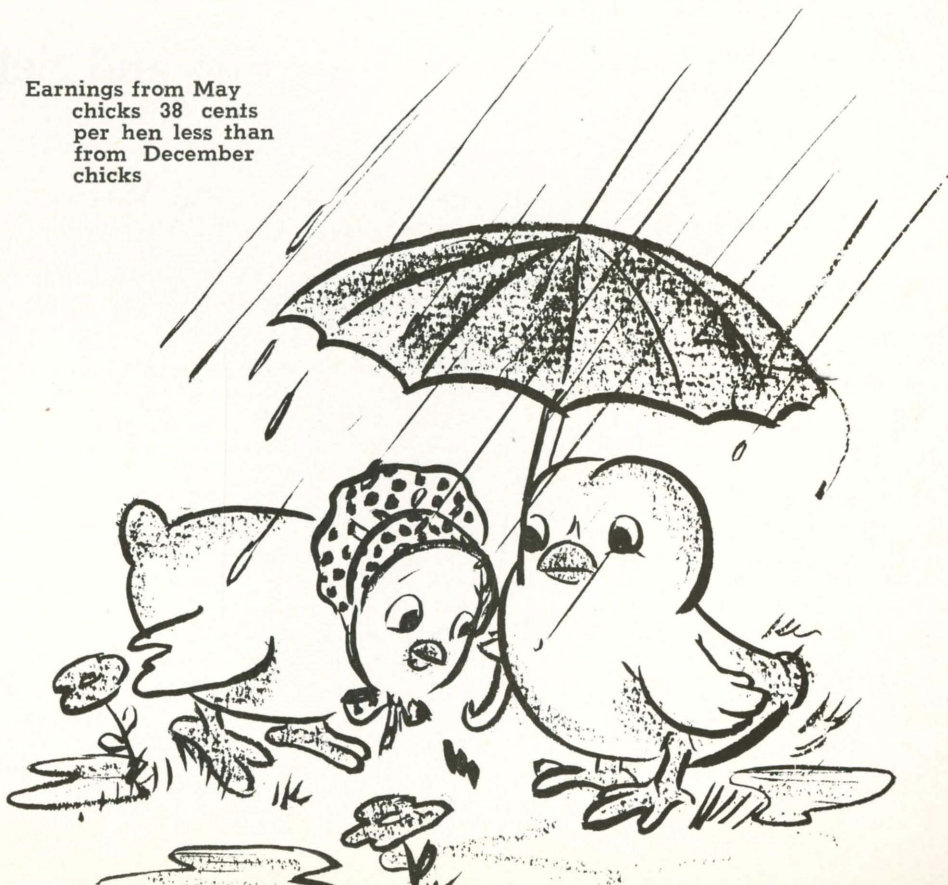
advantage is best. This is in February, March, and April.

- He will sell the flock after a reasonable production period when the price received per pound is highest. This is in March, April, and May.

Producers can take advantage of seasonal changes.

To adjust the production of eggs to take advantage of price cycles he would simply start the flock at a desired time. If it is assumed that the rate of lay, size pattern of eggs laid, the time re-

Earnings from May chicks 38 cents per hen less than from December chicks



quired to mature pullets, and the ability of the operator to keep a pullet in production for 12 months would not vary regardless of when the pullet was started, a calculation of the probable earnings that would result from alternative times for starting the pullet flock, could be made. No good evidence seems to exist that would suggest that these assumptions are unrealistic. Table 1 is based on these assumptions and further that the pullets would be started, reared for 6 months, lay for 11½ months, and then be sold for meat. The egg-size pattern was assumed to be the same as that found in tests in California. The seasonal price of eggs by size used was the Utah Poultry and Farmers' Cooperative paying price minus 5 cents per dozen for marketing deductions.

Assuming a production per hen of 187 eggs the total receipts for eggs are shown in the second column. The differences in this column are caused entirely by the seasonal price of eggs and the differential in the size-price relation at varying seasons of the year. The feed cost would be constant since each group of pullets would be fed an identical span of time so that even though there is a seasonal cost pattern for feed it would not affect this problem. A pullet was assumed to consume 82 pounds of feed of which 60 percent is mash and 40 percent scratch. The price used was the 1947-1951 average price of laying mash and scratch feed in Utah as reported by

(Continued on page 69)



A part of the experimental herd bred through the proved sire breeding project, Utah Agricultural Experiment Station

A High Producing Dairy Herd... the Result of a Consistent Program of Breeding and Selection

GEORGE Q. BATEMAN

DURING 1953 the dairy experimental herd at the Utah Agricultural Experiment Station produced a total of 464,984 pounds of milk containing 17,715 pounds of butterfat. They also produced 44 calves. This amounted to an average production of 11,259 pounds of milk containing 429 pounds of butterfat, and 1.07 calves per cow. Lactation periods averaged 318 days with 47 dry days.

This record is the result of 26 years of breeding and selection. In 1926 the herd was made up of purebreds and grades. These animals were bred to proved Holstein sires and sons of proved sires from the Bureau of Dairy Industry

GEORGE Q. BATEMAN is associate professor of dairy husbandry and superintendent of the dairy experimental farm.

Station at Huntley, Montana. The young sires were proved at the Utah Station by mating them with virgin heifers. The objective was to breed cows that would produce 300 or more pounds of butterfat as two-year olds.

In 1953 the entire milking herd was made up of females from proved sire natural matings. During this year 35 cows completed 305 day records (table 1).

Of these 13 were two-year olds, 7 three-year olds, 5 four-year olds, 3 five-year olds, 4 six-year olds, 2 nine-year olds, and 1 eleven-year old. The 13 two-year olds produced an average of 382 pounds of butterfat and ranged in production from 299 to 451 pounds with their first calves. This production when calculated to maturity indicates a produc-

tion as mature cows of 389 to 555 pounds of butterfat.

The oldest cow in the herd, HU-34, in 11 lactations, averaging 324 days each, produced a total of 134,734 pounds of milk containing 5,189 pounds of butterfat. This is an average of 12,339 pounds milk, 507 pounds of butterfat, and a calf per year for the 11 lactations.

Amounts of Feed Used

These production records were made on a ration of alfalfa hay, corn silage, pasture, and grain fed according to production. The grain mixture was composed mostly of barley with a small percentage of wheat and dried beet pulp, 1 percent salt and 1 percent steamed bone meal. No cow in the present herd has been fed grain during the dry period.

The cows were milked twice a day and bred in an attempt to have them freshen at yearly intervals.

Average Production

The average production for the 35 cows completing 305 day records was 11,142 pounds of milk and 423 pounds of butterfat. On a mature equivalent basis this would average 12,610 pounds of milk and 479 pounds of butterfat. These data were taken from the experimental farm records where every milking is weighed. The milk is tested for percentage butterfat at two week intervals.

Cows Perform Other Duties

Most of the cows, while making the reported records, were being used in various research projects: 36 were used during the summer of 1953 on a study to determine the rate of feeding grain to dairy cows when on pasture; 12 of the 36 received no grain. During the winter ten cows were on a ration of alfalfa hay that had been treated with insecticides to determine their toxicity when fed to dairy cows. The entire herd during the summer was used to study the carrying capacity of irrigated pastures. Many of the cows do double duty, being on one experiment in the summer and another during the winter period.

Housing

During the winter the herd is housed using open sheds and hard surfaced yards. The cows are stanchioned only for feeding grain at milking time.

Dr. Vaughn E. Hansen, associate professor of irrigation engineering, was granted a year's leave of absence to accept a position as assistant chief engineer with the Hydrotechnic Corporation of New York. He is employed on a 500,000 acre irrigation project in Angola, West Africa. The Hydrotechnic Corporation has a contract with the Foreign Operations Administration of the United States government and with the Portuguese government to determine the feasibility of irrigating the land of that country and to ascertain what land should be included within the project, to locate water diversion and storage facilities and hydroelectric structures, and to check the design of the dams and power plants.

During the course of the year Dr. Hansen will spend about two and a half months in New York and Washington, D. C., a month in Europe mostly in the Netherlands and in Portugal, and about nine months in Africa in Angola and Egypt.

Dr. O. W. Israelsen, emeritus professor of irrigation and drainage, is spending three months in Puerto Rico as an adviser on drainage problems.

For September 1954

Table 1. Production of the experimental dairy herd by ages, 1953

Number	Age in years	Milk <i>pounds</i>	Butterfat <i>percent</i>	Butterfat <i>pounds</i>	Mature equivalent	
					Milk <i>pounds</i>	Butterfat <i>pounds</i>
13	2	9,958	3.84	382	12,661	485
7	3	11,324	3.77	427	12,912	488
5	4	11,348	3.97	450	11,875	471
3	5	11,874	3.67	436	12,069	443
4	6	13,410	3.51	434	12,410	434
2	9	12,557	3.86	523	13,964	538
1	11	12,140	4.14	502	13,233	547
35	Average	11,142	3.80	423	12,610	479



Dairy cows convert large quantities of feed, unedible to man, into human food

The Dairy Cow . . . an efficient machine

The great efficiency and the importance to humanity of the dairy cow in converting material not edible by man into human food is not generally appreciated.

