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D. C. TINGEY and R. W. WOODWARD

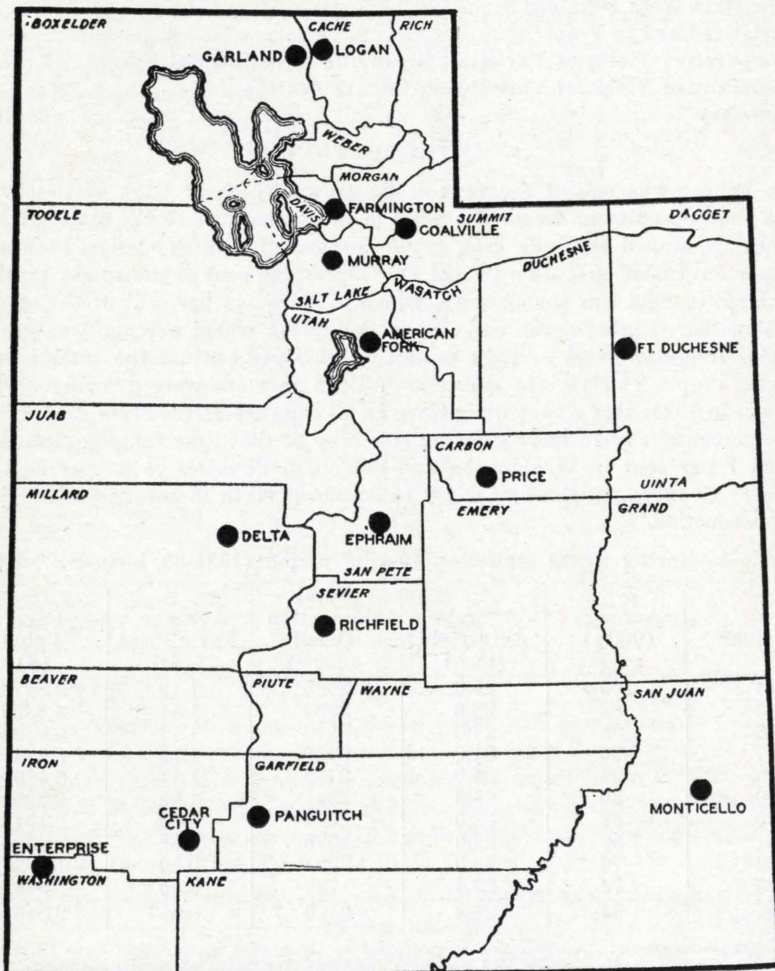


Figure 1.—Map of Utah, showing location of spring wheat tests.

(In Cooperation with the Division of Cereal Crops and Diseases, Bureau of Plant Industry, United States Department of Agriculture)

UTAH AGRICULTURAL EXPERIMENT STATION
 UTAH STATE AGRICULTURAL COLLEGE
 Logan, Utah

Comparative Yields of Spring Wheat Varieties¹

D. C. TINGEY and R. W. WOODWARD²

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INTRODUCTION

Wheat was one of the first crops grown by early Utah settlers.³ It has since occupied an important place in the agriculture of the state. While wheat is almost the only crop grown successfully on dry-lands, it is also important under irrigation (Table 1). Thirty per cent of the wheat acreage of Utah in 1929 was spring-sown, which produced 44 per cent of the state's production. Eighty-seven per cent of the spring wheat acreage was grown under irrigation, this acreage producing 92.3 per cent of the total spring wheat crop. Thirty-eight per cent of Utah farmers were growing spring wheat in 1929; this wheat was grown in all counties of the state except one, the percentage of farmers growing this crop at that time ranging from less than 1 per cent in Washington and San Juan Counties to 64 per cent in Emery County; yet Emery County ranks about sixth in acreage and eighth in production.⁴

