Circular No. 73 - Annual Summary of Publications
Circular No. 73 contains a summary of publications issued by the Utah Agricultural Experiment Station, through its Division of Publications, since July 1, 1927. The publications of this Station are no longer sent to a general mailing list (except in cases of libraries, state editors, county agricultural agents, state vocational agricultural teachers, and state agricultural inspectors), but are sent only on request. Therefore, copies of any of the publications listed will be sent without charge to those requesting them as long as the supply is available. However, in the case of reprints (abstracts of scientific and technical papers) the supply is very limited, and the requests for these should be limited as far as possible to those only who are especially interested in this phase of experimentation.

Check those publications desired. FILL IN NAME AND ADDRESS in space provided above (write legibly), place this circular in a stamped envelope, and return to

Division of Publications,
Utah Agricultural Experiment Station,
Logan, Utah, U. S. A.

Approved for publication by Director, July 9, 1928.
Bulletin 203—Cattle Ranching in Utah
WILLIAM PETERSON, P. V. CARDON, K. C. I KELER, GEORGE STEWART, and A. C. ESPLIN

This publication contains the results of a preliminary economic survey of the cattle ranch situation in Utah as of 1925. The survey was made in cooperation with the U. S. Bureaus of Agricultural Economics and Animal Industry. The first part of the bulletin contains a resume of the development of ranching in Utah. This is followed by the survey data including such topics as land utilization, distribution of ranch investment, ranch indebtedness, inventory of cattle and work stock, labor requirements, distribution of ranch expense and ranch receipts, financial summary, etc. The complete operations of 55 Utah cattle ranches are studied under two main headings: (1) public domain in winter and (2) no public domain in winter. The highest average balance for the year 1925 is shown for the larger ranches which use no public domain in winter. The smaller ranches in all cases show a loss.

Bulletin 204—Sheep Ranching in Utah
A. C. ESPLIN, WILLIAM PETERSON, P. V. CARDON, GEORGE STEWART, and K. C. IKELER

This bulletin is a report of a preliminary economic survey of the sheep ranch situation as of 1925. As in the case of Bulletin 203, survey for this bulletin was made in cooperation with the U. S. Bureaus of Agricultural Economics and Animal Industry. Development of sheep ranching in Utah is covered in the first part of the bulletin, followed by survey data. The study includes over 137,000 head of sheep, having a total value exceeding $1,698,900. Fifty-four sheep records are considered in four size groups: Group I, less than 1000 breeding ewes; Group II, 1001 to 2000; Group III, 2001 to 3000; and Group IV, over 3000. Total ranch receipts are shown to have increased rather uniformly with the sizes of ranches. On the larger ranches, receipts were derived almost exclusively from sales of sheep and wool. On the smaller ranches of the first group 12.6 per cent of total receipts came from crops and 3.4 per cent from livestock other than sheep.

Bulletin 205—The Beet Leafhopper in Utah
A Study of Its Distribution and the Occurrence of Curly-top
GEORGE F. KNOWLTON

The results of a study on the distribution and abundance of leafhopper in Utah are included for the areas so far covered.
Observations on the number of beet leafhoppers present and the amount of curly-top occurring in the beet fields in a number of the beet areas are given for the years 1926 and 1927. A list of plants on which the leafhopper has been collected during this survey is included and a few of the most important host plants are discussed.

**Bulletin 206—Treehopper Injury in Utah Orchards**

C. J. SORENSON

Many orchards in Utah suffer considerable injury because of being attacked in the late summer of each year by certain species of treehoppers. Damage is most prevalent where alfalfa, sweet clover, grass, or weeds grow in the orchard. The injury is a result of numerous cuts made in the bark of fruit trees by female treehoppers in which they lay their eggs.

Bulletin 206 contains a description of the injury, of the conditions (favorable and unfavorable to its cause), and of the insects responsible for it. Various methods for the prevention of the injury are also discussed.

**Bulletin 207—The Physical Curd Character of Milk and Its Relationship to the Digestibility and Food Value of Milk for Infants**

R. L. HILL

This bulletin contains a report of the research conducted on milk by the use of curd-test developed at this station. The effect of breed of dairy cattle, period of lactation, feed, and individuality of the animal as they affect the curd character of the milk are discussed. Results obtained by doctors and nurses in feeding the soft-curded milk to infants are given. These would indicate that the curd character of the milk, as determined by the test described in the bulletin, is an index to its digestibility by infants.