Cow HU-34, productive lifetime in the herd of 11.7 years, is an example of the magnitude to which the dairy cow serves as a converter of food. This cow during her lifetime separated 134,734 pounds of milk containing 5,189 pounds of butterfat and produced 10 calves, only one of which is needed to replace the original machine when worn out, from approximately 35 tons of alfalfa hay, 41 tons of corn silage, 2047 days of grazed pasture, and 15 tons of grain that contained 400 pounds of salt and 400 pounds of steamed bone meal.

The phenomenal ability of the bovine to take the feed nutrients from

the blood and convert them into milk, and the udder's tremendous capacity for work make it one of the greatest converters serving man. Dairy scientists have determined that it requires a flow of approximately 400 pounds of blood through the udder to produce one pound of milk. At this rate of blood flow more than 6 million gallons of blood passed through this cow's udder during her 10 lactations. This great converter of human food, the dairy cow, is not surpassed by any other known animal or machine.

In these 134,734 pounds of Holstein milk there will be found approximately 4,608 pounds of protein, 6,548 pounds of milk sugar, and 916 pounds of ash, mostly calcium and phosphorus, all of which are most important foods for good human nutrition.

—G. O. Bateman

USAC Assumes Extended Responsibility for Technical Assistance Program in Iran

College assumes charge of technical assistance program in fields of plant science, agricultural engineering including farm machinery and farm irrigation, animal science, and agricultural extension . . . College will also serve as advisor to Karadj Agricultural College . . . Staff of about 42 members to be maintained in Iran

A THREE YEAR contract was signed June 30 between the Utah State Agricultural College and the Foreign Operations Administration of the United States Government extending and enlarging the technical assistance program of the College in Iran. Under the new agreement the College will have charge of the technical assistance program in the fields of plant science, agricultural engineering including farm machinery and farm irrigation, animal science, and agricultural extension in Iran. In addition the College will serve in an advisory capacity to Karadj Agricultural College to aid in its program of service to the diverse agriculture in Iran.

The USAC has been participating in a contract with the United States Government in the technical assistance work in Iran since 1951. The success of

the work under this contract by USAC personnel has prompted the further expansion of the program.

Program Nationwide

The USAC program in Iran is centered in the capital, Tehran, with regional offices in eight other cities: Kerman, Meshed, Shiraz, Isfahan, Tabriz, Ahwaz, Kermanshah, and Resht.

In carrying out the new contract the College will recruit, train, and maintain in residence in Iran a staff of approximately 42 members, also short-term consultants. Some of these people are now in Iran and effort is being made at the present time to fill the other positions in order to have a full staff of agricultural workers.

Dr. R. W. Roskelley, head of the Sociology Department, has served on

the USAC program in Iran as chief agriculturist during the past three years and has now returned home to resume his duties at the College. Other staff members who have been in Iran in this work are Professor C. H. Milligan, head of the Irrigation Department, Dr. J. Clark Ballard, professor of horticulture, and Professor Joseph C. Coulam, head of the Department of Woodwork and Building Construction. These men have returned to their duties here on the campus and others are being employed to carry on the work for which they have been responsible. Other people who have participated are Odeal C. Kirk, superintendent of the Howell Field Station for Horticultural Research; Glen A. Wahlquist of the Agronomy Department of the College of Southern Utah at Cedar City; Bruce H. Anderson, irrigation en-

Dr. R. H. Walker, dean of the School of Agriculture and director of the Agricultural Experiment Station, and Thorpe B. Isaacson, chairman of the Board of Trustees, Utah State Agricultural College, spent the month of June in Iran with officials of the FOA and of the Iranian Ministry of Agriculture in development a new contract program for USAC. The picture on the left

shows from left to right: Mostafa Zahedi, deputy minister of agriculture of Iran; R. W. Roskelley, chief agriculturist, U. S. operations missions to Iran; His Excellency Ahmad Houssian Adle, Iranian minister of agriculture; Dr. Moavani, in charge of the cottonseed oil factory at Veramin; Thorpe B. Isaacson; and R. H. Walker. The center picture



gineer, who served one two-year term in Iran, during the past summer was home on vacation, and has now returned to Iran as chief of the Irrigation and Engineering Branch. Dr. Hendrik Versluis served on the mission as veterinarian for two years and after a home leave he has gone back to work in the public health field. Glenn Morrill, who was formerly vocational agriculture teacher at the Gunnison High School, is completing a two-year assignment, and it is anticipated that he will return to Iran after a two months' vacation. LeRoy Bunnell, formerly vocational agriculture instructor at the Bear River High School, who has just completed a two-year assignment, will return to Iran for another two year period after a short vacation. Others included in this program are Bert Despain, who has returned after two years of service, and Melvin C. Peterson, who has been in Iran about two and half years. During the summer some new staff members have gone to Iran. Among these are James H. Wood, agronomist; Rex Ottley, livestock and extension specialist; Charles A. Hymas, extension specialist, and Rell F. Argyle, agronomist and extension specialist.

Cost Met By Federal Funds

The entire cost of this program is being met by funds appropriated to the Foreign Operations Administration

under the foreign aid bill. Consequently, it is not costing the Utah State Agricultural College any money from regular appropriations; and neither does this program in any way interfere with the work of the College, but merely extends its sphere of responsibility and opportunity for service.

Colleges Aid in Technical Assistance Program

At the Land-Grant College meeting in November 1953, Harold Stassen, administrator of the Foreign Operations Administration, expressed his hope and also the general policy of the Foreign Operations Administration that a larger proportion of the technical cooperation program conducted in the underdeveloped free nations of the world could be carried on on a contract basis through the assistance and help of the colleges and universities of America. This hope, he said, was based on the assumption that the colleges and universities have had an important part in helping to develop the technical skills and know-how in America which have led to increased efficiency in food production, improved sanitation, and overall improvement in the economy and welfare of the people and of the nation. The United States government, he said, proposed to share this kind of leadership and training with the peoples of other

nations to assist them in developing their own trained people and in stabilizing their institutions so that they could carry on or initiate the same kind of a developmental program in their countries.

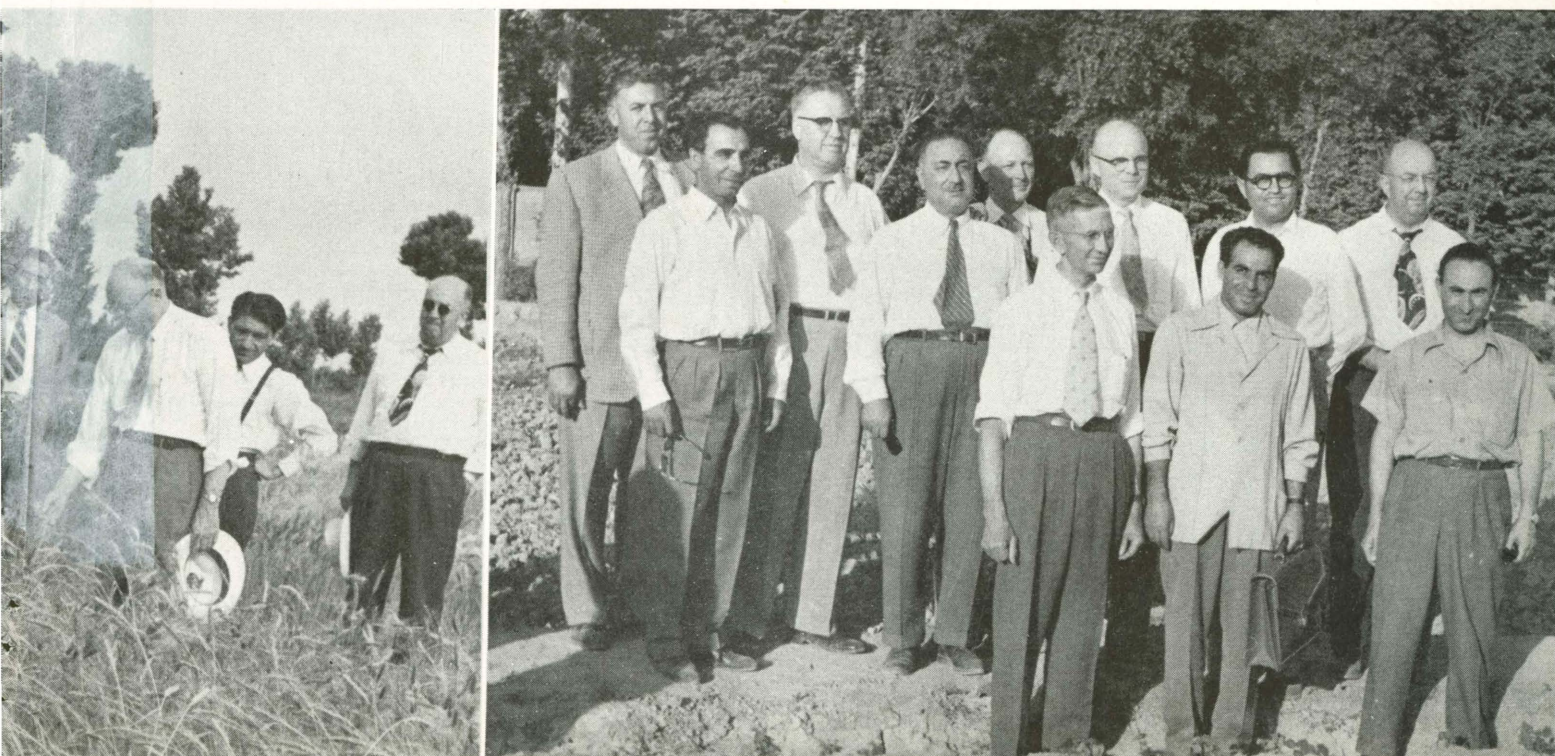
A number of colleges and universities in the United States now have contracts with the Foreign Operations Administration for technical assistance in foreign countries. There are six universities with contracts in seven countries of South America, one with a contract in Europe, seventeen universities with contracts in the Near East, South Asia, and Africa; and six universities with contracts in three countries of the Far East. Of the institutions in western United States, the University of Wyoming has a contract in Afghanistan, University of Arizona in Iraq, the State College of Washington in Pakistan, Texas A & M also in Pakistan, Oregon State College in Thailand, and Stanford University in the Philippines. The BYU has a contract in the area of education in Iran.