Table 1—Spring wheat statistics, 10-year period (1924-33, inclusive), Utah

Year	Acreage (000's)	Average Acre-yield (bus.)	Total Production (bus.) (000's)	Average Farm Price (\$)	Farm Value (\$)
1924	105	25.0	2625	1.10	2,887,500
1925	88	33.0	2904	1.51	4,385,040
1926	88	27.0	2376	1.17	2,779,920
1927	90	31.0	2790	1.12	3,124,800
1928	95	33.0	3135	1.11	3,479,850
1929	80	29.3	2344	1.02	2,390,880
1930	82	32.0	2624	0.82	2,151,680
1931	63	25.0	1575	0.56	882,000
1932	76	29.0	2204	0.50	1,102,000
1933	74	23.4	1729	0.56	968,240
Average	84	28.8	2430	0.95	2,415,191

Acknowledgment: Appreciation is expressed to those who in any way have helped to make this investigation possible and a success from the standpoint of results obtained. This includes all substation superintendents, various county agricultural agents, local growers, and Station staff members. The seed of different varieties and strains of wheat used, as well as the history of these varieties and strains, was furnished by the Division of Cereal Crops and Diseases, Bureau of Plant Industry, U. S. Department of Agriculture.

¹Contribution from Department of Agronomy, Utah Agricultural Experiment Station.

²Assistant Agronomist, Utah Agricultural Experiment Station, and Junior Agronomist, Division of Cereal Crops and Diseases, Bureau of Plant Industry, U. S. Department of Agriculture, respectively.

³Bancroft's "History of Utah".

⁴United States Census Report, 1930.

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Leading counties in spring wheat production are Utah, Cache, Boxelder, Sanpete, Salt Lake, Sevier, Weber, Emery, and Duchesne. Annual production by these counties ranges from 425,000 to approximately 100,000 bushels, (Table 2).

Table 2—Spring wheat statistics for Utah, by counties, 1929

County	Acreeage	Production (bus.)	Percentage of Farmers Growing Spring Wheat	Average Farm Acreeage
Beaver	665	15,199	30.4	5.5
Boxelder	9,079	260,735	38.9	11.8
Cache	10,548	283,030	44.1	10.1
Carbon	804	20,758	45.3	6.2
Daggett	184	5,759	48.1	7.4
Davis	1,754	56,179	22.6	5.3
Duchesne	4,097	99,789	53.8	7.3
Emery	4,576	106,124	64.9	9.3
Garfield	559	12,552	20.8	5.2
Grand	None	None	None	None
Iron	459	11,519	15.1	5.1
Juab	333	8,275	11.7	5.7
Kane	47	1,061	5.0	4.7
Millard	1,239	29,505	16.4	6.1
Morgan	1,226	34,414	58.3	8.5
Piute	915	23,881	55.0	7.3
Rich	1,222	21,491	20.5	21.8
Salt Lake	6,993	233,148	35.9	6.6
San Juan	94	1,858	0.01	15.7
Sanpete	7,817	227,108	52.7	8.7
Sevier	4,682	105,761	63.2	7.1
Summit	674	19,356	28.7	4.6
Tooele	549	9,990	12.9	9.8
Uintah	2,982	79,654	42.8	6.5
Utah	11,709	428,788	48.8	6.8
Wasatch	1,274	44,155	52.7	5.4
Washington	351	6,764	0.1	5.4
Wayne	983	22,935	54.7	7.0
Weber	4,565	114,908	36.7	7.0
Avg. for State....	80,380	2,344,196	38.1	7.8

The demand for wheat as a bread grain has usually made this crop slightly more profitable and a better cash crop than the other small grains. It has been traditional in Utah to grow a little wheat to provide the family with flour as well as a precaution against food shortage. These factors, together with the ease of growing and handling the crop, accounts for its popularity by many Utah farmers.

CLIMATIC CONDITIONS OF AREAS WHERE FIELD TESTS WERE CONDUCTED

Because of the wide range of climatic conditions in Utah, it seemed desirable to determine the relative yielding ability of Dicklow and Federation wheats and to compare them with new spring wheats of hybrid origin. This wide range in climatic conditions in Utah is partly associated with differences in elevation. In areas where tests were conducted, the elevation ranged from 4400 feet (Salt Lake County) to 7000 feet (San Juan County). The frost-free period ranges from 65 to 143 days. Elevation, however, is not a satisfactory index of the length of frost-free period of a given area, as is shown in Table 3. The mean monthly temperature for the growing season

(April to September, inclusive) ranges from 56.1° F. (Garfield County) to 64.2° F. (Utah County).

