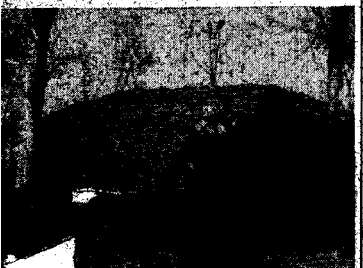
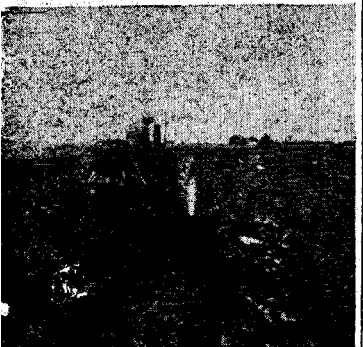
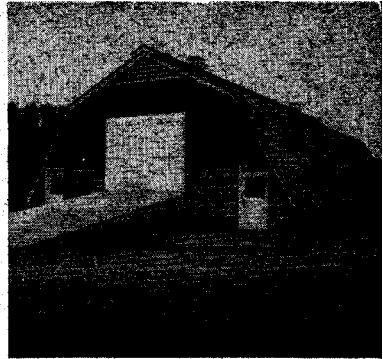
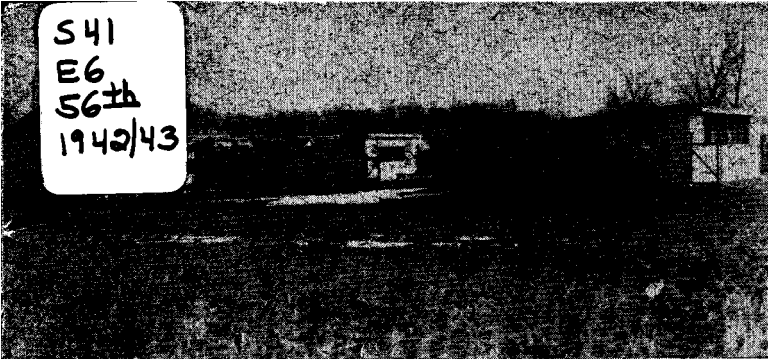


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FARM SCIENCE AT WAR

Fifty-Sixth Annual Report
1942-43

Colorado Agricultural Experiment Station
Colorado State College
Fort Collins

Some of the activities of the Experiment Station research program devoted to helping win the war. Left to right, top row: Three types of poultry laying houses being compared; experimental potato storage cellar on College Farm. Second row: Food dehydrator developed at the Station; steers in Akron substation experimental dry-land feedlots; Parshall measuring flume helping to make irrigation water produce more by better distribution. Left, reading downward: Trench silo partially filled with alfalfa silage being tested as a wartime livestock ration; sugar-beet harvester in operation; stack of beet-top silage, another wartime livestock feed.

COLORADO STATE COLLEGE
COLORADO AGRICULTURAL EXPERIMENT STATION
 FORT COLLINS, COLORADO

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EXPERIMENT STATION STAFF

AGRICULTURAL DIVISION

Agronomy

Alvin Kezer, A.M., Chief Agronomist
 D. W. Robertson, Ph.D., Agronomist
 ¶Warren H. Leonard, Ph.D., Agronomist
 *Robert Gardner, M.S., Associate Agronomist (Soils)
 Dale S. Romine, M.S., Assistant Agronomist (Soils)
 ¶Ralph Weihing, Ph.D., Assistant Agronomist
 ¶Robert Whitney, M.S., Assistant Agronomist (Soils)
 Robert F. Eslick, M.S., Asst. Agronomist

Animal Investigations

R. C. Tom, M.S., Associate Animal Husbandman, Acting in Charge
 L. E. Washburn, Ph.D., Associate Animal Husbandman
 Howard C. Dickey, Ph.D., Associate Animal Husbandman
 W. E. Connell, M.S., Associate Animal Husbandman
 H. H. Stonaker, Ph.D., Associate Animal Husbandman
 ¶Melvin Hazaleus, M.S., Assistant Animal Husbandman
 A. Lamar Esplin, M.S., Assistant Animal Husbandman
 Eugene Bertone, B.S., Assistant Animal Husbandman

Botany and Plant Pathology

L. W. Durrell, Ph.D., Botanist and Plant Pathologist
 Bruce J. Thornton, M.S., Associate Botanist
 E. W. Bodine, M.S., Associate Plant Pathologist
 W. A. Kreutzer, Ph.D., Associate Plant Pathologist
 A. O. Simonds, Ph.D., Asst. Botanist
 M. E. Paddock, Ph.D., Assistant Plant Physiologist
 J. L. Forsberg, M.S., Assistant Plant Pathologist

Chemistry

J. W. Tobiska, M.A., Chemist
 Earl Douglass, M.S., Assoc. Chemist
 C. E. Vail, M.A., Associate Chemist
 C. F. Metz, Ph.D., Associate Chemist
 Lowell Charkey, M.S., Asst. Chemist
 Merle G. Payne, B.S., Asst. Chemist

Entomology

Charles R. Jones, Ph.D., Entomologist
 George M. List, Ph.D., Associate Entomologist
 John L. Hoerner, M.S., Associate Entomologist
 Leslie B. Daniels, M.S., Associate Entomologist

Horticulture

A. M. Binkley, M.S., Horticulturist
 Louis R. Bryant, Ph.D., Associate Horticulturist
 John G. McLean, Ph.D., Associate Horticulturist
 ¶George A. Beach, M.S., Assistant Horticulturist
 Walter C. Sparks, B.S., Assistant in Horticulture

Home Economics

Inga M. K. Allison, S.M., Home Economist
 W. E. Pyke, Ph.D., Prof. of Food Research
 Elizabeth Dyar, Ph.D., Associate in Home Economics Research
 Hazel Stevens, M.S., Assistant in Home Economics Research

Pathology and Bacteriology

Floyd Cross, D.V.M., Veterinary Pathologist
 I. E. Newsom, B.S., D.V.S., D.Sc., Veterinary Pathologist
 Dudley P. Glick, Ph.D., Associate Bacteriologist
 Hilton A. Smith, D.V.M., M.S., Assoc. Veterinary Pathologist
 G. S. Harshfield, D.V.M., M.S., Assoc. Veterinary Pathologist
 A. W. Deem, D.V.M., M.S., Assistant Veterinary Bacteriologist
 Frank X. Gassner, D.V.M., Assistant Pathologist
 ¶Max E. Tyler, M.S., Assistant Bacteriologist

Range and Pasture Management

E. W. Nelson, A.M., Range Conservationist
 Clinton H. Wasser, B.S., Assistant Range Conservationist
 ¶Frank J. Kapel, M.S., Assistant in Range Management

EXPERIMENT STATION STAFF (Continued)

Poultry

H. S. Wilgus, Jr., Ph.D., Poultry
Husbandman

Rural Economics and Sociology

L. A. Moorhouse, M.S., Rural
Economist
R. T. Burdick, M.S., Associate Rural
Economist
R. W. Roskelley, Ph.D., Associate
Rural Sociologist
A. W. Epp, M.S., Assistant Economist

Seed Laboratory

Bruce J. Thornton, M.S., in Charge
Helen M. Kroeger, B.S., Seed Analyst

ENGINEERING DIVISION

*N. A. Christensen, Ph.D., Chairman

Civil Engineering

*N. A. Christensen, Ph.D., in Charge
W. E. Code, B.S., Associate Irrigation
Engineer
Adrian R. Legault, M.S., Assistant
Civil Engineer

D. F. Gunder, Ph.D., Associate in
Hydraulics Research
Maxwell Parshall, B.S., Meteorologist
Cooperators:

R. L. Parshall, B.S., Senior Irrigation
Engineer, U. S. D. A.
Carl Rohwer, B.S., C.E., Irrigation
Engineer, U. S. D. A.

Mechanical Engineering

J. T. Strate, M.S., in Charge
Ray Barmington, B.S. M.E., Assistant
Mechanical Engineer

Cooperators:

E. M. Mervine, M.E., Agricultural
Engineer, U. S. D. A.
A. D. Edgar, B.S., Agricultural
Engineer, U. S. D. A.

Substations:

Herman Fauber, M.S., Supt., Rocky
Ford
Ferris M. Green, B.S., Supt., Austin
Dwight Koonce, M.S., Associate
Agronomist, Fort Lewis

♀As of June 30, 1943. See page 5 for information on leaves, resignations,
and new staff members.

♂On military leave

*On leave

56 Years of Service

With the ending of the fiscal year of 1942-43, the Colorado Agricultural Experiment Station brings to completion 56 years of scientific service to the agriculture of Colorado and the nation.

An experimental department was maintained in connection with the State Agricultural College, now known as Colorado State College of Agriculture and Mechanic Arts, from the time of its organization in 1879. In 1888 the Colorado Agricultural Experiment Station was organized under the provisions of a Congressional act of the preceding year.

The organization was effected at a special meeting of the State Board of Agriculture held at Del Norte on February 20, 1888.

Management of the Station was vested in an executive committee consisting of three members of the State Board of Agriculture. Officers of the Station were the director and the secretary-treasurer, with a working staff representing the various departments of the experimental work.

During the 56 years of its existence the work of the Colorado Agricultural Experiment Station has been under the supervision of the following men who have served as directors: C. L. Ingersoll, 1888-91; Walter J. Quick, 1891-93; Alston Ellis, 1893-99; L. G. Carpenter, 1899-1910; C. P. Gillette, 1910-32; E. P. Sandsten, 1932-39; Charles H. Kick, July 1-August 27, 1939; I. E. Newsom (acting), 1939-41; Homer J. Henney, 1941 to date.

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Personnel

On military leave during the entire year were George A. Beach, assistant horticulturist; Frank J. Kapel, assistant in range management; Ralph Weihing, assistant agronomist; and Robert Whitney, assistant agronomist. Those who went on military leave during the year were Melvin Hazaleus, assistant animal husbandman, September 1942; Warren H. Leonard, associate agronomist, November 1942; Max E. Tyler, assistant bacteriologist, October 1942; and Herbert S. Wilgus, poultry husbandman, March 1943. Robert T. Elliott, assistant in rural sociology, resigned in September 1942 to enter military service.