Walker and Isaacson Visit Iran

In furtherance of this program the Utah State Agricultural College was asked to extend its responsibilities in connection with the technical assistance program in agriculture in Iran. On the basis of this request Dr. R. H.

shows the same officials along with other Iranian officials and foreign scientists. The picture on the right includes some of the Utah group in Iran. Left to right: Dr. Moaveni, Mr. Fardad of the Tehran regional office; Mr. Isaacson; His Excellency Ahmad Adle; Dr. E. L. Waldee, assistant chief agriculturist, U. S. Operations mission and for-

merly associate professor of plant pathology, USAC; LeRoy Bunnell, formerly agriculture instructor, Bear River High School and now agronomist in the Tehran regional office; Dr. R. H. Walker; Ali Farrakh, a former USAC student, Mostefa Zahedi, R. W. Roskelley, and a member of the Iranian ministry of agriculture





Centers where USAC personnel are located. Headquarters are in the capital, Tehran

Walker together with Thorpe B. Isaacson, chairman of the USAC Board of Trustees, spent some time in Washington in the month of May followed immediately by a trip to Iran in June to work with officials of the Foreign Operations Administration and also with those of the Ministry of Agriculture in Iran in developing the new contract program which will give USAC expanded responsibilities and opportunities for participation in the technical assistance program.

Helping People to Help Themselves

The Utah State Agricultural College could perform no greater mission for the people of Iran and for world peace and understanding than to aid in improving Iranian agriculture. With 80 percent of her people engaged in agriculture the welfare of Iran is dependent basically on developing a successful and prosperous agricultural economy. Erosion control, use of fertilizers, better crop varieties, efficient methods of production are all essential to the production of more food to increase the standard of living of the people.

Iran also needs the advantages of modern information on production of feed for livestock on cultivated land to

prevent animal starvation when pastures are short or winters severe. A further need is for more developed livestock management methods to prevent the death each year from disease of thousands of livestock.

Technical assistance specialists are approaching the problem in many ways, and the Iranian people are quick and eager to adopt American technical skill.

Special emphasis is being given to the establishment of basic agricultural research, which will help train and demonstrate to agricultural technicians, students, and farmers the scientific knowledge and improved agricultural methods which will advance Iran's agricultural economy, particularly at the village level.

Improved seed stock and livestock strains have already been brought into the country to demonstrate how yields may be increased. Many of the crop varieties introduced from the United States have been found admirably adapted to Iranian conditions. Crop varieties now grown in Iran can be selected and improved.

A good example of how American technical knowledge is being accepted by the Iranian farmers and how this knowledge is increasing crop yields and thereby improving the economy of the country is the pistachio nut spraying pro-

gram. In the Chasvin area where it has not been the custom to spray pistachio trees for insect control, officials estimate that this year they will harvest 2,500 tons of good quality nuts because of a generally adopted spray program. This will mean about \$2,500,000 to the farmers where last year they harvested 100 tons of poor quality nuts. Check trees not sprayed this year failed to yield a crop. Results were similar in the Damghan area.

American personnel are working with Iranians trained in this country, many at USAC. These men work with the village farmers in improving their methods. Through the agricultural college at Karadj students will be trained in modern agriculture.

With the aid of American know-how supplied by specialists from the USAC, it is estimated that the present crop yield can be doubled and also the area of arable land. It will be a slow process, but already the program is showing results.

Cooperation With the Agricultural College at Karadj

It is anticipated that there will be three way participation in a cooperative program with the Iranian Agricultural College at Karadj, just outside Tehran. The USAC will appoint an adviser to help in establishing a program there similar to that found in the land grant colleges of America with residence teaching, research, and extension. In addition the Ford Foundation is considering making a grant to the American University at Beirut to be used for a scholarship program to train both faculty and outstanding students from Karadj.

With the recent appointment of Dean R. H. Walker to the Board of Trustees of the American University at Beirut the possibilities of cooperation among USAC, Beirut, and Karadj are good.

Dr. R. H. Walker, director of the Utah Station and dean of the School of Agriculture, recognized as a leader in foreign agricultural relations, has recently been named to the board of trustees of the American University of Beirut, Lebanon. Dr. Walker will become chairman of the board's agricultural committee and act as special adviser on technical assistance.

With Dr. S. W. Edgecombe, formerly head of the Horticulture Department, USAC, as dean of the School of Agriculture, the American University is making an outstanding contribution throughout the Middle East to the training of students in modern agricultural methods. Fifty-one nationalities are represented in its student body.

Most Areas in Utah Lack Adequate Library Services



Salt Lake County Library, with headquarters at Midvale, is probably the best supported and among the most active in servicing its area. It has a working budget of more than \$2 per capita, maintains seven community libraries, seven combination school and community libraries, eight school branches, serves sixteen schools by bookmobile, and makes eleven other bookmobile stops. In addition it makes classroom loans to twenty-eight schools

CARMEN FREDRICKSON

IN SPITE of the fact that for many years Utah has stood at the top in her system of public education and in the percentage of the population in school, the state is near the bottom of the list in the availability of library services. Three counties in Utah have no public libraries. There are many counties with extremely inadequate libraries. There are large numbers of people who live too far away from libraries for them to be practically useful. A still larger number are excluded from libraries, not by distance, but by their own habits. There is no state library to act as a central supply resource to supplement and strengthen local libraries especially in rural areas. Utah is the only state in the union without a state library.

The Library Service Bills, proposing federal funds for the extension of library

MRS. CARMEN D. FREDRICKSON, associate professor of sociology, and Dr. Joseph A. Geddes have been studying libraries in the state. A bulletin reporting their findings will be published during the coming year.

services in rural areas, are pending in Congress. Yet if they do pass, Utah cannot take advantage of them because of the lack of a state library or central agency to administer the funds.

The Utah state law provides for city and county libraries on petition of the taxpayers. Counties may tax up to 1 mill for library support on property outside of cities of more than 20,000, provided that the taxes collected from towns having libraries are turned back to them. Cities of the first class may levy from $\frac{1}{3}$ to 1 mill for library purposes; second class cities cannot exceed $1\frac{1}{2}$ mills, and third class cities cannot exceed two mills.

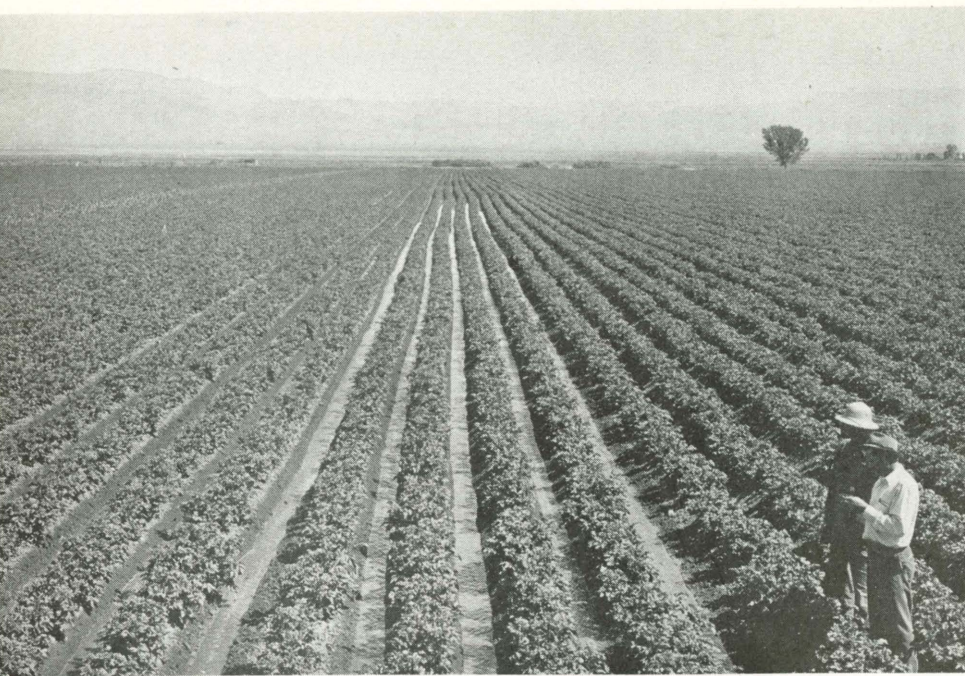
Salt Lake County, because of its valuable mines and rich industrial development, has an adequate library budget. In 1953 the budget of the county library system amounted to \$215,901.83. This was more than the \$2 per capita recommended by the American Library Association to provide adequate service. The Salt Lake County system maintained seven community libraries, seven combination school and community branches,

eight school branches, sixteen schools served by a bookmobile, and eleven bookmobile stops at places other than schools. In addition the system made classroom loans to 28 schools. There are a few other county libraries in the state that are providing good service to their communities, among them the Davis and Washington County libraries.