**Circular 68—Summary of Publications**

BLANCHE CONDIT-PITTMAN

This circular contains a summary of publications issued by the Utah Station from July 1, 1926 to July 1, 1927. In this circular the following bulletins and circulars are summarized: Bulletins Nos. 198, 199, 200, 201, and 202, and Circulars Nos. 62, 63, 64, 65, 66, and 67. Eleven abstracts of technical articles appearing in five different scientific publications are also included in the summaries given.
Circular 69—Clean Milk and Its Production

E. G. CARTER

Milk is unquestionably one of the most important of all human feeds. Therefore, the importance of clean milk and its production cannot be overestimated. This 16-page circular is complete in its analysis of the situation and in offering suggestions for the production of clean milk. Included in the publication will be found a discussion of such topics as the food value of milk, the dangers from impure milk, the importance of cleanliness in handling milk, bacteria in milk, pasteurization, and how clean milk may be produced.

Circular 70—The Agricultural Outlook for Utah, 1928

P. V. CARDON and W. P. THOMAS

This circular is based on the national agricultural outlook for 1928 from the standpoint of Utah conditions and requirements, which in some cases are quite the reverse of average conditions in the country as a whole. While no expansion in the acreage of feed crops is recommended, the circular suggests the advisability of producing as much feed per acre as may be consistent with production costs. The various crops are treated from the standpoint of the ultimate agricultural situation. Some expansion in dairying seems warranted. The poultry situation is one of promise and the beef cattle and sheep outlook is favorable.

Circular 71—Weeds

Losses, Agencies in Distribution, Nature, and Control

WILLIAM PETERSON and D. C. TINGEY

A consideration is given in this circular to the weed problem in general. The losses caused by weeds, the reasons for flourishing of weeds, and a classification based on the life period are briefly discussed. In addition to the most common methods of control, rotation and cultivation, the following treatments are recommended: (1) Treating with some chemical, (2) smothering either with a crop or some non-living material, (3) flooding and keeping the weeds covered with water, (4) pasturing, (5) burning, and (6) digging. For those interested in a further knowledge of the subject, a bibliography of some 29 references is included in this publication.
Circular 72—Brooding and Feeding Baby Chicks

BYRON ALDER

Included in this circular is a discussion on the type of brooder stove to use, the proper temperature at which the stove should be maintained (from 95° to 100° F.), the plan of the brooder house, the danger from overcrowding in the brooder, and proper disinfection of the old brooder house. When to feed baby chicks and what to feed them is also included in the publication as well as a general statement in regard to feeding pullets and to fattening cockerels for market.

ABSTRACTS OF SCIENTIFIC AND TECHNICAL PAPERS

Reprint 90. Smut Studies Preliminary to Wheat Breeding for Resistance to Bunt. D. C. Tingeys. In JOUR. AMER. SOC. AGRON., Vol. 19, No. 7 (July, 1927), pp. 655-660. A total of 259 strains of wheat was tested for resistance to bunt or covered smut and for the effect copper carbonate has in its control. These were represented by important local varieties, pure-line selections, and hybrid strains produced at the Station and seven important varieties supposed to be resistant to bunt. Copper carbonate proved highly effective in bunt control. Odessa showed some resistance. Eight spring-sown strains showed no infection, possibly due to chance and not due to resistance. All imported varieties proved immune and have been crossed with local varieties with the hope of producing a resistant variety which is adapted to this section.

Reprint 90. A New Rabbit Brush Aphid from Utah. By George F. Knowlton. In ANNALS AMER. ENTOM. SOC., Vol. 20, No. 2 (June, 1927), pp. 229-231. A new species of aphid is described and used as the type of the new genus here erected. Notes on the life history and a description of the damage to the host plant are given, together with a list of insects found associated with this aphid. Drawings are given to aid in the recognition of this very interesting insect.

1 The supply of scientific and technical reprints is very limited and it is not possible to supply all the requests made.