Others on leave were N. A. Christensen, chairman, Engineering Division, from December 1942, to do special wartime research at the ballistics laboratory of the Army's proving grounds at Aberdeen, Md.; Robert Gardner, associate agronomist, from March 1943, for special research at the U. S. Salinity Laboratory, Riverside, Calif.; Carl Rohwer, irrigation engineer, U. S. D. A., October 1942 to March 1943, to assist with expansion and irrigation of guayule plantings for rubber in California; and Clinton H. Wasser, assistant range conservationist, September 1942 to June 1943 for graduate study at the University of Nebraska.

There were three resignations from the staff, in September 1942. They were H. B. Osland, animal husbandman; Ivan Watson, assistant animal husbandman; and Leroy Van Horn, assistant in animal investigations.

Those who joined the staff during the year were Ray Barmington, assistant mechanical engineer, July 1942; Eugene Bertone, assistant animal husbandman (wool technology), December 1942; W. E. Connell, associate animal husbandman, January 1943; Mary Currier, assistant editor, May 1943; A. Lamar Esplin, assistant animal husbandman, September 1942; and H. H. Stonaker, associate animal husbandman, December 1942.

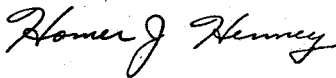
Transferred from the College resident instruction staff were Lowell Charkey, assistant chemist; Elizabeth Dyar, associate in home economics research; C. F. Metz, associate chemist; Merle G. Payne, assistant chemist; and Hazel Stevens, assistant in home economics research.

Letter of Transmittal
Fifty-Sixth Annual Report
Colorado Agricultural Experiment Station

Hon. John C. Vivian
Governor of Colorado
Denver, Colorado

Sir:

In compliance with the law, I herewith present the Fifty-Sixth Annual Report of the Colorado Agricultural Experiment Station for the fiscal year of July 1, 1942 to June 30, 1943, inclusive.



Director

Fort Collins, Colorado
July 1, 1943

Director's Annual Report

Fifty-Sixth Fiscal Year 1942-43

Colorado Agricultural Experiment Station

To the President and State Board of Agriculture:

Fully 85 percent of the activities of the Station research program at the end of the 1942-43 year were devoted directly to tangible accomplishments that would aid in winning the war.

By midsummer of 1942 it was evident that ranchers and farmers were more interested than they had been previously in finding answers to some of their problems. Some of the questions were: How to grow more with less labor, how to save more livestock, how to control plant diseases, and how to prevent livestock diseases. These became of prime importance to many who had neglected to find solutions for those problems in years past.

The problem of how to maintain one's financial security as prices rose increased precipitously the demand for information as to whether one should shift from the status of tenant to owner-operator, whether to shift from one kind of livestock to another, whether to shift from an irrigated to a dry farm in order to reduce labor requirements, or whether to sell out entirely and put one's money in bonds.

By the spring of 1943 demand for information increased as to what to plant on different types of soil, where to get seed, what variety of seed to buy, how to control insect pests, and many other specific problems found on most farms.

What Was Accomplished

Station research during 1942-43 probably accomplished more in obtaining answers for problems which will help produce more beef and lamb than any other combined set of projects. A second and only slightly less important achievement was the results in dehydration and preservation of vegetables.

With respect to the first of these, the Station found that certain proteins would replace the standard proteins in some livestock feeds. The Station also is the first to find indications that the protein in soybeans may have some injurious effects when used to replace certain other proteins in rations. The high price of ordinary feeds and the unavailability of certain feeds made it necessary to substitute some home-grown feeds that ordinarily had gone back into the soil as fertilizer or organic material. Grazing capacity tests were completed in several areas

so that it is now possible to give ranchers more specific information about the danger they are running into by injuring their native pastures permanently.

The several research projects dealing with the second phase of accomplishments, that on dehydration, have proved that Colorado is perhaps better adapted for the dehydration of vegetables than any other state in the Union. From the commercial processor's standpoint, his costs are low because of cheap fuel and low moisture content of the air. Vegetables and fruits are just as easy to obtain as in competitive states, if not easier. Analyses up to date indicate that Colorado-grown vegetables have a vitamin quality preference over vegetables in some other areas. The studies indicate still further that the vitamin content of Colorado vegetables is easier to maintain during the processing period than it is in West- and East-Coast areas.

Recommendations for Improvement

The Director recommends that the program of the Station be divided specifically into immediate wartime projects and long-time 20-year-program projects.

Some of the immediate problems on which the Station should coordinate its efforts during 1943-44 are: First, determine the value of native forage for sheep and cattle breeding herds. Certain mountain hays, certain dry-land grasses, and certain total grazing capacities have been studied over a period of years. Farmers and ranchers want an answer as to just what is necessary as a supplement to their native-grown grass so that labor can be eliminated in putting up so much winter feed. The New Mexico and Wyoming stations both have approached this problem, but the situation in Colorado needs immediate attention from our Station. This might even involve additional grazing land within 50 miles of the main Station so that research workers from several of the different sections could cooperate on the project without too much travel expense. A range cow herd or band of ewes is necessary.

The problem of second importance, considered by many of first importance, is finding out more about how to process Colorado fruits and vegetables so that Colorado processors can obtain more Government contracts. Recent reports indicate that 50 percent of the dehydrated fruits and 30 percent of the dehydrated vegetables grown and processed on the southern and western coasts of the United States and sent to our armed forces in the tropics were inedible. As much as 50 percent of the Station's

efforts on this program during 1943-44 could easily return to Colorado more dollars per dollar expended in research than almost any other program.

Estimated Costs 1943-44

The costs for the 1943-44 year should be 10 to 20 percent larger than the previous year. Since the big cost of operating the Station is materials, supplies, and feed for livestock, the salary savings of 10 to 15 staff members in war work does not reduce the salary budget as much as the increased cost of these other items. The estimates on future costs are as follows: Hay, \$12 to \$18 instead of \$6 to \$8; grains, \$1.75 to \$2.50 per hundredweight compared with \$1.00 to \$1.50 per hundredweight; labor, 50 cents to 60 cents per hour compared with 25 cents to 40 cents per hour; monthly men, \$120 to \$150 per month compared with \$85 to \$105 per month.

Add to these increased competitive non-fixed cost items an increase in the Station's program to answer problems on how to use native forage more efficiently in all sections of Colorado and some increased emphasis on dehydration, and the total expense could very easily run the Station budget to \$350,000 instead of \$250,000.

Receipts from all sections during the 1942-43 year were considerably in excess of estimates made on the basis of the past 3-years' receipts. Receipts from special interest groups should be increasing.

AGRICULTURE DIVISION

Agronomy

Alfalfa Winter-Killing and Wilt Resistance

Methods of alfalfa breeding were tested. Seed production is controlled genetically by genes. Hardistan-Turkestan is the most abundant wilt-resistant strain source. Alfalfa needs to cross-fertilize to maintain vigor. One "synthetic" strain, Ranger, is under test.

Barley Genetics

Two new genes were located on a chromosome in 1942. In 1943 two additional genes were placed on chromosome number I.

Factors Affecting the Availability of Plant Nutrients

Nitrogen was the most variable plant nutrient. Alfalfa raised soil nitrogen temporarily. Farmyard manures supplied nitrogen and raised availability of mineral nutrients. About 2 tons of farmyard manure per year was required to maintain the soil nitrogen. Subsoils gave evidence of phosphorus and nitrogen deficiencies.

Optimum Nutrient Content of Soils

Sugar-beet yields were reduced markedly with reduced available nutrients in soil. Nitrogen was the most frequent limiting nutrient. Up to a certain point nitrogen alone increased yields. In the highest levels phosphorus was necessary to obtain maximum yield. Excessive nitrogen lowered sugar percentages.

Land-Use Surveys—(In cooperation with Bureau of Plant Industry and Soil Conservation Service.)

Many utility surveys were made. Studies were made of land use capability classifications and soil series. These were considerably simplified and clarified.

Disease Resistance of Small Grains

Bannock oats, arising from a cross between Victory and Markton, is giving high yields and is almost completely smut-resistant. It was distributed to farmers in 1943.

Stubble Mulch

The chief problems were to locate farms suitable for study and implements and devices which should be tested. A cooperative program of sampling was arranged between the Soil Conservation Service, the Kansas Experiment Station, and the Agronomy Section of the Colorado Agricultural Experiment Station.

Akron Dry-Land Projects

The severe January wind did only slight damage to Akron lands. The 1942 season was cool and moist. Frost came early. Only early varieties matured.

Corn

Hybrid corn varieties were tested on Stations at Akron, Fort Collins, and Rocky Ford. Farm tests were made near Eaton, Platteville, Longmont, and Grand Junction. Hybrids increased average yields in irrigated northern Colorado about 15 percent and about 50 percent in the Arkansas Valley irrigated districts. Our own hybrids made excellent showings.

Improved Seed

The greatest demand for approved seed in the spring of 1943 was for oats, barley, sorghums, alfalfa, and wheat in that order. There were more requests than for the past 10 years.

Fort Lewis

Irrigated and dry-land forage and field crops were tested. The southwestern area of Colorado enlarged its demand for improved seeds.

Rubber

Studies on possible rubber plants were made in 1942. The guayule shrub winter-killed at all locations in the state—Fort Collins, Akron, Rocky Ford, La Junta, Lamar, Trinidad, Monte Vista, Cortez, Grand Junction, and Austin. The Russian dandelion seemed to require a moister soil with a higher organic-matter content.

Miscellaneous

Sudan grass genetics tests were made by means of funds supplied by the Bureau of Plant Industry.

Animal Investigations

Cattle Experimental Work

Wartime Conservation of Supplements

Results from last year's project were published in mimeographed report no. 4626-42. One hundred and ten days on the experiment were completed April 12, 1942. Feedlot gains ranging from 2.15 to 2.88 pounds per day, average 2.46, were made during that period. Analysis of blood samples and digestion balance trials have been made.

Improved Range Practices

The 1942 studies were completed October 27. The results were analyzed from the standpoint of seasonal gains and pounds of beef produced per acre.

Nutrient Utilization by Cattle of Certain Native Mountain Meadow Hays Showing a History of Toxic Properties—(In cooperation with Range Management and Chemistry Sections.)

The first phase consisting of three balance trials in which eight heifer calves were each fed a native meadow hay produced in a different locality of Middle Park was finished.