However, most of the libraries of the state have entirely inadequate financial support. As a result, these libraries are housed in uninviting buildings; they contain worn and old books, often those discarded by private families. These books are distributed by untrained individuals who lack the vision of library potentialities. These libraries are largely unused and unusable.

No institution surpasses the library in its potential role of aiding men to live richly. A library permits man to travel in time and relive the events of history. He has only to enter and take down a book to commune with the mighty dead. The library is the cornerstone of adult education. One of the most promising

(Continued on page 68)



Potatoes need frequent, light irrigations and a fertile soil. On most fertile soil, yields of potatoes show response to added fertilizers

JAY L. HADDOCK

Yields slightly better with sprinkler than with furrow irrigation

Yield and Quality of Potatoes Influenced by Fertilizers and Irrigation

THERE ARE many problems relative to the production of maximum yields of quality potatoes that are still unsolved. However, sufficient information is available to increase average potato yields in Utah from 260 to 500 bushels per acre. To obtain high yields of quality potatoes, it is necessary to apply 20 to 30 inches of water to the crop in relatively light frequent applications.

Irrigation practices, which are effective in increasing total yields, are also effective in improving the grade quality of potato tubers.

There is an intimate relation between irrigation practice and nutritional status of potato plants. If these relations are understood, they can be manipulated to some extent by the farmer to achieve a proper balance between fertilizer and irrigation practice. It is advisable to apply some commercial fertilizer to the potato crop even on relatively fertile soils. This is especially necessary if a good irrigation program is followed. The amount of nitrogen and phosphorus fer-

tilizer that is justified will depend on the present soil fertility conditions, but probably should not be less than 80 pounds of nitrogen and 80 pounds of phosphoric acid per acre when good irrigation practice is followed.

These recommendations are the result of a recent study of the influence of irrigation practice and commercial fertilizer application on the yield and quality of potatoes.

Results of Current Research

The data obtained in these experiments will be presented in bar graphs for ease of interpretation. In order to simplify this presentation, symbols representing field treatment will be used freely. These are described in a general way as follows:

F — furrow irrigation
S — sprinkle irrigation (Perf-O-Rain)
1F and 1S — relatively dry

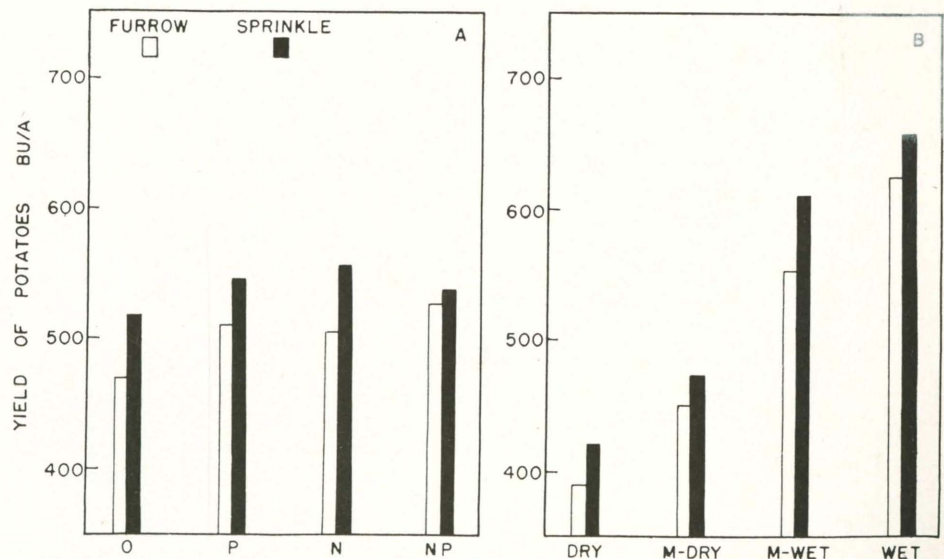


Fig. 1. Yield of potatoes as influenced by fertilizer, method of irrigation, and soil moisture condition, 1952

DR. JAY L. HADDOCK is one of a three-man research team working on a regional project on plant, soil, and water relations at the Utah Station. The other scientists are Dr. Sterling Taylor and Dr. Vaughan Hansen. Dr. Haddock is employed by the Agricultural Research Service and works cooperatively with the Utah Station.

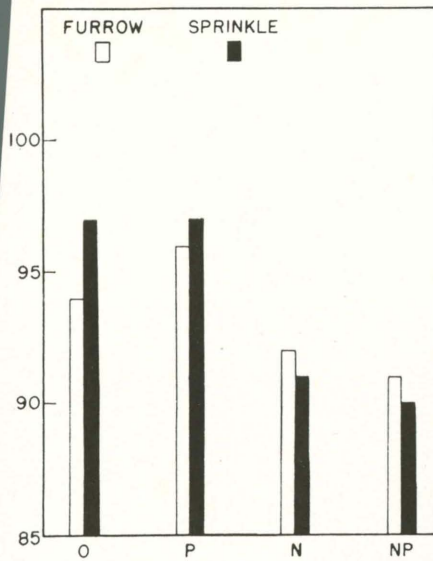


Fig. 2. Quality index of potato tubers as affected by fertilizers

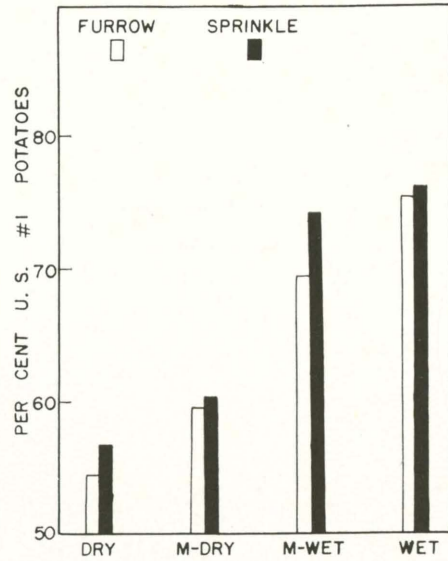


Fig. 3—Percentage of U. S. no. 1 tubers of Russet Burbank as affected by method of irrigation and soil moisture condition

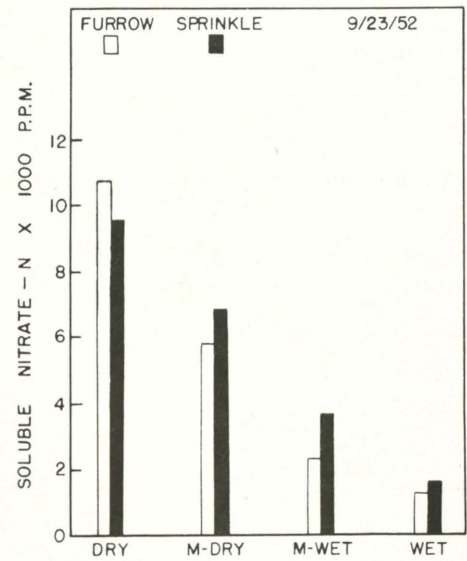


Fig. 4. Soluble nitrate nitrogen content of potato petioles as affected by soil moisture condition and method of irrigation

10.4 and 9.6 inches irrigation water (2 applications)
 2F and 2S — moderately dry
 14.1 and 13.7 inches irrigation water (5 applications)
 3F and 3S — moderately moist
 24.5 and 22.1 inches irrigation water (20 applications)
 4F and 4S — moist
 39.1 and 30.0 inches irrigation water (30 applications)
 O — no commercial fertilizer

P — 250 pounds of treble superphosphate per acre
 N — 400 pounds of ammonium sulfate per acre

Potato plants may give a growth response to nitrogen and phosphorus fertilizers even on relatively fertile soils. Such a response is shown in the yield data of fig. 1A. Under both furrow and sprinkle irrigation there was a small but consistent advantage for nitrogen and phosphorus fertilizers. Although this soil is sufficiently fertile to produce

500 bushels of potatoes and 6.5 tons of alfalfa hay per acre without fertilizer, the potato crop shows the need for supplemental fertilizers.

Most farmers recognize that irrigation practice is important in potato growing. However, they don't always appreciate how much a good irrigation program will increase the yield and market quality of potato tubers.

