Milling, Baking, and Chemical Properties of Marquis and Kanred Wheat Grown in Colorado and Stored 19 to 27 Years

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The quality characteristics of various lots of Marquis and Kanred wheat varieties grown in Colorado and stored for different periods of years were reported in 1938 (4) after 9 to 17 years' storage and again in 1943 (2) after 14 to 22 years' storage. Portions of these lots of wheat have been continuously under storage and were sampled again in the spring of 1948 (after 19 to 27 years' storage) for milling, baking, chemical, and germination tests. A sample of Marquis grown at Fort Collins, Colo., in 1948 was included in the tests for comparative purposes. Thiamine assays were also made of the 1948 samples.

**SOURCES OF SAMPLES**

The wheats studied were grown on experimental plots at the Colorado Agricultural Experiment Station, and were stored in cloth bags in a dry, unheated room at Fort Collins, Colo., for periods varying from 19 to 27 years as reported by Robertson, et al. (4). The samples consisted of the variety Marquis from each 9 crop years from 1921 to 1927, inclusive, and of the 1929 and 1948 crops; and the variety Kanred from each of the 3 crop years, 1921, 1924, and 1929. In the later years of storage there was considerable damage to the grain by the dermestid beetle, *Trogoderma tarsale*. The grain was cleaned at least once every 2 years with a fanning mill to remove damaged kernels, and the storage room was sprayed with ethylene dichloride-carbon tetrachloride mixture after each cleaning to control insect pests.

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**METHODS**

Milling and baking experiments were conducted in the laboratories of the Grain Branch, Production and Marketing Administration, Beltsville, Md. The tempered wheats were ground on an Allis-Chalmers experimental mill provided with three pairs of break rolls and one pair of smooth rolls. None of the lots required special tempering treatment or unusual milling technic for the production of patent flours on an Allis-Chalmers experimental mill. Chemical tests (moisture, ash, protein and fat acidity) were made according to accepted and approved methods of the American Association of Cereal Chemists.

The bread-baking tests by the straight-dough method were made by a formula using 100 grams of flour, 2.0 grams of yeast, 1.5 grams of salt, 5.0 grams sugar, 3.0 grams of shortening, 4.0 grams of nonfat dry milk solids, and different amounts (0 to 1 mg) of potassium bromate. The ingredients of the bread were mixed for a sufficient length of time to develop the gluten and then baked for 3 hours at 86°F (30°C), panned and proofed for 55 minutes at 86°F (30°C), then baked for 25 minutes. Loaf volumes and other data were averaged for the two loaves. The milling, baking, and chemical tests made in 1943 on these samples were conducted by the same methods as those used in 1938. Any changes occurring in either of the last storage periods in the properties of the wheats are, most likely due to storage and not to differences in testing.

**EXPERIMENTAL RESULTS**

The milling and baking results obtained in 1938 and 1948 are shown in table 1. The thiamine contents of the samples drawn in 1948 are shown in table 2, and the germination data in table 3. The latter table includes the percentage of germination for each lot 6 months after harvest and at the end of various periods of storage.

The test weights of the grain were slightly but consistently lower for the samples taken in 1948 than in either 1938 and 1943 except for the 1924 Marquis content of the grain was highest in 1943, but accounts, in part, for the differences in the test weights.