Sorghums for Wartime Beef Production

Results of the experiment started February 5, 1942, indicate that a grain mixture of corn, wheat, and Coes sorghum fed with cane silage and cottonseed cake is a satisfactory ration for fattening steers. For wintering steers cane fodder or silage should be supplemented with cottonseed cake.

Limited vs. Unlimited Pasture for Dairy Cows

Four pairs of cows were on the pasture experiment for a period of 120 days during the summer of 1942. Results indicate that the dairyman should utilize his pastures to their fullest extent.

Pea-Vine Silage for Milk Production

Because of requests from dairymen and pea-cannery interests in Colorado an experiment was set up to determine the value of pea-vine silage for dairy cows. Results indicate that pea-vine silage is comparable to corn silage for milk and butter-fat production but that it is less palatable.

Nutritional Control of Mastitis

Results of this project have been summarized, and these studies will be continued when personnel and materials are available.

Sperm Longevity

This project has been temporarily discontinued; hence no active work has taken place during the past year. So far the work has been entirely with dairy cattle. Much interest has been shown.

Sheep Experimental Work

Beet Tops in Lamb-Fattening Rations

Best results were obtained from the feeding of beet tops when they were used as a part of the roughage in the ration and fed in combination with alfalfa hay. Beet-top silage gave slightly better results than dried beet tops.

Crossbreeding Range Ewes for Heavier Market Lambs

This experiment is still in progress, and the results for each year's work have been recorded.

Economic Losses in Feedlot Lambs Due to Internal Parasites

The rate of intake of grain and the gains made in the feedlot were practically the same for all lots. When slaughtered,

the lambs drenched two and three times had fewer livers condemned.

Increased Lamb Feeding Through Proper Utilization of Beet Tops

A rapid loss of carotene occurred during the first 30 days of storage. Sheltered beet tops maintained the highest carotene content during the entire period. Piled beet tops gradually decreased in carotene until at the end of March there was only an insignificant amount present.

Mineral Supplements for Wintering Range Ewes

This study was changed from a mineral supplement study to one using irradiated yeast. The effects on wool clip, percentage of lamb crop, ease of lambing, birth weight of lambs, lactation of the ewes, and other production factors are being studied carefully.

Commercial Wool Scouring

Wool shrinkage data on Colorado wools is being accumulated. Reports giving the results of shrinkage tests are made to the extension animal husbandman, the county agent, and the wool grower.

Cooperative Studies to Increase Quantity and Quality of Wool

Cooperators have indicated that the culling of their herds has resulted in improvement. Fleece analysis data are being accumulated. Sheep breeders have been assisted in the selection of breeding animals.

Wool Baling

Results of previous studies have been published in misc. series paper no. 154, "Progress Report on Wool Baling." Studies made and work done in the future will be influenced by the availability of equipment and materials for used by the various cooperating sections.

Swine Experimental Work

Wheat, Milo, and Different Grades of Corn with Two Levels of Soybean Oil Meal in Fattening Pigs

An experimental study of grades of corn compared with wheat and milo and of various amounts of protein supplement was conducted.

Preparation of Colorado Sorghums for Fattening Hogs

Data obtained from this experiment have been recorded and

filed. Because of changes in personnel, these data have not yet been analyzed.

Official Testing

As a service to the breeders of purebred dairy cattle in Colorado the testing was authorized and checked each month of the fiscal year for an average of 195 purebred dairy cows in 19 herds. This service is performed in cooperation with the various purebred dairy cattle breed associations.

Botany and Plant Pathology

Virus Diseases of Stone Fruits

Three strains of peach mosaic have been separated and identified. A chemical method of detecting infected trees has been developed. Work has been completed on other virus diseases, including the golden net disease of peach, apricot, and plum, the X-disease of peach, and the rasp-leaf disease of cherry.

Poisonous Plants—(In cooperation with Pathology Section.)

BOTANY AND PLANT PATHOLOGY: One hundred and fifty species of plants were tested from wet meadows where cattle had been poisoned. Of these, nine new species have been found to produce hydrocyanic acid, deadly to cattle.

PATHOLOGY: Hydrocyanic acid poisoning in cattle is being studied. Continued sublethal doses of hydrocyanic acid are being given to rabbits to determine a possible residual effect.

Some investigation has been made on plants causing photosensitization in sheep and horses.

Fruit Rot of Tomatoes

See Horticulture Section for discussion.

Bacterial Ring Rot of Potatoes

See Horticulture Section for discussion.

Diseases of Pod Peas

One hundred and thirty-eight isolates of fungi were made from soils in different pea districts of the State. Some of these were found to cause a root rot and wilt of peas. Twenty-two varieties of peas were tested for possible resistance.

Breeding Barley for Smut Resistance

A large number of strains of barley were tested for resistance to loose smut.

Chemistry

Mineral Tolerance in Livestock Drinking Waters

Shallow water wells in the semi-arid and irrigated districts of Colorado often carry a degree of mineralization, or alkali, ranging from 0.3 to 1.0 percent or more, which in the livestock feedlots tends to cause losses by death or unthriftiness of animals on feed. This experiment was an effort to define the stage of mineralization at which these waters become unsafe or undesirable for livestock.

Tests with white rats corroborated in large measure the previous findings of the Oklahoma Experiment Station—that these animals can in certain instances survive on waters of 1 percent or more of mineralization with individual salts. Mixtures, particularly those of chlorides, nitrates, and sulfates, proved harmful in smaller quantities than did many single salts. Satisfactory answers can be hoped for only from cattle and sheep as experimental subjects.

Nutritive Values of Native Range Forage Plants in Relation to Range Livestock Production

See Range and Pasture Management Section for discussion.

Occurrence, Mineral Composition, and Nutritive Values of the Forage Plants in Middle Park

See Range and Pasture Management Section for discussion.

Entomology

General Insect Investigations

General insect problems with few exceptions the past season were about as usual. The spider beetle and Hessian fly are relatively new and threaten to become major insect problems in Colorado.

PTINUS FUR (spider beetle).—This new household pest for Colorado is on the increase. It was reported from three new localities the past year.

HESSIAN FLY.—This season we have had a problem with the Hessian fly in our dry-land wheat-growing areas in northeastern and eastern sections of the State. At present there are 10 counties known definitely to be infested with the fly. In the severely infested areas the wheat crop was reduced at least 70 percent. In general damage ran from 5 to 10 percent.

Through plantings at 1-week intervals from September 5 to October 5 in the Hessian fly-infested area, we were able to set the tentative fly-free date as September 19.

Trashy fallow practices, a recommendation of the Soil Conservation Service to prevent soil erosion by wind, will undoubtedly have to be modified if the fly increases. Such practices furnish ideal conditions for Hessian fly propagation.

CHERRY LEAF ROLLER.—The cherry leaf roller has become an extremely dangerous pest to the cherry industry of eastern Colorado. In the Loveland area it threatens this industry. The roller defoliates the trees and damages the fruit. For lack of experimental data we know little about the control of this pest.

Cooperative experiments with dormant oil spray and various poisonous materials are being conducted.

CATTLE LICE.—Two species of cattle lice are very prevalent in Colorado; they are *Trichodectes bovis* Linn., the red cattle louse, and *Haematopinus eurysternus* Niksch, the short-nose louse. These have become a serious problem in feedlots, especially to yearlings. Lice control was effected at the Akron feedlots by dusting the infested cattle with a 10-percent derris-sulfur dust.

Ant Control

The ant control project is temporarily suspended but has been carried far enough so that we know that the agricultural ant, *P. occidentalis*, can be effectively controlled at a cost not to exceed 2 cents per hill for materials. It is our firm belief that this ant is responsible, because of its habit of seed collecting, for the long time required for exhausted grazing lands to be reseeded.

Psyllid Resistance

Seven potato family lines are showing resistance to psyllid feeding. The severity of "psyllid yellows" symptoms varies in the various crosses under greenhouse conditions. Seventeen to nineteen days are required for symptoms to appear. Enlarged nodes and aerial tubers occur in some strains.

Sprayer Efficiency

Comparison of horse-drawn and tractor-drawn sprayers was made. By meter measurement it was found that the number of gallons generally applied per acre was always less than that recommended for effective insect control, due to type of equipment, size of disc, and pressure used. For flea-beetle control four and five applications of dust or spray produce the

highest percentage of U. S. No. 1 tubers. Twenty- to thirty-percent increase was recorded from late applications.

Peach Mosaic

Tests with the green peach aphid, *Myzus persicae* Sulzer, have indicated the probability that this insect is the important vector of the peach mosaic virus in the Palisade district. Further testing is being done under greenhouse conditions. The control of peach aphid should reduce the incidence of mosaic.

Control of Insect Pests on Truck Crops

Wettable sulfurs, dusting sulfurs, barium polysulfide, and dry lime-sulfur gave psyllid control not significantly different from liquid lime-sulfur. Psyllid infestations affect certain potato characteristics.

Basic copper arsenate, cryolite, rotenone, and phenothiazine sprays gave significantly better bean-beetle control than zinc arsenite spray. Rotenone dust was less effective than rotenone spray.

Sulfur Residue on Canned Tomatoes

Canned tomato juices in storage for 2 years show no ill effect from sulfur residues resulting from psyllid control operations. Sulfurs can safely be used on tomatoes for psyllid control.

Control of Insects on War-Important Field Crops

Because of lack of population of tomato fruit worm, the evaluation of insecticides used for its control was impossible. Most effective baits used on the bean cutworm were one composed of bran, lubricating oil, and sodium arsenate, and another of bran meal and sodium arsenate. The latter was the most promising.

Insect Abundance on Stripland Cropping and Trashy Fallow Practice

This project was installed the past season principally to determine insect abundance and damage where the new trashy fallow practices recommended by the Soil Conservation Service are used. To date little has been accomplished.

Home Economics

Baking Flour Mixtures at High Altitudes

Continued study of the influence of altitude on the baking of batters resulted in the publication of an article containing

formulas permitting the substitution of corn syrup and honey for sugar in cakes.

Factors Affecting the Cooking Quality of Eggs—(In cooperation with Poultry Section.)

Strains of White Leghorn hens classified according to the interior quality of the eggs they produce are being maintained and propagated. The effort to select strains of this breed of chickens with the ability to produce eggs of a uniform and high interior quality is continuing.