A glance at the bar graph in figure 1B will show that although yields of

(Continued on page 70)

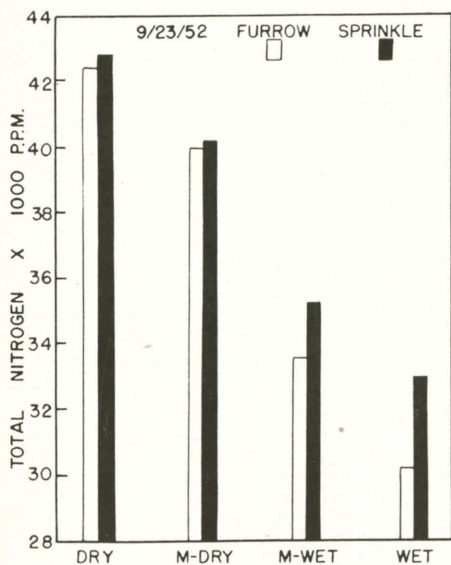


Fig. 5. Total nitrogen content of potato leaves as affected by soil moisture condition and method of irrigation

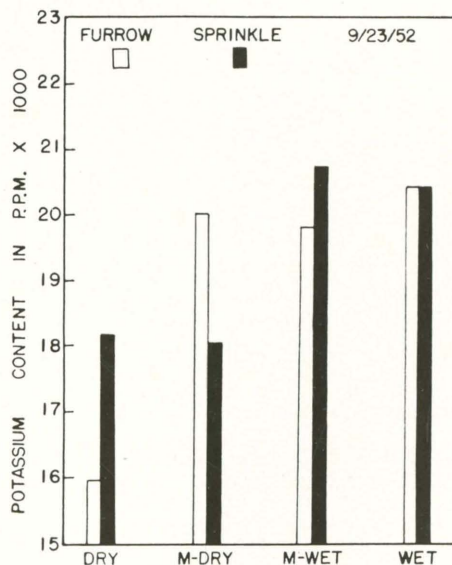


Fig. 6. Total potassium content of potato leaves as affected by soil moisture condition and method of irrigation

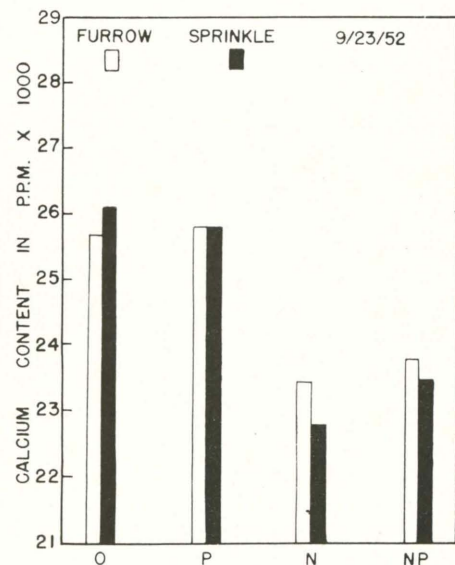
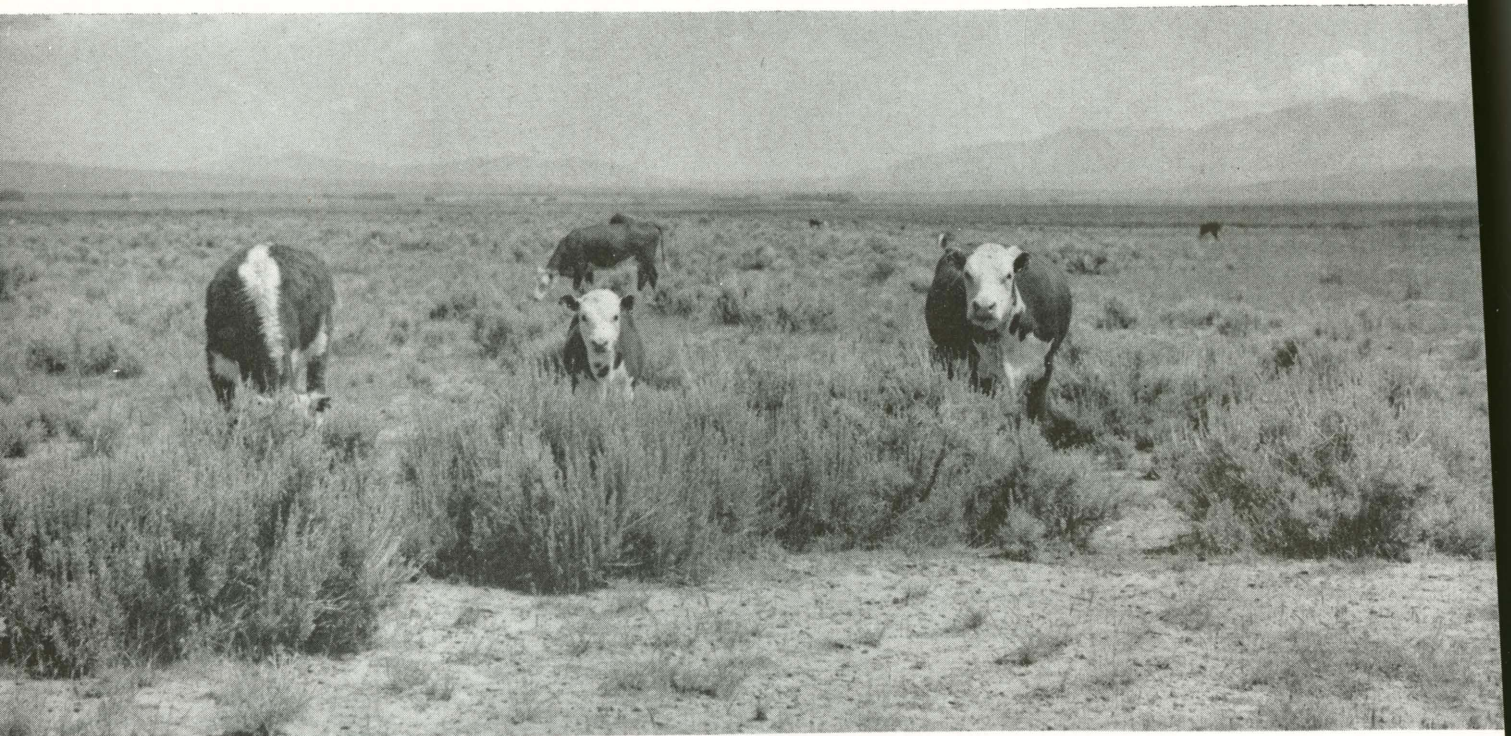


Fig. 7. Total calcium content of potato leaves as affected by fertilizer and method of irrigation

How Well Do Cattle Eat On The Range?



Supplementary feeding on winter ranges may pay dividends

THERE ARE approximately 12,474,000 cattle in the 11 Western States. Five hundred fifty-three thousand of these are in the state of Utah. About 85 percent of the land area in Utah is grazed by sheep and cattle and the income derived from these livestock is of major importance to the state's economy. A large portion of the cattle in the Intermountain Area subsist on the open range. Usually range cattle graze high mountain ranges during the summer months and the foothill ranges during the spring and fall. Dur-

ing the winter the cattle are fed meadow or alfalfa hay or they graze desert or semi-desert ranges.

The winter ranges have a diversity of soil, climate, topography, and vegetation and vary in forage production from year to year. Little is known about the nutritive content of Utah winter forages for cattle or how the grazing of these ranges affects beef production. It is known that many of these forage plants are deficient in essential nutrients in winter and in many areas there is not

sufficient forage available. Because of these facts supplementary feeding may pay dividends.

In order to obtain information on how to supplement cattle on the winter range the Animal Husbandry and Range Management Departments of the Utah Agricultural Experiment Station are initiating a cooperative project. Swift & Company has provided funds to supplement state and federal funds to initiate this project. Ferris James and Alvin James, cattle ranchers at Park

Plenty of water is necessary for maximum production on the winter range



ry, Utah, are supplying 80 head of Ford cattle. The Bureau of Land Management and other agencies are also cooperating. The research will be started on the winter range allotment of Ferris Alvin James in western Box Elder County near the Nevada border.

The project will have four objectives: (1) to develop techniques of handling range cattle for detailed experimental research; (2) to note the effect of supplements on the calf crop, weaning weights, death losses, weight gains or losses, and other production factors; (3) to determine the botanical and chemical composition of the diet of range cattle with special reference to deficient or excessive nutrients and minerals, and (4) to work out methods for determining the digestibility and metabolizable energy content of various plants which are consumed by cattle on Utah ranges.