Table 3—Location, elevation, frost-free period, and mean temperature of growing season where cereal tests were conducted

County	Locality	Elevation (ft.)	No. Frost-free Days	Mean Temp. of Growing Season (Apr. to Sept., incl.)
Salt Lake	West Murray	4400	127	64.0
Utah	American Fork	4700	132	64.2
Carbon	Price	5500	126	61.6
Boxelder	Garland	4500	129	63.9
Uintah	Ft. Duchesne	4900	131	61.0
Iron	Cedar City	5900	121	63.2
Davis	Farmington	4500	143	63.0
Sevier	Richfield	5400	109	60.8
Washington	Enterprise	5400	.....¹	.....¹
Millard	Delta	4500	118	62.3
Sanpete	Ephraim	5600	116	59.8
Cache	Logan	4500	142	61.7
Garfield	Panguitch	6700	87	56.1
Summit	Coalville	6500	65	56.1
San Juan	Monticello	7000	127	57.4

¹Data not available.

HOW DATA WERE OBTAINED

At the Greenville Experimental Farm in North Logan a comprehensive cereal breeding and testing project is being maintained. Here new strains are produced by hybridization and selection; promising varieties from other states are also tested. From these studies, six of the most promising wheat varieties or strains were selected for tests to be made in various agricultural sections of the state, where yield tests were conducted during 1931, 1932, and 1933. Each variety or strain was grown in from four to six plots. Each plot consisted of three rows 1 foot apart and 17 feet long. Seed was sown at the rate of 120 pounds to the acre. At harvest, the heads of grain from the central row of each three-row plot were cut and later threshed in a small nursery thresher.

VARIETIES USED IN TESTS

Two of the six strains tested, Dicklow and Federation, are the standard varieties grown in the state. Baart is grown only to a limited extent, except in one or two sections. The other strains were produced at the Utah Agricultural Experiment Station.

Dicklow.—This wheat was developed by selection and its uniformity indicates that it is a pureline, or nearly so. The origin of this strain of wheat, according to Clark et al.⁵, has been recorded by Aicher as follows:

"Mr. James Holly, of Utah County, Utah, obtained some California Club wheat from northern California and seeded it on his farm. Excellent results were obtained and he called the attention of his neighbor, Mr. Richard Low, to his new wheat. Mr. Low obtained some and grew it. He noticed that the wheat contained different types and proceeded to select the type which he liked best. He grew this selection for several years and the neighbors soon began clamoring for 'Dick' Low's wheat. As the wheat became spread over the section of Utah, it lost its personal connection with 'Dick' and became known simply as 'Dicklow' wheat."

⁵"Classification of American Wheat Varieties". By J. A. Clark, J. H. Martin, and C. R. Ball. U. S. D. A. Dept. Bul. 1074: 68. 1922.

Federation.—According to Richardson⁶, this variety was produced by the late William Farrer, wheat experimentalist of New South Wales (Australia) from a cross between Purplestraw and Yandilla. Yandilla is a cross between Improved Fife and Etawah, an Indian variety. The production of this wheat was probably the greatest of Farrer's many triumphs in wheat-breeding, for none of his many successful crossbred wheats has enjoyed such a wide measure of popularity as has Federation.

Federation was first introduced into the United States in 1914 by the United States Department of Agriculture from seed furnished by E. A. Cook, of Perth, West Australia. The variety first showed promise in 1916 in nursery experiments at the Sherman County Branch Station, Moro, Oregon, where it was increased and thoroughly tested. The first distribution to farmers for commercial growing was in the spring of 1920.

Baart.—Baart' with four other varieties from Australia, was received in 1900 by the United States Department of Agriculture. The commercial distribution of the variety in this country certainly is the result of this introduction. In Australia it has never been a leading commercial variety, although it has been grown by some farmers for many years. In recent introductions of wheat from South Africa, varieties have been obtained which are identical with Baart. The name "Baart" is the Dutch name for "bearded". It seems probable that this variety was introduced to Australia from the Orange River Colony or from the Transvaal in South Africa and that it was originally of European origin.