Properties of Colorado Fruits and Vegetables

This project, which is part of the National Cooperative Nutrition Research effort, is in cooperation with the Chemistry, Horticulture, Poultry, Pathology, Mechanical Engineering, Animal Investigations, Agronomy, and Entomology Sections of the Station. Also cooperating are the Colorado Publicity Department, the Extension Service, and the Western Regional Research Laboratory at Albany, Calif.

Many varieties of vegetable crops produced at different locations in Colorado and at different intervals during the growing season were assayed for vitamins and other nutrients. The effect of the usual methods of transportation and packaging upon the quality of several of these was evaluated.

Processing methods studied included freezing, canning, dehydration, and pickling. Vitamin losses were determined at various processing stages. Cooking losses were also evaluated.

Storage changes in field-stored and trench-stored carrots were followed. Trench-stored carrots were superior to unprotected field-stored carrots. Where field-stored carrots were mulched, little difference existed between their quality and that of trench-stored carrots. The nutritive value of mature trench-stored carrots was as high or higher in the spring than that of bunched carrots available on the market at that time. Mature carrots were far superior to baby carrots in nutritive value.

Home- and community-type dehydrators were developed and plans for the construction of these units were made available to the public.

Studies on heat penetration into mason-type glass jars packed with food for processing were made at different altitudes.

The effectiveness of vinegar (acetic acid), citric acid, and malic acid in increasing the acidity of the nonacid canned foods was studied.

The effect of fertilizer treatment, dates of planting, and psyllid injury upon the quality of various varieties of Colorado-grown potatoes was evaluated.

Tender sugar-beet tops at harvest-time were shown to be excellent sources of carotene and ascorbic acid. They made excellent greens and were found to yield an excellent frozen-food product.

Pinto-bean protein was found to be used as efficiently by college men as commonly used animal proteins. Wide variations in ability to use either type of protein were found.

Horticulture

The projects in Horticulture are now better meeting the demands of war emergency problems. This work includes (1) better low-cost methods of increasing production and quality of fruits and vegetables; (2) testing production possibilities of new crops needed under war conditions; (3) developing new varieties of vegetables; (4) testing vegetable varieties in different parts of the State for use in commercial fields and Victory gardens; (5) cooperating on dehydration, quick-freezing, storage, and nutritive-value tests of vegetables; (6) cooperating in the testing of labor-saving machinery in harvesting vegetables; (7) conducting seed production tests in all parts of the State in cooperation with the United States Department of Agriculture, and (8) assisting in control of diseases and insects on horticultural crops.

The section started a mimeo called "Spud Notes" which reviews current results of research work on potatoes and is mailed out to potato growers once a month.

This past year the Horticulture Section carried work in 10 counties of the State in addition to the program on the main Station. Cooperative work is carried with (1) two bureaus of the U. S. Department of Agriculture; (2) six sections of the Station, and (3) two county and district research programs.

Bacterial Ring Rot of Potatoes—(In cooperation with Botany and Plant Pathology, Entomology, and Bacteriology Sections.)

BOTANY AND PLANT PATHOLOGY AND HORTICULTURE: Five dates of planting with three methods of inoculation were used to estimate the effect of natural environment on foliage symptoms of ring rot. The abundance of bacteria was somewhat cor-

related with the severity of symptom expression. Subjecting knife-inoculated tubers to various disinfectants gave no effective control of ring rot. Infection in tubers stored at 40° F. was more accurately determined by the use of ultraviolet light than in those stored at 70° F. Movement of the organism was generally downward in the plant, except where new terminal growth was produced.

BACTERIOLOGY: Studies on the disinfection of seed-potato cutting knives were concluded. It was shown that most chemical disinfectants deteriorate too rapidly for economical use. Boiling water proved to be both efficient and inexpensive to use and prevented the spread of bacterial ring rot by the cutting knife. The spread of the spindle-tuber virus was also controlled in this manner. In addition to the experimental studies, equipment was designed and recommended for the commercial use of boiling water as a cutting-knife disinfectant using bottled gas, gasoline, or electricity as a means of heating the water. Centralized seed cutting was recommended.

A field experiment was conducted at the San Luis Valley substation to determine whether field spread may occur under conditions of sub-irrigation. In a field planted with ring-rot-free seed, seed pieces were removed at regular intervals and replaced by infected seed. No evidence of spread was found.

It is known that the ring-rot bacteria survive for long periods of time in infected tubers and it has been suspected that these bacteria survive well on surfaces of wood, metal, concrete, and so forth. Survival under the latter conditions is being studied. Evidence available at present indicates that the bacteria do not live longer than a few weeks on such surfaces.

Potato Breeding and Cultural Investigations—(In cooperation with U. S. Department of Agriculture.)

Fifty seedlings from the Colorado Potato Station at Greeley were tested in the San Luis Valley. Of these, 18 were saved for further testing, and 6 of the 18 will be included in comparative tests with standard varieties. Two seedlings from the previous year's selections outyielded all but 2 of the 12 standard varieties in the variety trial. The heaviest-yielding seedling, however, broke down in storage.

The Pawnee variety released last year has met with considerable approval by growers in northern Colorado.

Effect of Soil Treatments on Skin Color and Quality of Red McClure and Bliss Triumph Potatoes

Elements which were found to increase skin color (copper, iron, zinc, and manganese) were tested in factorial combinations in four localities in Colorado. Color, specific gravity, yield, and skin thickness are being measured on these samples. Significant increases in yield, skin thickness, and color were found, and certain treatments produced tubers which appeared superior in all three measurements.

Effect of Phosphate on the Vitamin A, B₁, and C Values of Tomatoes

Tomatoes of the Landreth variety were grown under three levels of phosphate in the greenhouse and in the field. Records were taken on yield per plant, fruit set per plant, and height and leaf growth per plant on the greenhouse test. In the field total yield and number of fruit set were taken on each plot. No significant differences in total yield per treatment were found in the greenhouse or field tests.

Fruit Rot of Tomatoes

HORTICULTURE: Apparent fruit-rot resistance was shown by Porter and some introductions. The optimum temperature for infection appears to lie between 27° and 30° C.

BOTANY AND PLANT PATHOLOGY: The cause of tomato fruit rot is a water mold, *Phytophthora capsici*, which attacks peppers and cucumbers as well as tomatoes. Several copper dusts were found to give protection. One hundred and nineteen tomato varieties were tested for resistance to the disease.

Insect- and Disease-Resistant Onions for Dehydration and Storage

Insect-resistant onion hybrids were planted in the Olathe district on the Western Slope. Thrips-resistant individuals were selected from the segregating populations and saved for increase and backcrossing. This phase has reached a point where it should not be long before a non-segregating thrips-resistant Danvers variety can be obtained.

Purple-blotch resistance work was carried on at Fort Collins, and selections were made for further testing.

New Crop Plants and Vegetable Types for Wartime Production and Use

An average of 117 varieties of 23 major vegetable crops were tested in various localities in Colorado. Information obtained is now of direct value in making specific recommendations on Victory garden programs; also as a result of this project commercial canners have in some cases changed their varieties to better ones.

Increasing Fruit Production for Wartime Use

Variety tests on apples, peaches, apricots, plums and other fruits were continued on the fruit substation at Austin, as were the cover-crop, commercial-fertilizer, and insecticide trials. The phosphate treatments on pears in Mesa County gave definite results, and this phase of the work was closed. On phosphate-deficient pear trees definite responses to phosphate applied at root level followed the application of 15 pounds or more of treble superphosphate per tree. Similar responses were obtained from the use of sulfur, presumably by its releasing phosphorus to the trees. Fertilizer trials in two commercial peach orchards in Mesa County showed response to nitrogen applications, both with and without phosphorus and potassium. No response followed the use of phosphorus or potassium alone or together.

Personnel

Mr. E. O. Olson was appointed to a fellowship with the section effective August 15, 1942.

Pathology and Bacteriology

Urinary Calculi in Lambs

Forced feeding of three different mineral supplements in excessive amounts for 190 days failed to produce clinical cases of urinary calculi in any of 20 lambs fed a ration containing adequate vitamin A. A few very small calculi were found in the kidneys of two lambs.

Overeating (Enterotoxemia) of Lambs

Chemical analyses of the blood of lambs which died of enterotoxemia showed a great increase in blood sugar but no change in the mineral ratio. Cell volume was increased. Toxoids from *Cl. welchii* did not immunize rabbits to *Cl. welchii* toxins. The feeding of partially cured beet tops seemed to increase the incidence of the disease.

Control of Fringed Tapeworms in Lambs

Lambs which were drenched with a copper-nicotine solution while still on range showed, when slaughtered, a 3.5-percent tapeworm infestation. Twenty-six percent of the untreated control lambs and twenty percent of the lambs drenched upon arrival at the feedlots had fringed tapeworms. Further work is in progress to attempt to determine the intermediate host of this parasite.

Abscessed Livers in Cattle

Studies have been made of the lesions in the carcasses of affected animals, occurrence of abscessed livers in cattle in various geographical areas, and the effect of sanitary conditions and rations in the feedlots. During a period of 8 months 1,028 beef cattle were examined in various packing plants. From tissues of these cattle approximately 5,000 slides were prepared for microscopic examination.

Poisonous Plants

See Botany and Plant Pathology Section for discussion.

Fur-Bearing Animals

Considerable study has been made of the incidence, diagnosis, and control of the internal parasites of foxes. Methods of management and hormone therapy for increasing the reproductive efficiency of foxes have been studied.

Wildlife Research

Many fecal examinations of game animals have been made to determine the possible relationship of their internal parasites to those of domestic sheep.

Miscellaneous

LISTERELLOSIS.—*Listerella encephalitis* was diagnosed in two flocks of breeding ewes. Death losses were 12 and 18 percent respectively.

MYCOTIC STOMATITIS.—An outbreak of so-called mycotic stomatitis was responsible for a 25-percent death loss in a herd of 200 cattle. A deficiency of vitamin A was a probable contributing factor.

PULLORUM TESTING OF TURKEYS.—An agglutination test for pullorum disease was made on blood samples from 6,158 turkeys. Four hundred and eighty-one reactors (7½ percent) were found.

Properties of Colorado Fruits and Vegetables—(In cooperation with Home Economics Section.)

Microbiological assay methods have been used on fruits and vegetables to determine their content of riboflavin, nicotinic acid, and carotene.