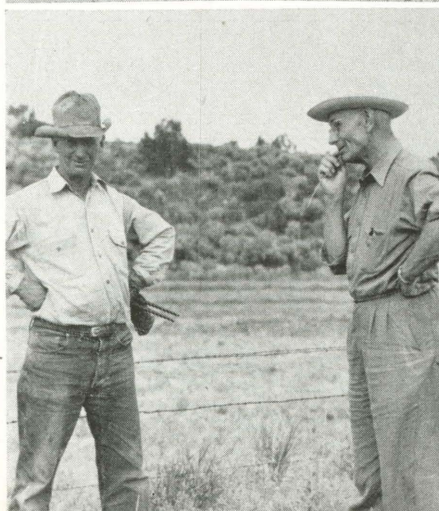
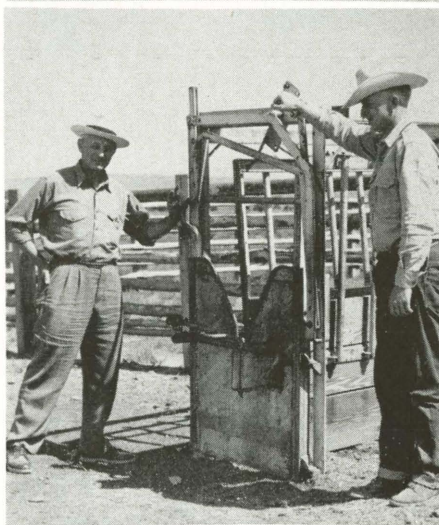
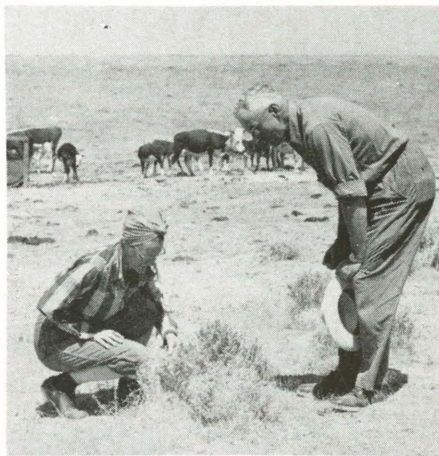
Eighty head of cattle were selected during April 1954, and tagged for identification, as were their calves. They will be grazed in the normal manner during the summer months. At the close of the summer grazing season they will be gathered, the calves will be weaned and weighed, and a feeding program started. Sixty head of cows will be taken to the winter range where 53 head will be given various levels of protein, urea, phosphorus, and vitamin A, and 7 head will receive no supplement. Twenty head will be fed on alfalfa and meadow hay on the James' ranches in western Box Elder County. The treatments will be compared on the basis of calf crop, death loss, weight gains, weight of calves at weaning age, and other factors affecting production. The cattle will be placed on summer range again the following season, and the experiment continued until definite conclusions can be drawn.

Corrals and feeding chutes are currently under construction, and it is anticipated that feeding will begin during late October or early November of this year.

At the conclusion of the research it should be possible to make recommendations on the supplements needed for the most efficient production of beef.

This project will be cooperative between the Department of Animal Husbandry and Range Management. DR LORIN E. HARRIS, professor of animal husbandry and chairman on the Institute of Nutrition is project leader. MILTON A. MADSEN, associate professor of animal husbandry, DR. C. WAYNE COOK, associate professor of range management, and

Dr. R. C. Newton, vice president of Swift and Company and in charge of research, inspects the experimental range. Swift and Company is helping finance the research. Upper picture: Dr. and Mrs. Newton look at a clump of range forage. Center, Dr. Newton and Carl James (right), research assistant, inspect cattle chute. Lower, Dr. Newton and Alvin James (left) chat about the cattle ranching business. Mr. James is one of the brothers who are providing 80 Herford cattle and the range land used in the research



DR. L. A. STODDART, head of the Department of Range Management are cooperating in the planning and work of the project. J. CARL JAMES, graduate student in animal husbandry, will be in charge of the feeding and management of the cattle.

Dairy Laws & Regulations

(Continued from page 53)

products that meet the generally accepted standards as to cleanliness, sanitary requirements, and nutritional qualities. Health authorities must protect consumers against contaminated milk in both interstate and intrastate markets. Examples of these restrictive regulations have been cited above.

Extreme differences prevail in the per capita production of milk in the eleven Western States. According to population in 1952, Idaho produced more than 6½ times and Utah 3 times as much milk as New Mexico. The latter state would need to import milk to meet its fluid milk requirements even though its entire milk production were devoted to that use. If its fluid milk consumption were the same as the estimate for Utah, 435 pounds per capita, it would require about 100 million pounds to meet the deficit in local production. To meet this basic food requirement Arizona is only slightly more favorably situated than New Mexico. Moreover, because of the rapid population growth in the West in the past fifteen years, our per capita milk production has declined substantially. In 1940 per capita milk production in the Western States was about 80 pounds greater than the national average. In 1952 it had declined to a point about 115 pounds below the average for the United States. These facts underscore the importance of the free flow of milk in interstate commerce.

Utah ranks second among the eleven states in per capita milk production. If our dairymen are to realize the most favorable returns, these will result from marketing the largest possible amount of milk as grade A fluid milk. Substantial quantities now move from Utah into Nevada and Wyoming, with lesser amounts going into Colorado, Arizona, and during certain seasons of the year into New Mexico. There is reason to believe the milk requirements of the deficit areas will increase rather than decrease.

Some of the important conclusions reached from this study are:

- Good production practices and essential facilities should be the goal to be attained by regulations. Most

particulars of structure and design should be recommendations, not requirements, of sanitary laws for the dairy industry. Physical specifications regarding barn structures and milk house requirements by one state are often impossible to meet by producers who have built their plants to meet specifications set by the code of another state.

- In the absence of complete uniformity of all requirements and procedures, cooperation and reciprocity by dairy officials of dif-

ferent states and cities appear to offer greatest promise of elimination or avoidance of barriers to the interstate movement of milk and dairy products.

- There is urgent need to systematize inspectional services to avoid annoyances that are generated by conflicting and inconsistent orders issued by inspectors.
- Since the objectives of regulation of the dairy industry are sometimes dictated more by political than by economic consideration, political

judgment and expediency may be more effective in the removal of restrictions than is economic measurement and analysis.

Correction of some of the existing requirements which apparently are related to quality of product or public health interest would appear to be proper subject for legislative action. The dairy industry, which is fighting for an expanded market, may do well to initiate action before appropriate legislative bodies to standardize dairy regulations.

Lack of Library Service

(Continued from page 63)

movements to vitalize public libraries is the development of extension courses by the colleges and universities. They have the power to bring adults and books together. Utah libraries are only beginning to act as active agencies in communities. Only the few progressive libraries are moving from being storage reservoirs for books to the active stage of real effort to build a causeway between people and books.

Public Library Research

Research on libraries in Utah is now being conducted by the Utah Station. Data have been obtained from 79 public libraries dealing with their services; attitudes of parents toward library standards; time devoted by family members to reading library books; and willingness of taxpayers to expand and modernize library service. The sample group cooperating includes 512 families living in Box Elder, Davis, Summit, and Salt Lake Counties.

Fewer than 17 percent of American adults read books today, as revealed by a recent Gallop poll. In 1949 the figure was 21 percent. Husbands and wives in the four counties of Utah who borrowed books from public libraries in 1951 constituted 16.9 percent of the population (table 1).

One-third more wives read books than do their husbands as indicated by percentages borrowing books. Twenty-one percent of wives borrowed books during the year in comparison with 12.6 per cent of husbands. Women also borrowed more books. Urban Salt Lake County adult married men and women both borrowed books in a higher percentage and in total books than in the other three counties. Twenty-five per-

cent from Salt Lake County borrowed books and 3.4 percent from Summit County. The percentage is eight times larger for Salt Lake County.

Wives also visit the library oftener during the year than do their husbands (table 2). More women from Davis County visit their library, Box Elder women are next, those of Salt Lake third,

and those of Summit last. For the husbands Davis also ranks highest, but Salt Lake passes Box Elder, while Summit remains far in the rear. However, there were more repeat visits made to the library by both men and women in Salt Lake County than in any of the other three counties, while Davis County holds a close second place.

Table 1. Percentage of husbands and wives who borrowed books and total books borrowed in four Utah counties 1951 (512 sample families)

Counties	Husbands		Wives	
	Percentage borrowing books	Number books borrowed	Percentage borrowing books	Number books borrowed
Box Elder	13.3	2.3	20.5	4.6
Davis	11.7	1.9	25.3	2.5
Salt Lake	19.1	5.2	30.9	8.7
Summit	3.1	.4	3.7	1.7
Total	12.6	2.7	21.0	4.7

Table 2. Percentage of husbands and wives who visited library and total visits made in four Utah counties 1951

Counties	Husbands		Wives	
	Percentage visiting library	Number times in library	Percentage visiting library	Number times in library
Box Elder	19.2	1.9	35.6	3.4
Davis	30.6	3.6	44.1	3.9
Salt Lake	24.8	5.8	34.2	4.7
Summit	7.2	.4	12.8	1.0
Total	21.1	3.2	32.1	3.4

Table 3. Percentage of children and young people borrowing books and visiting the library, and books borrowed and times in the library, Salt Lake County public libraries 1951

Family members	Percentage		Number	
	Borrowing books	Visiting library	Books borrowed	Times in library
Children 5 through 14				
boys	78.2	79.2	23.2	25.5
girls	67.4	66.3	27.6	25.3
Young people 15 & over				
male	47.5	59.1	11.6	21.7
female	76.1	80.4	23.1	28.5

Building Habits

During the early years patterns or habits are set for later life. Librarians share the vision of how to get books and people together and who work on the problem of helping children to form the reading habit while they are young are preparing for the future. This is being done in various ways, two of which are notable. One is the Saturday morning story hour for children during the winter months. Not only do children hear the story, they also see the book and the pictures. They see books with new inviting covers, they sit on low chairs to read, they look at pictures and handle them, they use various visual aids, and the total experience is stimulating and positive. The second is the school library hour during which a class of children comes to the library for instruction in the use of the card files and other library tools and where other effective devices are used to motivate the

children toward good reading habits. Children from the first grade through the elementary school have library classes organized for them which meet at regular intervals. Here again the facilities of the library are made attractive and with the cooperation of the teachers are put into the hands of the children. In the library they experience a curiosity about what is in books and they are encouraged to borrow them.