Baart was probably first distributed for commercial growing by the Arizona Agricultural Experiment Station, which obtained its original seed from the Division of Cereal Crops and Diseases, Bureau of Plant Industry, U. S. Department of Agriculture. The variety was well established in Arizona by 1914. It was first grown in Washington in 1914 and later spread to Oregon, Idaho, and California.

01-24.—Strain 01-24 is a short-strawed erect growing variety which seldom lodges. It was a selection either out of a Dicklow x Federation cross or a Dicklow x C.I. 4722 cross. C.I. 4722 is an Australian wheat. Available data and characteristics of the variety itself seem to indicate that strain 01-24 is probably out of the latter cross.

Q-80 and Q-227.—The two strains, Q-80 and Q-227, were selections from a Dicklow x Hard Federation cross, a cross which has been the source of some unusually promising spring wheats for irrigated sections. The high yield of Dicklow apparently has been combined with the strong straw and good-quality characteristics of Hard Federation. Some additional selections shown in Table 8 have similar origin.

COMPARATIVE YIELDS OF VARIETIES AT THE GREENVILLE EXPERIMENTAL FARM

Table 4 shows comparative acre-yields of the varieties grown under irrigation at Greenville over a nine-year period for the different strains used in the uniform tests. It is apparent that differences in yield are insignificant. Baart, while not in the nine-year test, on an average has yielded less than any

⁶Ibid: 103
⁷Ibid: 131.

of the other varieties. A lower yield for this variety was also obtained in the county tests, as indicated in Table 5.

Table 4—Comparative acre-yields of different strains and varieties grown at Greenville Experimental Farm, 1926-34, inclusive

Variety	Acre-yield (by years)									Average	
	1926	1927	1928	1929	1930	1931	1932	1933	1934	1926-34	1931-34
Dicklow	55.0	67.8	52.2	45.6	61.3	39.3	54.1	61.5	73.1	56.7	57.0
Federation	52.4	64.1	52.3	47.1	60.6	49.9	56.5	50.9	80.1	57.1	59.3
Q-80	60.2	73.3	56.6	45.1	68.4	43.3	50.4	59.5	79.0	59.5	58.0
Q-227	64.5	69.4	59.1	48.1	74.3	43.4	61.9	59.0	.....	60.0 ¹	.....
01-24	63.1	70.5	54.8	49.7	62.5	43.8	58.9	63.8	68.2	59.5	58.7
Baart	.....²	.....	.....	.....	.....	45.3	42.8	63.8	70.6	.....	55.6

¹Average for 1926 to 1933.

²Data not available.

Dicklow and Federation are about equal in yield, although during some seasons one variety outyields the other. This may be due partly, or wholly, to variations in soil on which they were tested; or it may be due in part to seasonal effects. Seasonal difference in yield of the two varieties has no doubt led some farmers to believe that Federation is a high yielder, while others believe the reverse to be true.

These yields on Federation and Dicklow are interesting in view of the fact that at present they are the two leading spring wheat varieties grown. The nine-year average of the three strains of hybrid origin, Q-80, Q-227, and 01-24, has been slightly higher than for either Dicklow or Federation.

COMPARATIVE YIELDS OF VARIETIES IN COUNTY TESTS

Comparative acre-yields in bushels for the varieties and strains grown in tests in the different areas are shown in Tables 5 and 6. At the bottom of each section is shown the bushels by which two varieties must differ in order to give what is considered a significant difference. All tests except those in San Juan County were grown under irrigation.

Considering the different localities and years, a total of 28 tests is represented. Federation was the highest yielder in five of these 28 tests and second highest yielder in seven; Dicklow was highest in six and second highest in seven; Q-80 was highest in eight and second highest in four; Q-227 was highest in three and second highest in eight. Baart, on the other hand, was highest in only one test and in no case was it second highest. In several counties two varieties tied for first and each was considered first. This accounts for the number of firsts totaling more than twenty-eight. This was also true with

the number yielding second highest. There appears to be little difference in the average yields from the twenty-eight tests of Dicklow, Federation, 01-24, Q-80, and Q-227, there being only a difference of 1 bushel in any case (Table 7).