Bacterial Ring Rot of Potatoes

See Horticulture Section for discussion.

Poultry Section

Iodine Requirements of Poultry—(In cooperation with Pathology and Bacteriology Section.)

Iodine-supplemented all-mash laying and breeding rations have not consistently increased egg production from birds in their first and second laying years. These birds were from second and third generations of birds maintained on these iodine-supplemented rations. Iodinated casein in certain quantities speeded feather development in chicks. A highly potent iodinated casein shows commercial possibilities for broiler raisers.

Carotene and Riboflavin Content of Alfalfa and Sprouted Grains—(In cooperation with Agronomy and Pathology and Bacteriology Sections.)

The carotene content of alfalfa varieties was in the same order as reported in 1941. Age and stand had no effect on carotene content. Exploratory results with sprouted grains indicate that maximum vitamin synthesis is reached in 10 to 12 days at a height of about 10 inches. Wheat sprouts are superior to those of barley and oats.

Methods of Feeding Poultry

Production of Single-Comb White Leghorn pullets fed a ration composed of 32-percent protein concentrate mixed with whole grains was unsatisfactory. Hatchability was not significantly affected. Ground wheat replaced wheat shorts and bran. Alfalfa hay ground to a granular consistency was superior to the fine ground hay used commercially.

Sources of Protein for Poultry

Expeller process soybean oil meal as a sole protein supplement produced inferior growth in chicks during early life. Mortality and culling losses were excessive. Two and one-half percent of meat and bone scrap incorporated in this ration was fully adequate for normal results. Soybean oil meal made from frost-damaged soybeans supported as satisfactory growth as that from normal soybeans when the starting mash contained 2.5 percent meat and bone scrap.

Egg production for the first half-year has been normal in a pen of hens fed a conventional laying and breeding mash with 17.5 percent soybean oil meal and 5 percent cottonseed meal as sole protein supplements. Hatchability and livability of chicks were consistently lower in this pen. The use of 5 percent of meat and bone scrap produced normal results.

In a series of growth trials synthetic riboflavin replaced one-half the dried whey in all trials and all the dried whey in nearly every instance. Dried whey, dried buttermilk, dried brewers yeast residuals, and a special liver residue were equally effective as riboflavin supplements.

Factors Influencing Reproduction in Turkeys

A 32-percent protein breeding concentrate mixed with whole grains was equal in results to the all-mash system of feeding and was more economical. Dehydrated alfalfa-leaf meal was more economical as a riboflavin supplement in the all-mash ration than dried buttermilk and was satisfactory. Neither pelleting the concentrate nor the addition to the ration of 10 parts per billion of iodine showed beneficial results.

Air flow in the commercial incubator used was varied as much as 10 times in both the incubating and hatching compartments. Experimental variations did not influence fertility, egg weight, shell thickness, or shell spotting. Hatchability was unsatisfactory in the experiment.

Range and Pasture Management

Induced Revegetation of Depleted Range and Abandoned Cropland

Seven-years' study of eight foreign grasses indicates their range value for this area. Russian wild rye, a more recent introduction, has possibilities as an early spring and midsummer range grass for dry-land areas.

Smooth brome and crested wheatgrass seed obtained from different sources and grown in this area showed no significant differences in annual yield. However, blue grama showed striking regional differences in annual yields and other growth characteristics.

Improved Range Practices to Increase Cattle Production

Drought-stricken grass stands improve more rapidly in good rainfall years under the conservative and the deferred and rotation grazing systems than when range is consistently heavily grazed during drought. Reduction in rate of stocking to actual grazing capacity and delayed grazing in the spring were important factors in improvement of stand and increased vigor of the better grasses.

Nutritive Values of Native Range Forage Plants in Relation to Range Livestock Production—(In cooperation with Chemistry Section and the Rocky Mountain Forest and Range Experiment Station.)

RANGE AND PASTURE MANAGEMENT: Rapid reduction in nutritive values of native forage plants occurs from early spring to late winter. Native grasses were utilized considerably at the high crude protein level in June. However, in mid-September mature western wheatgrass and green needlegrass with less than one-half the crude protein that they had in June showed little or no use. Buffalo grass with 39 percent less crude protein than in June was heavily grazed. Winter fat, an important shrub, retained a high crude protein content in the fall and was being grazed considerably by cattle.

An open dry winter did not decrease the amount of crude protein in the forage plants to any appreciable extent.

CHEMISTRY: From the standpoint of composition and general nutritive values, many native dry-land range plants do not equal the native upland meadow plants as represented at haying time. Particularly the native range grasses, except for short seasons in early summer, are not as rich as has been believed, and for winter pasture they deteriorate rather rapidly till during the winter months their nutritive values are scant. Herbs, shrubs, and broad-leaf species which apparently are not grazed much during summer months appear to furnish a larger part of the nutritional values of winter pasture.

The amount of summer moisture appears to influence greatly the nutritive value of summer pasture and to cause monthly fluctuations often of considerable extent.

One-third to two-thirds of the ash of grass species consists of silica, which has relatively no nutritive value. Also the phosphorus content of the grasses is relatively low.

Improving Sagebrush Lands to Obtain Maximum Range Livestock Production

A new study was started in 1942 on sagebrush land in Moffat County to determine practical methods of improving such lands for grazing, to test out forage plants for reseeding, and to test out grazing systems in cooperation with a local farmer.

Railing of sagebrush destroyed 36 percent of the better grasses, 43 percent of bitterbrush (a palatable shrub), and 71 percent of the sagebrush.

The better range grasses were utilized by cattle from 50 to 75 percent of their total seasonal growth. The use was considered too severe because of the low density of grasses.

Occurrence, Mineral Composition, and Nutritive Values of the Forage Plants in Middle Park—(In cooperation with Chemistry Section.)

RANGE AND PASTURE MANAGEMENT: Vegetative analysis of meadows on 14 ranches in Middle Park indicated marked differences in quality. A good upland meadow invariably consisted of 50 percent of smooth brome grass and alsike clover, 10 percent of sedges, 15 to 18 percent of timothy, and no foxtail. In a poor upland meadow little, if any, alsike clover or smooth brome is to be found. However, 40 to 45 percent of the vegetation will be sedges, 15 to 20 percent timothy, and some foxtail.

CHEMISTRY: Moisture conditions appear to be a large factor in the production of both quality and quantity forage in upland meadows. Continuous application of moisture favors quantity growth of rushes, sedges, and marsh grasses, a number of which do not produce hay of high quality. Moderate or intermittent moisture permits a more prolific growth of legumes (alsike) and other plants which are high in protein and phosphorus content and thus raises the general quality of the forage.

Lack of moisture tends to reduce both the quantity and quality of forage produced. Phosphorus content particularly may be reduced under droughty conditions.

Regarding toxic ingredients, in marshy lowland meadows some large spots were observed where as much as 50 percent of the vegetation consisted of arrowgrass, *Triglochin* sp., which is highly cyanogenetic. In the Middle Park region, some of the soils are degradation products of geologic outcroppings carrying selenium, molybdenum, and vanadium. These elements find their way in smaller or larger traces into the composition of some of the forage plants. It is significant that some herbaceous and shrubby plants take up enough of these elements to be injurious, but these are more plentiful on dry hillsides than in the meadows.

Evaluation Surveys of Colorado's Native Vegetation to Determine Rangeland Production Capacities

The effect of improved moisture conditions in 1941 and 1942 on 11 shortgrass (blue grama and buffalo grass) ranges in Elbert, El Paso, and Lincoln Counties was studied.

Favorable moisture conditions in 1942 and proper use by cattle for the preceding 6 years accounted for rapid recovery of

drought-damaged range grasses. Properly grazed shortgrass range in western Elbert County produced 5.2 times more blue grama than a nearby overgrazed contour-furrowed range. High yields of blue grama were also obtained on properly used contour-furrowed range but did not exceed yields on untreated properly grazed areas.

Artificial Reseeding of Abandoned Cropland in Eastern Colorado

Artificial reseeding of abandoned cropland in eastern Colorado can be successful in good rainfall years. Successful stands of blue grama, buffalo grass, sideoats grama, western wheatgrass, and weeping love grass were obtained in weed cover, fallow, and cropped stubble land. Seeded buffalo grass germinated better at 1 inch in depth than at one-half inch. With a better germination, the stand increased more rapidly, thereby competing more successfully with weeds. Regardless of the grass species, weed growth was at a minimum where grass stands were fully established.

Rural Economics and Sociology Section

Agricultural Economics

Effect of Recent Changes upon the Economic Relationship between Colorado Ranch and Range Properties

Financial and production data were obtained from cooperating ranch operators. The impact of the war upon the business problems of ranch management was noted and evidence obtained to aid in working toward a sound ranch organization.

Type of Farming Adjustments in Wartime

A report on Colorado maximum wartime production capacity stressed the proper balance between crop areas, range areas, and livestock production to give optimum use of farm resources and maximum output of food.

Farm Business Analysis Studies as Affected by World War II

In the northeastern non-irrigated area wheat production proved superior to corn production in relation to income during 1941 and 1942.

Economic and Social Effects on Farms Resulting from the Operation of a Definitely Planned Program of Soil Conservation—

(In cooperation with Soil Conservation Service.)

Use of special conserving practices increased crop yields on non-irrigated farms in southeastern Colorado more than enough to pay for the extra costs of such practices.

Wartime Problems in the Marketing of Colorado Fruits and Vegetables and in the Production of Colorado Poultry Products

Colorado peaches are well liked in Midwest markets. Growers should stress uniformity of ripening and of packing. Colorado poultry producers need local marketing facilities which will provide improved prices for quality eggs.

Rural Sociology

Health Practices and Attitudes of Rural People in a War Period

In a study of Colorado health and diet conditions a considerable proportion of the people interviewed were not consuming as large a variety or quantity of foods as considered necessary, due to cost, inaccessibility of foods, lack of refrigeration, or personal dislike.

Administration of an Over-All County Agricultural Program in a War Economy

Using a list of special problems facing rural leaders, attention was directed toward obtaining information needed to train rural leaders and toward developing a satisfactory procedure for such training.

Farm Population and Farm Population Movements as Influenced by the War—(In cooperation with the Bureau of Agricultural Economics.)