Adults and Libraries

Adults use libraries far less than other family members (compare tables 1 and 2 with table 3). A highest percentage of boys and girls from 5 through 14 years borrow books, with a slight decrease for young people 15 years and over, and a real drop for parents. This same pattern holds for percentage visiting the library, number of books borrowed, and number of times in the library during the year.

The library is the chief depository of human knowledge indispensable alike to the college and university, the high school and the junior high school. Increasingly the elementary schools are drawing on its resources. A chief cornerstone of the educational structure, its necessity and importance are more widely recognized from year to year.

If life is a process of growth, education can never cease. Formal education in childhood and youth gives him the tools. Adult life provides him with an extended period for continuous growth. Here self education with the aid of a library, positively and aggressively organized to give him guidance and to place in his hands tools and materials, becomes a golden period of living in which the balanced personality moves towards fulfillment. Planned study and balanced reading keep him in tune with his times. The well used library is a mark and a measure of the greatness of a maturing people.

Vending Milk

(Continued from page 52)

Kind of Products Sold

An indication of the kind and average amount of products sold in each location in this study is given in tables 2 and 3. Milk sales per vendor per day were higher than chocolate milk in office buildings and colleges. An exception was found at the Utah State Agricultural College where chocolate sales exceeded milk by 2 to 1. In the high schools chocolate outsold milk 3 to 1 and in the military locations, it was a 2 to 1 ratio, while at the industrial plants the preference was about equal.

Sales Patterns

Patterns of sales can be established for location and season of the year. Temperature and weather conditions affect

sales. Delivery men soon learn to adjust volume per location according to prevailing conditions. Orange and buttermilk are more popular in the summer than in the winter.

Industrial and office building locations sell about the same volume throughout the year. Sales in schools are highest in the autumn season, with no sales in the summer while the military vendors made the lowest sales in the winter season. Institutional habits of work, holidays, and peak loads of factory production affect sales patterns.

Vendor Sales New Sales

All vendor sales in this area are new business for the dairy industry. These total new sales for one year are given in table 4. Extra sales of 787,962 units at 10 cents each is \$78,796.20 of new business. It is a good start toward the bene-

fits of increased consumption. It is dairy industry "self-help" in operation to remove surplus.

The potential for vendor sales in the schools of the Intermountain Region has not been touched in spite of the milk consumed through the school lunch program. Bulk dispensing in cafes and eating places is far ahead of package vending in this area.

Winter Chicks

(Continued from page 57)

the U. S. Department of Agriculture in their monthly agricultural prices report.

Flock depreciation was calculated as the difference between the cost of 100 pullets at \$2.00 each and the sale value of remaining hens at 4 pounds each after an estimated 18 percent death loss for the laying period. Price of pullets, size of hen, and percent mortality are all average figures for 1947-1951 as reported for Utah by U. S. Department of Agriculture. The difference in the column, *flock depreciation* results from seasonal variation in the monthly average price of light hens.

Overhead and miscellaneous expenses are assumed to be the same for each group since they are all on hand for the same amount of time and for all practical

Table 4. Total sales in one year for 54 vendors

Location	Half pint	1/3 quart
High schools	16,560	53,352
College	39,940	23,180
Industrial	115,297	77,221
Stores & office buildings	174,141	26,645
Military	212,796	48,830
Total	558,734	229,228
Grand total	787,962 units or 464,600 pounds	



**Winter is the time to start your chicks,
don't wait till Easter**

purposes this can be regarded as one full year. This is assumed to be 4 percent of the total cost and is based on survey data assembled by the Department of Agricultural Economics and Marketing, Utah Agricultural Experiment Station.

The column, *total cost except labor*, results from an addition of the three preceding columns.

Labor earnings is the difference between the total cost except labor and the sale value of the eggs. (It should be remembered that the sale value of the cull hen reflects in the flock depreciation). The differences in this column, therefore, reflect seasonal variation in value of eggs which is the result of price by size of egg and variations in the liquidation value of the flock. It should also be remembered that each pullet as she became part of the laying flock was valued at a cost of production of \$2.00. This was assumed to be the same regardless of the month of the year she was hatched. Studies reviewed show the differences in cost of producing a pullet are insignificant so far as seasonal variation is concerned. If there is a cost advantage from ranging growing pullets over confinement rearing, this has not been reflected.

In the column, *labor earnings*, the greatest amounts come in December, November, January, and October in that order. In figure 1 the labor earnings for the December pullets have been given a value of 100 since their earnings were the highest and each other group's earnings have been expressed in relation to December as 100. Earnings from chicks hatched May 1 were only 61 percent as high as for those hatched December 1.

It can be noted that under the conditions assumed pullets hatched December 1, would bring the greatest profits and these would be 38 cents per hen per year more than from pullets started May 1. To apply a little arithmetic, this amounts to \$383 per thousand pullets placed in the laying house or \$1915 for a full-

time one-man flock of 5,000 hens or an extra \$159 per month for taking advantage of the seasonal variations in prices and costs. Hatchery reports show that the majority of laying flock replacements are in March and April. The difference isn't quite so great as between December 1 and May 1 hatches, but would be worth about \$100 per month to a 5,000 hen producer.

To Summarize

Reading across the columns in table 1, this story is implied and most nearly fits the requirements for a successful management program outlined above. Pullets hatched December 1 of any year with the characteristics of the 1947-1951 average would be matured for 6 months and entered in the laying flock June 1 valued at \$2.00 each. During the time a pullet was in production it is assumed she would not molt but would produce

187 eggs (the average production Utah, 1947-1951). She would be given credit for laying 66.7 percent large and 20.1 percent medium, 5.1 percent small and 8.1 percent of varying other grades. She would lay small and medium eggs during the summer months and large eggs from September on when price of large eggs is most favorable. After 12 months of production, 82 percent of the original 100 hens would be sold at an average of 4 pounds each for the purpose of light hens June 1.

Since these production and price patterns have, do, and probably will continue to exist, these gains can be made by properly timing the beginning date of the flock replacement. A challenge to a poultry producer is to find ways of making all the assumed conditions exist so he can take advantage of circumstances to maximize his labor earnings.

Yield and Quality of Potatoes

(Continued from page 65)

400 bushels per acre were obtained for two irrigations (dry plots) or 10 inches of water, 575 bushels were obtained where 24 inches of water were used (M-wet). These results agree with earlier work with potatoes at the Utah Station by Widtsoe, Merrill, and Harris.

It is generally recognized that total yield of a crop may not give all the information one would like in appraising a farm practice. The data in fig. 2 show that nitrogen fertilizer has had an adverse effect on the quality index (mealiness) of potato tubers. This quality is further depressed under sprinkle irrigation where nitrogen fertilizer is applied.

Many farmers ask what can be done to improve the grade of Russet Burbank potatoes. Frequently, an excessive amount of second growth occurs on this variety. The data in fig. 3 give a partial answer to this important question. By maintaining a relatively moist condition in the soil the grade of tubers can be substantially improved, whether one is using sprinkle or furrow methods.

The importance of good irrigation practice is further emphasized when the two factors of yield and grade are combined (see fig. 3 and 1B). From these data, it will be noted that the dry plots with approximately 10 inches of irrigation water in two irrigations yielded 220 bushels of U. S. no. 1 potatoes per acre, while the moderately-wet and wet plots yielded 414 and 487 bushels, re-

spectively, for 23 and 35 inches of irrigation water and 20 and 30 irrigations

Effect of Irrigation on the Chemical Composition of Potato Plants

From what has been said, one may erroneously conclude that the potato crop should be kept wet continuously. The term wet, as applied to soil moisture condition here, is only relative. The soils on the plots designated wet are actually relatively wet when contrasted with the dry plots. It is entirely possible to apply too much water to any crop, and particularly potatoes, if the soil is not well-drained. Although the best yields in this experiment were obtained from the so-called wet plots, it must be remembered that the soil was well-drained and had a chance to become well aerated between irrigations. However, even within the conditions of this experiment, it is obvious from the data shown in fig. 4 and 5 that the quantities of irrigation water used on the potato crop have a marked effect on the nutritional status of the plants. It will be noted that the nitrogen content of both potato petioles and leaves tended to decrease as the irrigation water was increased. It has not been definitely established at what nitrogen content growth tends to be impeded, but it is obvious that growth may be retarded because of insufficient nitrogen under many conditions. These observations suggest that there is a desirable balance

between soil fertility and the amount of irrigation water that should be applied to a given crop. In this particular investigation, the balance between nutritional requirements and soil moisture conditions was most nearly met under the conditions of the wet plots.