2 Not received from publisher in time to include in abstract of reprints for period ending July 1, 1927.
Reprint 92. A Few Capitophorus (Aphididae) of Utah with Descriptions of Two New Species. By George F. Knowlton. In CANADIAN ENTOM., Vol. 59, No. 10 (October, 1927), pp. 235-238. Two new species of aphids from rabbit brush are described; figures and life history notes are included for one of these. In addition, a few notes and figures are given on two described forms of the same genus, with notes on their occurrence in Utah.

Reprint 93. Measurement of Physical Characteristics of Soils. By Lynn H. Stauffer. In SOIL SCIENCE, Vol. 24, No. 5 (November, 1927), pp. 375-379. This paper reports methods for measuring some physical characteristics of soil conglomerates in terms of fundamental units. An effort is made to avoid complicated apparatus without loss of accuracy. The characteristics measured are cohesion of wet conglomerates, modulus of rupture in dry conglomerates, and shrinkage in drying. These measurements applied to a series of synthetic soils reveal interesting relations between water content and the characteristics measured.

Reprint 94. Inheritance of Awns in Crossing Sevier and Federation Wheats. By George Stewart. In JOUR. AMER. SOC. AGRON., Vol. 20, No. 2 (February, 1928), pp. 160-170. A pure-line of Federation (awnless wheat) crossed with pure-line No. 59 of Sevier (fully awned wheat) yielded from true-breeding awn types—the two parental forms and two intermediate forms. Another cross between a pure-line of Federation and G149 (a fully awned pure-line hybrid between Sevier x Dicklow) produced the same four true-breeding awn classes. The F₃ plants were classified by their F₃ breeding behavior. In both cases the homozygous intermediate forms were considerably less numerous than the parental forms. Besides the four true breeding classes there were five segregating classes. These nine classes gave P's of 0.57 and 0.89, respectively, for the two crosses when two linked factors for awns with about 35 per cent crossing over was assumed.

Reprint 95. Origin of a Segregate Resistant to Blackstem Rust in a Cross between Two Susceptible Parents. By George Stewart. In AMER. NATURALIST, Vol. 62, (March-April, 1928), pp. 188-191. Several highly rust-resistant pure-line hybrids have been obtained from several crosses involving Sevier wheat. These seemed to arise by recombination. In order to prove this
pure-line hybrids from definitely known parental lines were tested along with their parental lines in the Artificial Rust Nursery at St. Paul, Minnesota. One form arising from the cross Federation x Sevier No. 59 was found to give a highly resistant reaction (25R) when one of the parental lines was fully susceptible (Federation = 100 S) and the other was only slightly resistant (Sevier No. 59 = 75 S. R.). Here is a new way for rust resistance to be obtained.

Reprint 96. Penetration of Ultraviolet Rays through Clothing Materials. By Carrie C. Dozier and Harriet Morgan. In AMER. JOUR. PHYSIOL., Vol. 84, No. 3 (April, 1928), pp. 603-609. Methods of procedure were developed in order to measure biologically the ultraviolet-ray transmissibility of clothing materials. To assure a constant source of ultraviolet light, a Hanovia A. C. air-cooled quartz mercury vapor lamp run at 220 volts and 2.5 amperes was used throughout the experiment. McCollum's line test for rickets was used to detect the potency of the irradiated cottonseed oil. Cottonseed oil irradiated in 44-gram quantities for 5 minutes at a distance of 12 inches was as rachitically potent as oil irradiated 10 minutes, when fed in amounts making up 15 per cent of rachitic diet 3143 and was as efficacious as 3 per cent cod liver oil. The material to be tested was interposed between the light source and the cottonseed oil. Baby flannel, pongee, and crepe de chine filter out and meadow lane and viscose artificial silk transmit the antirachitically potent ultraviolet rays.

Reprint 97. A Streak of Tomatoes Produced by a Disturbing Principle from Apparently Healthy Potatoes in Combination with Tomato Mosaic Virus. By H. L. Blood. In PHYTOPATH., Vol. 18, No. 3 (March, 1928), p. 311. An investigation of the nature of a mosaic disease of the tomato prevalent in the commercial tomato fields of Utah has identified the disease as “streak” of tomatoes. The disease has been shown to be produced by the combination of tomato mosaic and potato mosaic viruses in the infected tomato plant. Evidence indicates that apparently healthy potatoes of certain commercial varieties carry some disturbing principle which, when in combination with tomato mosaic virus, is capable of producing the same set of symptoms as characterize streak. Further investigations are in progress on this problem.