Analysis showed that Colorado rural population increased in 1940, but showed a net decrease in 1941 and 1942 due to movement of people to war industries and to the armed forces.

Seed Laboratory

About 33 percent more samples were received for testing by the Laboratory than were received in the preceding year.

A 600-blotter-capacity germinator, designed in the laboratory and made locally at less than half the cost of the commercial type, has proved to be entirely satisfactory. In addition changes have been made which greatly increase the efficiency and capacities of the older equipment.

A seed bill was prepared bringing Colorado's 1917 Seed Law up to date and in line with the Federal Seed Act and the seed laws of other states. It was adopted by the State Legislature and signed by the Governor on April 28, 1943.

The Laboratory was called in on one serious violation of the State Seed Law involving 11,000 pounds of blue grama grass seed. This seed was purchased by the Army from a Denver seed dealer for use on Buckley Field. The matter was adjusted to the satisfaction of both parties without recourse to law.

Inspection of seeds in the hands of dealers and others was conducted during April and May. Good seed was known to be limited in amount and much mislabeled and low-germinating seed was found to be in the hands of the dealers. To prevent, insofar as possible, the lowered production resulting from unknowingly planting seed of this type, samples of corn, cane, sorghum, and similar late-planted crops were tested and reported back to the dealers as rapidly as taken.

All remnant packages of last year's vegetable seeds were turned in for shipment to Russia.

Miss Kroeger attended the meeting of the Official Seed Analysts of North America in Kentucky during July 1942.

Mr. Thornton was re-elected president of the Colorado Seed Council at the annual meeting held in Denver in January, 1943.

Research efforts common to the problems of seed testing and those in cooperation with the Agronomy Section were continued.

Referee samples designed to coordinate the work of United States and Canadian laboratories are being received. The Colorado laboratory is one of five selected for this purpose.

ENGINEERING DIVISION

Civil Engineering

Government Cooperation

The work of the Civil Engineering Section is carried on in cooperation with the Division of Irrigation, Soil Conservation Service, United States Department of Agriculture. The work in the design and invention of irrigation equipment, investigations in connection with pumping for irrigation and drainage, and the snow survey work are the principal cooperative projects.

Meteorology

The regular twice daily observations on meteorological conditions were continued. Airway observations were taken by student assistants and reported to the U. S. Weather Bureau.

Structures and Devices Used in Irrigation

Hydraulic Sand Separator

The device tested last year has been rebuilt and improved

so that it now successfully separates sand sizes from samples into the fractions desired. This accomplishment is basic in attempting further work on the selection of sand sizes for hydraulic model studies.

Irrigation Structures

Some work was done in an endeavor to find a form of non-clogging inlet for the stilling wells of Parshall measuring flumes, particularly for those used in the measurement of sewage.

A scale model of a drop-chute structure was constructed in the hydraulics laboratory for a study of the dissipation of energy generated.

Measurement of Water

Investigations were concluded on the use of current meters in the measurement of water discharged from pipes. Results were published in Technical Bulletin 29, "The Use of Current Meters for Measuring Pipe Discharges."

In a study of pipes discharging partly full it was found that fairly reliable results were possible when the depth of flow did not exceed 0.6 the pipe diameter. Beyond that depth the discharge-depth relation was unstable and assumed peculiar characteristics.

Ground-Water Investigations

Use of Ground Water for Irrigation in the South Platte Drainage

The survey on pumping for irrigation in the South Platte basin was completed and a report prepared. In the year 1940 it was found that 1,957 irrigation wells produced 220,000 acre-feet of water for 165,500 acres of land. The large pumping draught was attended by a definite lowering of the water table in many areas.

Ground-Water Supply of Prospect Valley

A study of the ground-water supplies for the Prospect Valley was started in the spring of 1942 because of the serious lowering of the water table since 1933. Because conditions during the pumping season were unfavorable for obtaining data; it was decided to continue the study a second season.

Ground-Water Fluctuations

The routine semiannual measurements of depth to the water table in 189 observation wells in the South Platte and Arkansas Valleys revealed a substantial gain in nearly all pumping districts over the preceding year's measurements. This was anticipated in view of increased river supplies and reduced pumping in 1942.

Analytical Ground-Water Studies

Research on the analytical treatment of ground-water problems was begun, and a basic mathematical treatise on sources and sinks was prepared.

Design and Operation of Pumping Plants

Investigations on the friction in footvalves, strainers, and bell entrances for irrigation pumps were made on the 4-, 6-, and 8-inch sizes.

Snow Surveys

Snow Surveys by Photograph

Photographs were again made of the experimental snow-covered mountain area near Fort Collins. Calculations made for April 1 and May 1 for comparison with snow-course measurements were unsatisfactory. The general results, however, are sufficiently encouraging to warrant continuing investigations of this method of forecasting runoff.

Snow Course Measurements and Irrigation Water-Supply Forecasts

Snow-cover reports based on 185 snow courses in Arizona, New Mexico, Utah, Idaho, Montana, Wyoming, and Colorado for the Missouri, Arkansas, Colorado, and Rio Grande Rivers were issued for February, March, April, and May 1943. Where definite correlations between snow cover and runoff existed, forecasts of stream flow were made with reasonable accuracy. Where the relation was inconsistent, general forecasts which merely indicated the expected trend of the runoff were made. The results of this work are especially important in planning the production of crops during the present emergency.

Miscellaneous

Plans were prepared for a new outlet structure which was constructed in April to replace a defective valve at College Lake.

Mechanical Engineering

Sugar Beet Machinery

Bulletin No. 476, "Mechanical Thinning of Sugar Beets," published by the Station in March 1943, illustrates methods and results of mechanical thinning.

Progress is being made on mechanical harvesting machines and methods. In some cases as much as four-fifths of the harvesting labor may be eliminated.

Potato Storage

A comparison of potatoes stored 6 months in sacks, bulk, and boxes showed a net gain per hundredweight stored of 10 cents for bulk and 16 cents for boxes over sack storage. Two storages for the campus and one for the Wiggins Potato Growers Cooperative Association were designed. Plans embodied experimental features and use of wood substitutes.

EDITORIAL SERVICE

Publications Issued

Popular Bulletins:

- | <i>No.</i> | <i>Title and Author</i> |
|------------|--|
| 473 | "Will We Help Youth Preserve Democracy?" by R. W. Roskelley, Paul M. Berry, and G. E. Klipple. |
| 474 | "Lamb Diseases in Colorado Feedlots" by I. E. Newsom and Floyd Cross. |
| 475 | "Starting Vegetable Plants" by A. M. Binkley. |
| 476 | "Mechanical Thinning of Sugar Beets" by E. M. Mervine and R. D. Barmington. |
| 477 | "Making and Using a Food Dehydrator" by W. E. Pyke and L. W. Charkey. |
| 478 | "Freezing Vegetables and Fruits" by W. E. Pyke and A. M. Binkley. |
| 479 | "Psyllid Control on Potatoes and Tomatoes in the Victory Garden" by George M. List. |

Technical Bulletins:

- | | |
|----|---|
| 29 | "The Use of Current Meters in Measuring Pipe Discharges" by Carl Rohwer. |
| 30 | "Location and Movement of the Causal Agent of Ring Rot in the Potato Plant" by W. A. Kreutzer and John G. McLean. |
| 31 | "The Effect of Rations on the Production of Urinary Calculi in Sheep" by I. E. Newsom, J. W. Tobiska, and H. B. Osland. |

Press Bulletins:

- | | |
|----|---|
| 96 | "Plant-Source Possibilities for Rubber Production in Colorado" by the Rubber-Crop Production Committee. |
| 97 | "Wartime Food Processing Aids" by W. E. Pyke and Elizabeth Dyar. |

Quarterly Bulletins:

- Vol. IV, No. 3, Colorado Farm Bulletin, July-September 1942.
- Vol. IV, No. 4, Colorado Farm Bulletin, October-December 1942.
- Vol. V, No. 1, Colorado Farm Bulletin, January-March 1943.
- Vol. V, No. 2, Colorado Farm Bulletin, April-June 1943.

Annual Report:

- Fifty-Fifth Annual Report, Colorado Agricultural Experiment Station, 1941-42.

Other Publications:

Sixty-four papers by Station staff members were edited for publication in scientific journals and elsewhere.

Fifty-two radio manuscripts and 101 news stories were written.

Miscellaneous

Bulletins mailed out totaled 49,229. Of these, 30,650 were in answer to individual requests, 3,442 to the regular mailing list, and 15,137 to the Farm Bulletin mailing list.

Since establishment of the practice of referring to this office all inquiries on agricultural subjects, these inquiries have averaged 170 per month.

Staff Contributions

- Animal Investigations. Eastern Colorado Feeds for Wintering and Fattening Steers. Colo. Exp. Sta. mimeo. May 1943. Misc. Series 201
- Animal Investigations. Progress Report on Wool Baling. Colo. Exp. Sta. mimeo. Sept. 1942. Misc. Series 154
- Animal Investigations. Wartime Conservation of Feed in Cattle Fattening. Colo. Exp. Sta. mimeo. June 1943. Misc. Series 209 and 209-A.
- Binkley, A. M. Chlorosis in Horticultural Plants. Hort. Circ. 25. June 1942. Misc. Series 148
- Binkley, A. M. Growing Baby Lima Beans. Ext. Serv. mimeo. April 1943. Misc. Series 198
- Binkley, A. M. Growing Carrots in Colorado. Ext. Serv. mimeo. April 1943. Misc. Series 197
- Binkley, A. M. Hits and Misses. Spud Notes 1(2):6. Feb. 1943. Misc. Series 186
- Binkley, A. M. Notes on Growing Tomatoes in Greenhouses. Ext. Serv. mimeo. Feb. 15, 1943. Misc. Series 210
- Binkley, A. M. Plant Vegetables Late for Storage and Canning. Ext. Serv. 4-H mimeo. May 1943. Misc. Series 200
- Binkley, A. M. Standard Varieties of Vegetables for Colorado. Colo. State College mimeo. Hort. Circ. 26. Feb. 9, 1943. Misc. Series 188-A
- Binkley, A. M. Use of Hormones Becoming an Important Tool in the Growing of Horticultural Plants. Colo. Farm Bul. 4(3):18. July-Sept. 1942
- Binkley, A. M. Vegetable Storage Will Help Win the War; Attention to Several Factors is Necessary. Colo. Farm Bul. 4(4):12. Oct.-Dec. 1942
- Binkley, A. M. and John G. McLean. Profit by Increased Yield Per Acre. Spud Notes 1(3):4-5. March 1943. Misc. Series 194
- Bodine, E. W. Virus Diseases of Stone Fruits. Mesa County Research Comm. mimeo. Dec. 1942. Misc. Series 159