Table 5—Comparative acre-yields (bushels) of wheat varieties in county tests

Variety	1931	1932	1933	3-year Average
CACHE—Greenville Experimental Farm				
01-24 (Fed. x Dick.).....	43.8	58.9	63.8	55.5
Q-80 (H. Fed. x Dick.)	43.3	50.4	69.8	54.5
Baart .....	.....¹	42.8	63.4	53.1 ²
Federation	49.9	56.5	50.9	52.4
Dicklow	39.3	54.1	61.8	51.7
Q-227 (H. Fed. x Dick.).....	43.8	52.0	59.0	51.6
Average	44.0	52.5	61.6	52.7
Sig. Difference ³	7.3	10.2	9.2	5.6 ⁴

CARBON—Experimental Farm, Price

Q-80 (H. Fed. x Dick.)	49.6	65.2	55.8	56.9
01-24 (Fed. x Dick.).....	49.6	68.6	51.6	56.6
Dicklow	41.9	69.6	51.1	54.2
Baart .....	.....¹	55.1	49.8	52.5 ²
Federation	39.1	62.7	55.1	52.3
Q-227 (H. Fed. x Dick.)	43.8	65.6	43.8	51.5
Average	44.8	64.5	51.2	53.5
Sig. Difference ³	10.4	14.2	9.6	6.4 ⁴

SALT LAKE—G. Kasworm, Murray

Q-227 (H. Fed. x Dick.)	80.7	68.3	58.4	69.1
01-24 (Fed. x Dick.)	74.2	72.3	58.0	68.2
Dicklow	78.3	65.5	54.9	66.2
Q-80 (H. Fed. x Dick.).....	73.7	64.6	60.0	66.1
Federation	72.8	64.3	56.3	64.5
Baart .....	.....¹	61.1	63.8	62.5 ²
Average	75.9	66.0	58.6	66.8
Sig. Difference ³	5.6	6.7	7.3	3.6 ⁴

UINTAH—Experimental Farm, Ft. Duchesne

Dicklow	82.0	86.9	90.7	86.5
Q-80 (H. Fed. x Dick.).....	80.6	88.4	83.4	84.1
Q-227 (H. Fed. x Dick.).....	80.9	80.2	90.2	83.8
Baart .....	.....¹	80.5	79.7	80.0 ²
Federation	77.8	81.1	81.5	80.1
01-24 (Fed. x Dick.).....	79.7	79.6	78.5	79.3
Average	80.2	82.8	84.0	82.3
Sig. Difference ³	9.0	7.1	9.8	4.8 ⁴

¹Baart not grown in 1931.

²Average not comparable to others, as Baart was not included for all years.

³Two varieties should differ by this amount to be significant. This gives odds of about 20:1 that the one is a higher yielder than the other.

⁴Average obtained by using a weighted error variance. From this the significant difference was calculated in the usual ways, with proper allowance for the total number of replications.

Variety	1931	1932	1933	3-year Average
BOXELDER—R. Richards, Riverside				
Federation	85.6	.....¹	66.9	76.3
Q-227 (H. Fed. x Dick.).....	83.9	.....	68.1	76.0
Q-80 (H. Fed. x Dick.)	76.5	.....	72.3	74.4
01-24 (Fed. x Dick.)	73.9	.....	64.5	69.2
Baart .....	.....¹	.....	64.8	64.8 ²
Dicklow	73.9	.....	53.3	63.6
Average	78.8	.....	65.0	71.9
Sig. Difference ³	8.3	.....	10.8	6.6 ⁴

GARFIELD—Experimental Farm, Panguitch

Federation .....	.....¹	62.8	85.1	74.0
01-24 (Fed. x Dick.).....	.....	62.1	83.9	73.0
Dicklow .....	.....	66.4	77.1	71.8
Q-80 (H. Fed. x Dick.).....	.....	58.9	83.9	71.4
Q-227 (H. Fed. x Dick.).....	.....	52.9	71.7	62.3
Baart .....	.....	49.8	66.0	57.9
Average .....	.....	58.8	78.0	68.4
Sig. Difference ³ .....	.....	8.1	10.4	6.4 ⁴