4 Formerly in charge Department of Home Economics, Utah Agricultural Experiment Station.
Reprint 98. **Predisposition of Sugar-beets to Late Rootrot.**
By George Stewart and D. W. Pittman. *In* PHYTOPATH., Vol 18, No. 3 (March, 1928), pp. 263-276. During certain years late rootrot has in epidemic years caused heavy losses in sugar-beets in the intermountain region and other sections. At the Utah Station 35 plats of sugar-beets have been maintained for several years with low, intermediate, and high states of productivity. In two epidemic years the yields of beets varied 4 or 5 tons on the plats of low productivity to 20 to 25 on plats of high productivity. Meanwhile, the percentage of loss due to rootrot varied from 54 to 1.5 per cent. There was such a high percentage of correlation between the state of productivity and the percentage of disease that it was concluded there were strong predisposition effects when the productivity was low.

Reprint 99. **Effect of Delayed Harvesting on Quality of Wheat.** By A. F. Bracken and C. H. Bailey. *In* CEREAL CHEMISTRY, Vol. 5, No. 2 (March, 1928), pp. 128-145. Through the extensive use of the combine harvester-thresher during the last few years in the west the problem of delayed harvesting as affecting the quality of wheat, especially after being wet by storm, has been one of uncertainty and difference of opinion. In an attempt to give some light on this problem an investigation covering the crop seasons of 1925 and 1926 was conducted at the Nephi Experimental Dry-land Station. The conclusion drawn from this study after measuring the titratable acidity, H-ion concentration, diastatic activity, length of epithelial cells, solubility of protein material, and loaf volume (the final criterion on the problem) is that dark hard wheat does not deteriorate in quality upon standing in the field when subjected to alternate wetting and drying up to about 50 days after ripe, in spite of the fact that the grains bleach and lose weight per measured bushel.

Reprint 100. **Replaceable Bases in Some Soils from Arid and Humid Regions.** By M. D. Thomas. *In* SOIL SCIENCE, Vol. 25, No. 5 (May, 1928), pp. 379-391. Eight heavy clay soils collected from widely separated localities, together with a naturally occurring colloidal silicate, were each treated to replace their replaceable bases for a single base. After removing the soluble salt they were then washed by shaking with a measured volume of

5 Associate Agricultural Biochemist in charge Cereal Technology, Minnesota Agricultural Experiment Station.
6 Formerly Associate Soil Chemist.
water filtering in a Pasteur-Chamberland filter until 90 to 95 per cent of the water added was removed. The washing process was repeated several times and the successive filtrate analyzed. The alkali soils were given a preliminary washing to free them of soluble salt. In the leaching of the alkali soils there was a nearly constant solubility of sodium on a high level of concentration as compared with other bases, after removal of soluble salts. The alkali soils contained appreciable amounts of soluble silicates which were not present in the humid soils, had a higher pH value, and showed a marked tendency to hydrolize in washing out the soluble salts.

Reprint 101. Aqueous Vapor Pressure of Soils: III. Soil Structure as Influenced by Mechanical Treatments and Soluble Salts. By M. D. Thomas. In SOIL SCIENCE, Vol. 25, (May, 1928), pp. 409-418. Duplicate samples of Trenton clay, thoroughly washed to remove soluble salts, were brought to a moisture content of 30 per cent by the addition of water or of salt solution containing different amounts of chloride of sodium, calcium, potassium, magnesium, and aluminum, the sulfate of sodium, iron, and aluminum, and finally sodium carbonate. One series was frozen at -18° C. to -22° C., thawed and refrozen several times. The other series was worked with a spatula to simulate a thorough puddling. The materials were then subjected to the static vapor-pressure process. Puddling the clay increased its water-absorbing power at vapor pressures above 85 per cent; freezing had the opposite effect. The chlorides of sodium, magnesium, calcium, and aluminum modified the water-absorbing power of the soil by an amount which could be calculated on the assumption that the salt was entirely in solution and did not exert an influence on the soil. Evidence is presented to show that the sulfates, carbonates, and the potassium chloride reacted with the replaceable bases in the soil.