- Bryant, L. R. and Robert Gardner. Chlorosis in Elberta Peaches. Mesa County Research Comm. mimeo. Dec. 1942. Misc. Series 161
- Bryant, L. R. and Robert Gardner. Peach Fertilizer Trials. Mesa County Research Comm. mimeo. Dec. 1942. Misc. Series 160
- Bryant, L. R. and Robert Gardner. Phosphorus Deficiency in Pears. Amer. Soc. Hort. Sci. 42:101-3. June 1943. Sci. Jour. Series 158. Mesa County Research Comm. mimeo. Dec. 1942. Misc. Series 162
- Burdick, R. T. Bulk Storage of Potatoes to Save Burlap Costs No More, Former Study Shows. Colo. Farm Bul. 4(4):9. Oct.-Dec. 1942
- Burdick, R. T. Here's a Handy Guide for Calculating Rental Charges on Farm Machinery per Crop Acre. Colo. Farm Bul. 5(2):3. April-June 1943
- Burdick, R. T. and A. M. Binkley. Selection of High-Value Crops Will Produce More Food per Unit of Space in War Gardens. Colo. Farm Bul. 5(2):2. April-June 1943
- Cross, Floyd. Urinary Calculi, Problem in Feedlot Meat Production, Largely Caused by Ration. Colo. Farm Bul. 4(3):16. July-Sept. 1942
- Daniels, L. B. Insect Vectors of the Peach Mosaic Virus. Mesa County Research Comm. mimeo. Dec. 1942. Misc. Series 158
- Daniels, L. B. Spray Schedules. Spud Notes 1(3):3-4. March 1943. Misc. Series 194
- Deming, G. W. Comparison of Whole Sugar-Beet Seed and Segmented Seed. Through the Leaves 31(2):11-5. March-April 1943. Misc. Series 189
- Edgar, Alfred D. Potato Storage Study at the San Luis Valley Experimental and Demonstration Farm. Spud Notes 1(5):4-5. May 1943. Misc. Series 202
- Edmundson, W. C. "Irrigating Up" Potatoes. Spud Notes 1(4):1. April 1943. Misc. Series 195
- Edmundson, W. C. Work of the Colorado Potato Experiment Station. Spud Notes 1(5):6-7. May 1943. Misc. Series 202
- Edmundson, W. C., L. A. Schaal, and A. M. Binkley. Pawnee Potato Is New Variety "Tailored" for Northern Colorado Growing Conditions. Colo. Farm Bul. 5(2):13. April-June 1943.
- Edmundson, W. C., L. A. Schaal, and A. M. Binkley. The Pawnee Potato. U. S. D. A. Circ. 665. March 1943. Sci. Jour. Series 163
- Epp, A. W. A Survey of the Colorado Peach Market. Mesa County Research Comm. mimeo. Dec. 1942. Misc. Series 163
- Forsberg, J. L. Seed Treatment Aids Against Pea Root Rot if Disease Is Not Too Concentrated in Soil. Colo. Farm Bul. 5(2):5. April-June 1943
- (Gamble, A. F.) and H. S. Wilgus, Jr. Ventilating the Farm Poultry House. Colo. Poultry Improvement Board mimeo. Dec. 1942. Misc. Series 169
- Gardner, Robert. Efficient Use of Manure Patriotic Duty as Well as Good Business on Colorado Land. Colo. Farm Bul. 4(3):8. July-Sept. 1942
- Gardner, Robert. Soil Tests and Soil Fertility Discussed; "Salvage Manure" is War-Vital Slogan Now. Colo. Farm Bul. 5(1):17. Jan.-March 1943

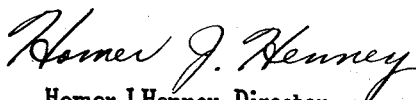
- Gassner, F. X. The Experimental Fur Unit at the Colorado Agricultural Experiment Station. National Fur News 14(12):12. Jan. 1943. Misc. Series 168
- Gassner, F. X. The College Column. National Fur News 14(6):7. July 1942. Misc. Series 144
- Gassner, F. X. The College Column. National Fur News 14(7):10. August 1942. Misc. Series 150
- Gassner, F. X. The College Column. National Fur News 14(9):8. Oct. 1942. Misc. Series 155
- Glick, D. P. Disinfecting the Seed Cutting Knife. Spud Notes 1(4):2-3. April 1943. Misc. Series 195
- Glick, D. P. The Deterioration of Disinfectants in Agricultural Use. Jour. Bact. 45:42. 1943. Abs. Series 19
- Green, Ferris M. Careful Planning of Orchard Work Can Help Alleviate Effects of Labor Shortage Later. Colo. Farm Bul. 5(1):7. Jan.-March 1943
- Jones, Charles R. Winter Wheat in Areas Infested by the Hessian Fly in Colorado. Colo. Exp. Sta. mimeo. July 15, 1942. Misc. Series 146
- Kezer, Alvin and A. M. Binkley. Fertilizing Victory Gardens. Ext. Serv. mimeo. April 1943. Misc. Series 199
- Kreutzer, W. A. Can You Distinguish Early Blight from Late Blight? Spud Notes 1(6):1-3. June 1943. Misc. Series 211
- Kreutzer, W. A. Information Which May Help Prevent Potato Losses Due to Late Blight. Spud Notes 1(1):3-4. Jan. 1943. Misc. Series 181
- Kreutzer, W. A. and L. R. Bryant. Varietal Resistance and Mulching Show Promise in Control of Tomato Fruit Rot. Colo. Farm Bul. 5(1):12-5. Jan.-March 1943
- Kreutzer, W. A. and D. P. Glick. The Role of Packing Methods in the Increase of Anthracnose of Honeydew Melon Fruits. Phytopath. 33(3):245-48. March 1943. Sci. Jour. Series 151
- Kreutzer, W. A. and John G. McLean. The Ring-Rot Situation. Spud Notes 1(3):1-2. March 1943. Misc. Series 194
- List, George M. Several Substitutes for War-Short Bean Insecticides Found Satisfactory in Tests. Colo. Farm Bul. 5(2):9. April-June 1943
- List, George M. and W. A. Kreutzer. Transmission of the Causal Agent of the Ring-Rot Disease of Potatoes by Insects. Jour. Econ. Ent. 35(3):455. August 12, 1942. Sci. Jour. Series 142
- Lungren, E. A. Eradication of 14 Million Barberry Bushes Protects Colorado Grain from Stem Rust. Colo. Farm Bul. 5(2):11. April-June 1943
- McLean, John G. Late Blight of Potatoes. Spud Notes 1(1):1-3. Jan. 1943. Misc. Series 181
- McLean, John G. Potato Fertilizer and Chemical Soil Treatments in the Fruita District. Mesa County Research Comm. mimeo. Dec. 1942. Misc. Series 164
- McLean, John G. Potato Work at the Colorado Agricultural Experiment Station. Spud Notes 1(6):4. June 1943. Misc. Series 211

- McLean, John G. and W. A. Kreutzer. The Prevalance and Severity of Certain Potato Diseases in Colorado During 1942. Plant Disease Reporter 27:18-9. Jan. 15, 1943. Sci. Jour. Series 157
- McLean, John G., (J. C. Walker, and J. P. Jolivette). Boron Deficiency Disease on Garden and Sugar Beets. Jour. Agr. Res. 66(3):97-123. Feb. 1, 1943
- Mervine, E. M. High Proportion of Labor in Growing Sugar Beets Can Be Saved in 1943 by Mechanizing. Colo. Farm Bul. 5(1):3. Jan.-March 1943
- Mervine, E. M. Labor Saving by Sugar Beet Mechanization. Agricultural Engineering 24(3):79. March 1943. Sci. Jour. Series 156
- Nelson, E. W. Bibliography on Western Range Forage Plants. Colo. Agr. Exp. Sta. mimeo. Jan. 20, 1943. Misc. Series 184
- Nelson, E. W. Partial List of Commercial Sources of Seed in Colorado of Native and Introduced Grasses. Colo. Agr. Exp. Sta. mimeo. Dec. 12, 1942. Misc. Series 166
- Paddick, M. E. Rubber Producing Plants. Colo. State College Library Bul. 12. August 1942. Misc. Series 149
- Pyke, W. E. Honey and Corn Syrup for Cakes Will Save Sugar for Preserving Fruit; Recipes Given. Colo. Farm Bul. 4(3):10. July-Sept. 1942
- Pyke, W. E. and Ray Barmington. Preserving Nutritive Value in Drying Food is Goal of Project; Dehydrator Plan Given. Colo. Farm Bul. 4(4):10. Oct.-Dec. 1942
- Robertson, D. W. and O. H. Coleman. Location of Glossy and Yellow Seedlings in Two Linkage Groups. Jour. Amer. Soc. Agron. 34(11):1028-34. Nov. 1942. Sci. Jour. Series 148
- Robertson, D. W., W. H. Leonard, and J. F. Brandon. Dry-Land Hybrid Corn Tests. Colo. Agr. Exp. Sta. mimeo. Feb. 1943. Misc. Series 187
- Robertson, D. W., W. H. Leonard, Herman Fauber, and R. F. Eslick. Tests of Hybrid Corn under Irrigation in Colorado. Colo. Agr. Exp. Sta. mimeo. Feb. 1943. Misc. Series 185
- Roskelley, R. W. Mistakes to Be Avoided in Meeting Labor Crisis in Coming Year Revealed by Study. Colo. Farm Bul. 5(1):4. Jan.-March 1943
- Rubber-Crop Production Committee. Report of the Rubber-Crop Production Committee on Plants Grown and Tested as a Source of Rubber During 1942. Colo. Agr. Exp. Sta. mimeo. April 1943. Misc. Series 196
- Schaal, L. A. The Scab and Rhizoctonia Diseases of Potatoes. Spud Notes 1(5):5-6. May 1943. Misc. Series 202
- Simonds, A. O. Histological Study of Freezing, Desiccation, and Winter Injury of Raspberry Canes. Botanical Gazette 104(2):356-61. Dec. 1942. Sci. Jour. Series 154
- Sparks, W. C. Tuber Color of Red Potatoes. Spud Notes 1(6):1. June 1943. Misc. Series 211
- Thornton, Bruce. Good Seed Helps Win the War. Western Farm Life 45(4):3. Feb. 15, 1943. Misc. Series 172