MILLARD—Experimental Farm, Delta

Federation .....	.....¹	55.4	48.6	52.0
01-24 (Fed. x Dick.).....	.....	60.7	41.7	51.2
Q-80 (H. Fed. x Dick.).....	.....	52.0	40.2	46.1
Baart .....	.....	51.4	39.4	45.4
Dicklow .....	.....	47.3	40.5	43.9
Q-227 (H. Fed. x Dick.).....	.....	51.5	34.7	43.1
Average .....	.....	53.1	40.9	47.0
Sig. Difference ³ .....	.....	11.1	10.4	7.2 ⁴

SANPETE—Experimental Farm, Ephraim

Dicklow .....	.....¹	77.1	79.3	78.2
Q-80 (H. Fed. x Dick.).....	.....	70.2	64.9	67.6
Federation .....	.....	68.0	59.5	63.8
Q-277 (H. Fed. x Dick.).....	.....	64.3	61.8	63.1
01-24 (Fed. x Dick.).....	.....	60.5	64.4	62.5
Baart .....	.....	59.2	46.2	52.7
Average .....	.....	66.6	62.7	64.7
Sig. Difference ³ .....	.....	9.4	4.8	5.0 ⁴

UTAH—State Training School, American Fork

Federation	45.8	44.3	.....¹	45.1
01-24 (Fed. x Dick.).....	48.1	41.0	.....	44.6
Q-277 (H. Fed. x Dick.).....	45.7	40.1	.....	42.9
Dicklow	42.0	42.1	.....	42.1
Q-80 (H. Fed. x Dick.).....	35.1	40.9	.....	38.0
Baart .....	.....¹	37.1	.....	37.1 ²
Average	43.3	40.9	.....	42.1
Sig. Difference ³	9.0	5.8	.....	4.4 ⁴

Table 6—Comparative acre-yields (bushels) in county tests

Variety	Acre-yield (bus.) by County and Year ¹						Avg.
	Davis 1931	Sevier 1931	San Juan ² 1932	Summit 1933	Iron 1933	Wash- ington 1933	
Q-227 (Hard Fed. x Dick.)	52.5	67.8	17.8	37.5	58.7	24.0	43.0
Q-80 (Hard Fed. x Dick.)	53.5	58.8	20.0	33.8	66.9	23.7	42.8
01-24 (Fed. x Dick.)	44.5	60.9	17.8	36.5	59.0	27.2	41.0
Dicklow	49.4	55.7	19.7	31.5	64.4	25.0	41.0
Federation	40.3	59.5	19.9	36.5	55.0	23.7	39.2
Baart	.....	.....	16.9	30.7	59.2	23.2	32.5 ³
Average	48.0	60.5	18.7	34.4	60.5	24.5	43.1
Sig. Diff. ⁴	7.1	12.1	2.9	6.9	7.3	9.2	.....

¹See Table 3 for location.

²Grown on dry land.

³Average not comparable, as Baart was not grown in all counties.

⁴See Footnote 2, Table 5.

Baart has yielded an average of from 6 to 7 bushels, or 8 to 11 per cent, less to the acre than any of the other varieties or strains (Table 7).

A study of varietal yields by counties shows a pronounced differential response of varieties to different sections. Dicklow seems especially well adapted on the farms where tested in Sanpete and Uintah as compared with Federation. However, the latter appears to do much better in the Boxelder and Millard County tests. In the remaining sections there seems to be little difference in the yields of the two varieties. The three strains of hybrid origin, 01-24, Q-80 and Q-227, apparently possess as wide a range of adaptation as either Dicklow or Federation. In yield, Baart seems to be inferior to any of the others.

In 1934, a number of new strains were added to the county tests and some of those previously tested were eliminated. Because of the severe water shortage of 1934, some of the nurseries failed completely. Those on which data were obtained are shown in Table 8. Considerable bird injury resulted in the test in Boxelder County, which partially accounts for the extremely high yield obtained with Federation 47; this strain was later in maturing and was injured to a less degree.