Reprint 102. Aqueous Vapor Pressure of Soils: IV. Influence of Replaceable Bases. By M. D. Thomas. In SOIL SCIENCE, Vol. 25, No. 6 (June, 1928), pp. 485-493. A group of soils from widely different localities, together with a natural-occurring colloidal mineral, were treated to exchange their bases for a single replaceable base; the vapor-pressure moisture relationship was determined after the removal of the excess soluble salts. In dry soils, the potassium-treated mineral has the least and the calcium-treated mineral the greatest water-absorbing power; however, this
function is greatest for the sodium-saturated material in the wet soils. Since the vapor-pressure moisture relations of the colloidal mineral and moist soils are similar, it is suggested that this mineral, or other similar ones, may be present in soils. The existence of hydrates in sodium-treated colloidal mineral is established and the influence of these hydrates on the slope of the curve is pointed out.

Reprint 103. Replaceable Bases and the Dispersion of Soil in Mechanical Analysis. By M. D. Thomas. In SOIL SCIENCE, Vol. 25, No. 6 (June, 1928), pp. 419-427. A number of soils from widely scattered localities, together with the colloidal material, were subjected to the mechanical analysis process with and without sodium carbonate as a deflocculating agent. All samples had been treated with neutral salts of 0.05 N HCl to exchange their replaceable bases for a single base. The sodium-saturated soil in most cases was the most completely dispersed, the deflocculating agent either not affecting or decreasing the dispersion. The dispersion of the calcium-saturated sample was increased by the deflocculating agent, but the reverse was true for the magnesium-treated mineral. A preliminary treatment of dilute hydrochloric acid followed by leaching and subsequent treatment with sodium carbonate gave dispersion equal to the sodium-saturated treatment.

Reprint 104. Transgressive and Normal Segregations in a Cross of Marquis x Federation Wheat. By George Stewart and D. C. Tingey. In JOUR. AMER. SOC. AGRON., Vol 20, No. 6 (June, 1928), pp. 620-624. Two awnless parents, Marquis and Federation wheats, when crossed yielded in F3 about 25 per cent of the progenies which were true breeding for awns of about half length. Color of chaff, color of grain, and the dwarfing character behaved in what seemed to be normal behavior. The F ratios as tested in F3 were 3:1 for bronze and white glumes, 15:1 for red and white grain, and 13:3 for tall and dwarf plants.

Reprint 105. Seasonal Behavior of Alfalfa Flowers as Related to Seed Production. By John W. Carlson. In JOUR. AMER. SOC. AGRON., Vol. 20, No. 6 (June, 1928), pp. 542-556. From a study of 2042 racemes, 82.1 per cent possessed pods with mature seeds at harvest time. Of a total of 27,059 alfalfa flowers allowed to develop naturally, 43.2 per cent formed pods. When the flowers were tripped by artificial means, 63.9 per cent formed pods as against 37 per cent of an approximately equal number
allowed to develop naturally. In general, it was found that when alfalfa flowers on the average are from one to three days in the full bloom stage and from two to five days in the wilted stage, the chances are greatest that they will form seed pods.

Reprint 106. **Three New Aphids from Utah.** By George F. Knowlton. *In PAN - PACIFIC ENTOM.,* Vol. 4, No. 4 (April, 1928), pp. 169-172. Two new species occurring on rabbit brush are described, and notes on a number of other forms belonging to the tribe *Macrosiphini* are given. Notes on the distribution and damage of forms attacking economic plants are included.