- Thornton, Bruce. Principal Seed Law Provisions of the Different States and the Federal Seed Act as Related to Colorado's Proposed Law. Colorado Agr. Exp. Sta. mimeo. March 1943
- Thornton, Bruce. Seed Quality Vital in All-Out Production; Only High Quality Seed Should be Saved. Colo. Farm Bul. 4(3):22-3. July-Sept. 1942
- Thornton, Bruce. The Proposed Colorado Seed Law. Colo. Agri. Exp. Sta. mimeo. March 1943
- Thornton, Bruce. The Pure Seed Bill. Colo. Agr. Exp. Sta. mimeo. March 1943
- Tobiska, J. W., C. E. Vail, and Earl Douglass. Alfalfa Hay, War-Important Feed, is Shown to Vary Considerably in Mineral Makeup. Colo. Farm Bul. 4(3):24. July-Sept. 1942
- Tom, R. C. Cattle Feeding Test at Akron Indicates Good Method of Marketing Dry-Land Feed. Colo. Farm Bul. 4(3):14. July-Sept. 1942
- Tyler, M. E. and H. H. Weiser (Ohio State Univ.). Factors Affecting Swiss Cheese Starter Activity. Effect of Heat Treatment and Source of Milk. Jour. Dairy Sci. 25:939. 1943
- Wasser, C. H. Forage Improvement on Sagebrush-Grass Range Will Produce More Meat for Victory. Colo. Farm Bul. 4(4):3. Oct.-Dec. 1942
- Weihing, Ralph M. Green and Air-Dry Weights for Determining Hay Yields of Varieties of Alfalfa. Jour. Amer. Soc. Agron. 34(10):877-82. Oct. 1942
- Weihing, Ralph M. and D. W. Robertson. The Comparative Performance of Alfalfa Varieties in Nursery and Field Plots in Irrigated Soil Infested with *Phytomonas Insidiosa*. Jour. Amer. Soc. Agron. 35(2):125-36. Feb. 1943. Sci. Jour. Series 149
- Whitney, Robert S. and Robert Gardner. Effect of Carbon Dioxide on Soil Reaction. Soil Science 55(2):127-41. Feb. 1943. Sci. Jour. Series 153
- Wilgus, H. S., Jr. August Poultry Reminders. Western Farm Life 44(15):14. August 1942. Misc. Series 145
- Wilgus, H. S., Jr. Commercial Cleaning of Feathers. Colo. Agr. Exp. Sta. mimeo. June 1943. Misc. Series 203
- Wilgus, H. S., Jr. Commercial Poultry Mash and Supplements. Western Farm Life 45(7):20. April 1, 1943. Misc. Series 188
- Wilgus, H. S., Jr. December Poultry Reminders. Western Farm Life 44(23):14. Dec. 1942. Misc. Series 157
- Wilgus, H. S., Jr. Egg Production; Use of Batteries for Brooding. Colo. Agr. Exp. Sta. mimeo. June 1943. Misc. Series 204
- Wilgus, H. S., Jr. Feather Picking; Cannibalism; Prolapse or Blow Outs; Difficulty with Colds in Chickens. Colo. Agri. Exp. Sta. mimeo. June 1943. Misc. Series 205
- Wilgus, H. S., Jr. February Poultry Reminders. Western Farm Life 45(3):21. Feb. 1943. Misc. Series 171
- Wilgus, H. S., Jr. Green Range Will Provide Essential Poultry Feed to Replace That Made Scarce by War. Colo. Farm Bul. 4(3):3. July-Sept. 1942

- Wilgus, H. S., Jr. House Construction; Broiler Raising; New Crop Grain. Colo. Agr. Exp. Sta. mimeo. June 1943. Misc. Series 207
- Wilgus, H. S., Jr. January Poultry Reminders. Western Farm Life 45(1):13. Jan. 1943. Misc. Series 170-A
- Wilgus, H. S., Jr. July Poultry Reminders. Western Farm Life 44(14):31. July 15, 1942. Misc. Series 143
- Wilgus, H. S., Jr. November Poultry Reminders. Western Farm Life 44(21):19. Nov. 1942. Misc. Series 156
- Wilgus, H. S., Jr. October Poultry Reminders. Western Farm Life 44(19):14. Oct. 1942. Misc. Series 151
- Wilgus, H. S., Jr. Riboflavin Mixes. Colo. Agr. Exp. Sta. mimeo. Feb. 18, 1943. Misc. Series 192
- Wilgus, H. S., Jr. September Poultry Reminders. Western Farm Life 44(17):20. Sept. 1942. Misc. Series 147
- Wilgus, H. S., Jr. Small Eggs; Soft-Shelled Eggs; Rupture of Yolks; Nests and Waterers; Crooked Breasts. Colo. Agr. Exp. Sta. mimeo. June 1943. Misc. Series 206
- Wilgus, H. S., Jr. Study of Protein Sources. Flour and Feed 43(8):30. Jan. 1943. Misc. Series 170
- Wilgus, H. S., Jr. 32-Percent Protein Supplements for Poultry Rations. Colo. Agr. Exp. Sta. mimeo. March 10, 1943. Misc. Series 193
- Wilgus, H. S., Jr. Wartime Poultry Rations. Colo. Agr. Exp. Sta. mimeo. March 10, 1943. Misc. Series 191
- Wilgus, H. S., Jr. and O. C. Ufford. Chick Brooding Rules. Ext. Circ. 1688. July 1942. Misc. Series 141
- Wilgus, H. S., Jr. and O. C. Ufford. Wartime Poultry Rations. Colo. Agr. Exp. Sta. mimeo. Suppl. to Ext. Bul. 366-A. March 10, 1943. Misc. Series 183
- Wilgus, H. S., Jr. and O. C. Ufford. Wartime Turkey Rations. Colo. Agr. Exp. Sta. mimeo. Suppl. to Ext. Bul. 370-A. Jan. 20, 1943. Misc. Series 182
- Wilgus, H. S., Jr., R. C. Tom, and E. W. Nelson. The Feed Situation. Colo. Ext. Serv. mimeo. Dec. 23, 1942. Also, Flour and Feed, 43(9):12. Feb. 1943. Misc. Series 167
- Wilgus, H. S., Jr., R. C. Tom, and L. E. Washburn. The Bonemeal Problem. Colo. Agr. Exp. Sta. mimeo. Feb. 26, 1943. Misc. Series 190
- Wilkes, Roy and H. C. Dickey. Self-Feeder, Movable Automatic Waterer Suggested as Labor Savers in Hog Growing. Colo. Farm Bul. 5(1):11. Jan.-March 1943

Respectfully submitted,


Homer J. Henney, Director

FINANCIAL REPORT, COLORADO EXPERIMENT STATION

For the Year Ending June 30, 1943

DR.	Hatch fund	Adams fund	Purnell fund	Bankhead-Jones fund	State mill levy fund	Special fund	Pure-Seed fund	Total funds
Balance July 1, 1942					\$ 27,726.19	\$ 55,992.34*		\$ 83,718.53
From the treasurer of the United States per appropriations for the fiscal year ending June 30, 1943, under the Acts of Congress approved March 2, 1887, (Hatch fund), March 16, 1906, (Adams fund), February 24, 1925, (Purnell fund), and June 29, 1935, (Bankhead-Jones fund)	\$15,000.00	\$15,000.00	\$60,000.00	\$22,430.96				112,430.96
Other sources than the United States					103,408.17†	45,278.52‡	4,500.00	153,186.69
	\$15,000.00	\$15,000.00	\$60,000.00	\$22,430.96	\$131,134.36	\$101,270.86	\$4,500.00	\$349,336.18
CR.								
Salaries (and Retirement)	15,000.00	13,068.81	42,357.52	12,496.44	54,995.52	169.04	3,082.63	141,169.96
Labor		809.06	8,321.69	3,495.35	16,082.86	6,423.01	1,055.33	36,187.30
Travel		297.76	1,815.18	577.04	2,837.57	1,638.21	49.85	7,215.61
Transportation of Things			31.29	1.80	619.01	141.29	6.19	799.58
Communication17	64.03	52.54	1,437.90	115.15	59.15	1,728.94
Rents and Utility		256.48	1,000.97	643.15	5,657.50	3,816.64	2.75	11,377.49
Printing and Binding			829.51	265.78	2,827.53	320.50		4,243.32
Other Contracted Services		62.53	380.69	376.57	5,100.16	941.85	26.06	6,887.86
Supplies and Materials		170.74	3,698.82	3,561.16	15,749.35	13,250.01	192.74	36,622.82
Equipment		334.45	1,500.30	961.13	6,865.92	7,172.66	25.30	16,359.76
Land and Structures					4,597.04	472.94		5,069.98
Total—Regular Disbursements	\$15,000.00	\$15,000.00	\$60,000.00	\$22,430.96	\$116,270.36†	\$ 34,461.30‡	\$4,500.00	\$267,662.62
Revolving Fund						1,000.00		1,000.00
A. S. T. P. (Loan)						40,000.00		40,000.00
Total—Station Disbursements	\$15,000.00	\$15,000.00	\$60,000.00	\$22,430.96	\$116,270.36	\$ 75,461.30	\$4,500.00	\$308,662.62
Balance on hand June 30, 1943					14,864.00	25,809.56		40,673.56
Grand Total	\$15,000.00	\$15,000.00	\$60,000.00	\$22,430.96	\$131,134.36	\$101,270.86	\$4,500.00	\$349,336.18

*Balance brought forward differs from figure shown in 1941-42 report due to the fact that receipts and disbursements from miscellaneous funds were not shown in that report.

†Includes \$13,900 H. B. 83.

‡Includes \$3,272, Sugar Beet fund, and \$320.70, Hybrid Corn Test fund.

§Includes disbursements of \$1,623.36, Sugar Beet fund; \$520.73 Hybrid Corn Test fund; and \$160.24 American Potash Institute fund.