Not only is the nitrogen content of plants influenced by irrigation practices, but the potassium, calcium, and magnesium content is also affected. As somewhat typical of these relations, it is observed in fig. 6 that the total potassium content of potato leaves tends to increase as irrigation water is increased. The relation between sprinkle and furrow irrigation is not consistent at all for soil moisture conditions shown, but the influence of soil moisture on nutrient content is definite. Calcium and magnesium show a positive and consistent increase in potato leaves as the quantity of irrigation water is increased. It is not known at the present time what in-

fluence calcium, magnesium, and potassium have on the growth of potatoes.

Fertilization and Mineral Uptake

The nutrition of crop plants is not a simple matter. It has been shown that one cannot irrigate a crop without modifying its nutritional relationships. Similarly, one cannot add fertilizers to a soil without affecting the nutritional status. This is shown by the data in fig. 7. It will be seen that the addition of superphosphate as a fertilizer had little if any influence on the calcium content of potato leaves. However, when nitrogen

fertilizer was added to the soil, it sharply decreased the calcium content of potato leaves. This effect seems to be more pronounced under sprinkle than furrow irrigation. It is not difficult to find a reason for this latter phenomenon. Owing to lack of space, it is not possible to present the data which show that the nitrogen content of potato plants from nitrogen fertilizer plots is 50 percent greater than on unfertilized plots and about 10 percent greater on sprinkler than on furrow plots. Apparently there is an inverse relation between nitrogen and calcium content of potato plants.

Sweet Clover Weevil . . . new pest in Utah

GEORGE F. KNOWLTON

THE SWEET clover weevil, *Sitona cylindricollis* Fahr., now is a pest of sweet clover in Utah. This beetle was first found damaging sweet clover in the Ogden-Kaneville area of Weber County during early May of 1954. Subsequent surveys have shown that it occurs in several other Weber County areas, and in parts of Davis, Cache, Box Elder, Wasatch, and Utah Counties. One small infestation was found as far south as Cove Fort. Infestations doubtless also occur in other parts of Utah.

This insect is a native of Europe. It first was reported in North America during 1924. It evidently has been established in Utah for at least two or three years to be so widely distributed.

This grey to brownish-grey beetle is about $\frac{1}{4}$ inch long. It survives the winter in protected places, emerging in spring

to feed, mate, and lay eggs. The adult weevils feed on the leaves, notching them. It is easiest to locate the weevils in spring, by watching for their characteristic leaf-notching injury. This becomes severe where heavy infestations occur.

This weevil has the ability to kill seedling sweet clover plants and largely to defoliate more mature plants in late spring and summer. It may migrate by both flight and walking. Damage caused by the adults to the foliage apparently exceeds the injury caused by the larvae, which develop on the roots. Where heavy infestations of beetles have existed near alfalfa, and the sweet clover has been plowed up, this weevil has occasionally caused injury to alfalfa foliage. Adult weevils feed actively from spring until colder weather in fall. They survive the winter as adult beetles in litter or in other in other protected places.

The following insecticides are recommended for control of sweetclover weevil (amounts given in pounds of active ingredient required per acre):

1. Heptachlor $\frac{1}{2}$ pound
2. Dieldrin $\frac{1}{2}$ pound
3. Aldrin $\frac{1}{2}$ to $\frac{3}{4}$ pound
4. Toxaphene 2 to 3 pounds
5. Chlordane 2 to 3 pounds

Present evidence indicates that heptachlor and dieldrin give better protection against weevil injury than the other materials compared. DDT applied at 2 pounds per acre was less effective; at least 3 pounds are needed.

It is advisable to spray the entire field of new seedlings in the spring since overwintered adults migrate by flying and walking.

NEW PUBLICATIONS

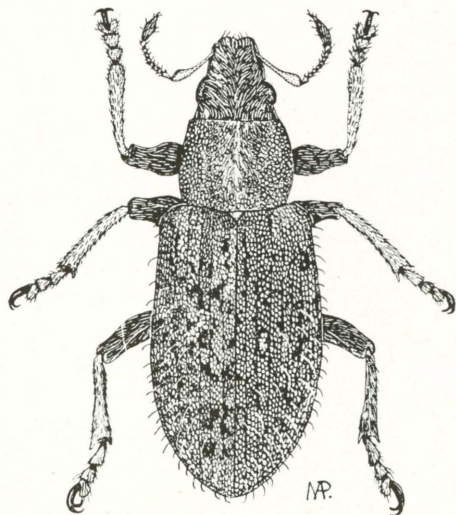
Bul. 369. Impact of urbanization on Davis County, Utah, by Theresia R. Black, Carmen D. Fredrickson, William A. DeHart, C. Jay Skidmore, and Don E. Carter. Department of Sociology. 46 p.

This bulletin discusses the changes brought about by a large influx of people during the 1940-1950 decade in Davis County and the reactions of the people toward the changes. These are discussed under the following heads: changes in institutions, effect on community morale, on social participation, on level of living, on the role of women, on family living, and on parent-child relations.

Bul. 370. The superb plant bug *Adelphocoris superbus* (Uhler), its life history and its relation to seed development in alfalfa, by Charles J. Sorenson and Lowell Cutler. Department of Zoology, Entomology, and Physiology. 20 p.

This bulletin describes the life stages of the superb plant bug, its distribution, host plants, the extent of its damage to alfalfa seed, and methods of control.

Either of these publications may be obtained free by writing the Utah Agricultural Experiment Station, Logan.



Sweet clover weevil



Penalty for private use to avoid payment of postage \$300

Agricultural Experiment Station
Utah State Agricultural College
Logan, Utah

R. H. Walker

Director

Form U. Q. Permit 1142

commercial spray company before coming to USAC. He is studying insects as carriers of plant diseases in horticultural crops.

Other Members of Department

Other members of the Department of Botany are Dr. S. W. Boyle who is working on cytogenetic research on native grasses; Arthur H. Holmgren, curator of the Intermountain Herbarium, who, with Dr. Bassett Maguire of the New York Botanical Garden, is preparing a flora of the Rocky Mountain Region; George W. Cochran, who works with the electron microscope on virus diseases of stone fruits; Richard J. Shaw who spends his full time in teaching.

In addition a number of federal college laborators help to strengthen the research program of the department. Dr. Orsola S. Cannon is working on the breeding of disease resistant tomato varieties; Dr. Bryce N. Wadley and George H. Kalochian are investigating virus diseases of stone fruits; Dr. Leonard L. Janson and Eugene H. Cronin are studying methods of controlling the poisonous weed, halimolobos.

POSTMASTER: Please return if unclaimed

Changes in the Department of Botany and Plant Pathology

Ames Appointed Department Head

DR. RALPH W. AMES was appointed the new head of the Department of Botany and Plant Pathology at the August meeting of the Board of Trustees. Dr. S. W. Boyle has been acting head since the death of Dr. F. B. Wann.

Dr. Ames came to the College two years ago as associate professor of plant pathology. He is a native of Freedom, Wyoming. He received his B.S. degree at the University of Wyoming, and his Ph.D. from the University of Illinois. Before coming to USAC he was a member of the staff of the Illinois Natural History Survey.

Dr. Ames will continue to devote half his time to research. His major interest is in celery diseases. He is also investigating the relation of air pollution to plant diseases. He will be assisted in the phase of the work by a new plant physiologist just appointed, Dr. Herman H. Wiebe.

Wiebe, New Plant Physiologist

Dr. Wiebe comes to the College from the Oak Ridge Institute of Nuclear Studies where he has been investigating mineral absorption and translocation in plants by use of radioactive isotopes. Dr. Wiebe is a native of Kansas. He received his B.S. degree from Goshen College, Indiana; his M.S. from the State University of Iowa, and his Ph.D. from Duke University. Dr. Wiebe has also taught at North Carolina State College.

Two-thirds of Dr. Wiebe's time at USAC will be spent in research on minor element deficiency diseases, including chlorosis, and on the effect of air pollution on crop plants.

Davis Collaborating in Disease Studies

Another new staff member who is collaborating in the plant disease studies is Dr. Donald W. Davis of the Entomology Department. Dr. Davis joined the staff January 1. He is a graduate of the University of California and worked for a

CONTRIBUTIONS TO RESEARCH

May 15 to August 15, 1954

U. S. Steel Company Geneva-Columbia Division		\$117,200 for research on fluorosis
Utah Power & Light Company	\$7,000	) for studies in rural electrification
Telluride Power Company	425	
Southern Utah Power Company	290	
Uintah Power Company	85	
U. S. Smelting, Mining, & Refining Company		\$1,200 for study of minor element deficiencies diseases of horticultural crops
Moroni Hatchery		200 turkey poult for study of respiratory diseases
Geigy Company		LoV-weed killer and brush killer for range improvement studies
Dow Chemical Company		Esteron, Kuron, Dalapon for range improvement studies
California Spray Chemical Corporation		2, 4-D and 2, 4, 5-T for range improvement studies
Wyeth Laboratories		Billicin SM for study of staphylococcus
Shell Chemical Corporation		Dieldrin household spray for insect control tests
D. G. Denning		Heptachlor for insect control tests