**LIST OF AVAILABLE PUBLICATIONS**

**BULLETINS**

121-Soil of Southern Experiment Station.
122-Nature of the Dry Farm Soil in Utah.
123-Fruit Variety Test on Southern Experiment Farm.
125-Chemical Milling and Baking Value of Utah Wheats.
128-Blooming Periods and Yields of Fruit in Relation to Minimum Temperatures.
131-Variety Tests of Field Crops in Utah (1914).
132-Minor Dry-land Crops at Nephi Experiment Farm.
133-Irrigation and Manuring Studies, Pt. 1.
134-Nitric Nitrogen Content of Country Rock.
137-Quality of Home-grown Wheat vs. Imported Wheat.
139-Movement of Soluble Salts with Soil Moisture.
140-Summer Pruning of a Young Bearing Apple Orchard.
141-Variation in Minimum Temperatures due to Topography of a Mountain Valley in Relation to Fruit-growing.
144-Water Table Variations.
145-Soil Alkali Studies.
147-Alkali Content of Irrigation Waters.
150-Further Studies on Nitric Nitrogen Content of Country Rock.
151-Freezing of Fruit Buds.
152-Effect of Soil Moisture on Certain Factors in Wheat Production.
158-Soil Moisture Studies under Dry-farming.
159-Soil Moisture Studies under Irrigation.
160-Important Factors in Operation of Irrigated Farms.
161-Orchard Heating.
163-Composition of Irrigation Waters in Utah.
165-Labor Cost and Seasonable Distribution of Labor in Irrigated Crops.
167-Irrigation of Oats.
169-Use of Alkali Water for Irrigation.
173-Duty of Water in Cache Valley, Utah.
178-Irrigation of Barley.
181-Duty-of-Water Investigations on Coal Creek, Utah.
183-Water-holding Capacity of Irrigated Soils.
184-Farm Management Study of Great Salt Lake Valley.
185-Influence of Nitrogen in Soil on Azofication (Technical).
186-Irrigation Experiments in Sugar-beets.
187-Irrigation Experiments in Potatoes.
188-Maintaining the Productivity of the Soil.
189-Ridding the Land of Wild Morning Glory.
190-Corn Silage in the Dairy Ration.
191-Oedipodinae of Utah (Technical).
193-Cache County Water Conservation District No. 1.
194-The Influence of Storage on the Composition of Flour (Technical).
195—Field Studies of Sugar-beet Nematode.
196—Fruit Tree Leaf Roller.
197—The Pear Leaf Blister Mite as an Apple Pest.
198—Report of Director (for 18-month Period from Jan. 1, 1925 to June 30, 1926).
199—Mutual Irrigation Companies in Utah.
200—Maintaining Potato Yields by Hill Selection.
201—Economic Insects in Some Streams of Northern Utah.
202—Some Observations on Winter Injury in Utah Peach Orchards.
203—Cattle Ranching in Utah.
204—Sheep Ranching in Utah.
205—The Beet Leaf Hopper in Utah.
206—Treehopper Injury in Utah Orchards.
207—The Physical Curd Character of Milk and Its Relationship to the Digestibility and Food Value of Milk for Infants.

CIRCULARS
8—Varieties of Fruit Recommended for Utah.
12—Thinning Apples.
13—Fruit for Exhibition.
17—Number and Distribution Licensed Stallions and Jacks, 1913.
18—Better Horses for Utah.
19—Licensed Stallions in Utah, 1915.
21—Dry-farming in Utah.
22—Some Sources of Potassium.
23—Seed Situation in Utah (1916).
24—Licensed Stallions in Utah, 1916.
26—Storing Vegetables for Winter.
27—Licensed Stallions in Utah, 1917.
28—Contagious Abortion in Mares and Cows.
29—Control of Rodent Pests.
30—Codling Moth.
31—Alfalfa Weevil.
34—Sugar-beet Production in Utah.
35—Licensed Stallions in Utah, 1918.
39—A Day at the Utah Agr. Exp. Station (contains complete List of Publications from 1890-1918, inclusive).
41—Soil Alkali.
44—Agriculture in Utah.
48—Rural Credits in Utah.
49—This Public Domain of Ours.
51—Foot-and-Mouth Disease.
54—The More Important Insects Injurious to the Sugar-beet in Utah.
57—Economy in Harvesting Sugar-beets.
58—Potato Production in Utah (Revision of Circular 40 now out of print).
59—Control of Stinking Smut of Wheat with Copper Carbonate.
60—Seed-Potato Treatment.
61—Rules and Regulations for Third Utah Intermountain Egg-laying Contest.
63—Tomato Culture in Utah.
64—Onion Growing in Utah.
65—The Beet Leafhopper and Curly-top Situation in Utah.
66—Physical Curd Character of Milk and Its Probable Relation to Infant Nutrition.
68—Summary of Publications (from September 1926-July 1927).
69—Clean Milk and Its Production.
70—The Agricultural Outlook for Utah, 1928.
71—Weeds.
72—Brooding and Feeding Baby Chicks.
73—Summary of Publications (July 1, 1927 to June 30, 1928).

Blanche Condit-Pittman,
In Charge, Division of Publications.

(College Series No. 255)