Table 7—Average and relative acre-yield (bushels) for the period of time the tests have been conducted in each county

County and Location	Acre-yield (bus.) by Variety						Average Acre-yield (bus.) by County
	Federation	Dicklow	Baart	01-24	Hard Federation x Dicklow		
					Q-80	Q-227	
Three-year Average							
Cache: Experimental Farm, Greenville	52	52	53	56	55	52	53
Salt Lake: G. Kasworm, Murray.....	65	66	63	68	66	69	66
Carbon: Experimental Farm, Price	52	54	53	57	57	51	54
Uintah: Experimental Farm, Ft. Duchesne.....	80	87	80	79	84	84	82
Two-Year Average							
Utah: State Training School, American Fork.....	45	42	37	45	38	43	42
Boxelder: R. Richards, Riverside	76	64	65	69	74	75	71
Millard: Experimental Farm, Delta	52	44	45	51	46	43	47
Sanpete: Experimental Farm, Ephraim.....	64	78	53	63	68	63	65
Garfield: Experimental Farm, Panguitch.....	74	72	58	73	71	62	58
One-year Average							
Iron: Roice Nelson, Cedar City	47	55	45	49	63	49	50
Davis: Experimental Farm, Farmington.....	40	49	....	45	54	52	48
Sevier: Richfield	60	56	....	50	59	68	59
Washington: Seth M. Jones, Enterprise.....	24	25	23	27	24	24	25
Summit: Coalville	37	32	31	37	34	38	35
San Juan: Experimental Farm, Monticello.....	20	20	17	18	20	18	19
Variety Average (bus. per acre).....	57	58	51	58	58	57	....
Relative Average Yield (% of Federation)..... (In same tests and years)	100	102	92	103	103	100	....

Table 8—Comparative acre-yields of wheat varieties and strains in county tests, 1934

Variety	C.I. No.	Acre-yield (bus.) by County					State Avg.
		Cache	Uintah	Boxelder	Salt Lake	Sevier	
39a-337 (Hard Federation x Dicklow 3) ¹	11,623	80.8	65.1	36.7 ²	56.2	80.2	63.8
Q-80 (Hard Federation x Dicklow).....	11,429	79.0	69.7	46.5	60.7	82.1	67.6
Q-227-6 (Hard Federation x Dicklow) ³		76.4	65.0	53.5	62.3	79.9	67.4
Federation 47	11,619	83.5	72.0	72.3	60.5	88.7	75.4
Q-231-49 (Hard Federation x Dicklow) ³	11,544	78.6	58.8	52.8	62.6	82.4	67.0
Dicklow		73.1	59.6	34.9	60.4	72.9	60.2
39a-274 (Hard Federation x Dicklow 3) ¹	11,622	79.3	68.0	44.6	60.3	88.8	68.2
Q-231-45 (Hard Federation x Dicklow) ³	11,621	82.2	63.3	62.6	63.9	87.1	71.8
Federation 7	11,618	86.6	62.5	42.3	59.2	63.2	62.8
County Average		79.9	64.9	49.6	60.7	80.6	67.1

¹Selections from Hard Federation x Dicklow 3.

²Considerable bird injury on the earlier maturing varieties.

³Of the same origin as Q-80 and Q-227. (See description, page 6.)

SUMMARY

Data from the Greenville Experimental Farm are presented, showing comparative acre-yields for a nine-year period for two standard varieties, Dicklow and Federation, and for four strains of hybrid origin. Similar yield data are shown for the same varieties and strains from tests conducted in various counties during the three-year period of 1931-33. In 1934, some additional selections of hybrid origin were grown in various parts of the state and tested for yield, together with the Dicklow and Federation varieties.

From data obtained it was evident that Dicklow and Federation were about equal in yield, on an average, for all the sections where tests were conducted. Study of varietal yields by counties shows a pronounced differential response of varieties to different sections. Dicklow gave higher yields than Federation on farms where tested in Sanpete and Uintah Counties, whereas Federation appeared to do much better in Boxelder and Millard County tests. In all other sections there appeared to be no difference in yields of the two varieties. Some of the strains of hybrid origin yielded as high as either Dicklow or Federation; in addition, they appeared superior in straw strength, uniformity, and quality. One of the best of these is being increased for commercial distribution.