

NOTE

PROTEINS

Rapid Determination of Dry Gluten by Microwave

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ABSTRACT

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Drying of wet gluten using the standard method requires a period longer than 24 hr. Hence, there is a need to develop a quicker method for drying of wet gluten. In recent years, microwave has been used for faster heating

of food products (Rosenberg and Bogl 1987). Therefore, an attempt has been made for possible application of microwave for drying of wet gluten. The results are presented in this article.

MATERIALS AND METHODS

Different samples of commercially milled flour were procured from the local market. Whole wheat flour was obtained by grinding wheat in Kamas laboratory mill (SLAGY-200A) using an 0.8-mm sieve.

Gluten was estimated according to standard method 38-11 (AACC 1983), using 10 g of flour and the normal air-oven method for drying gluten. Wet gluten separated according to the standard method was also dried in a microwave oven (Philip model) for different periods (1-12 min) at varying power levels to arrive at optimum condition for drying wet gluten. Four power settings (420, 490, 560, and 630 W) were chosen. Each power setting was defined in terms of the temperature rise in 1 L of water after 1 min and converted to watts. The time required for drying gluten at each power setting was determined against the air-oven method. Dry gluten was also determined using refined wheat flour at the optimized condition. The protein content ($N \times 5.7$) of gluten dried by the air-oven method, as well as by the microwave oven method, was determined using AACC method 46-12. To determine the number of samples that could be dried at a time in the microwave oven, wet gluten separated from flour in four replicates were dried together at optimized conditions; the results were compared with that obtained by individual drying. Microwave was also used for drying gluten from 25 g of flour separated by hand washing (Method 38-10, AACC 1983).

All experiments were determined in four replicates and statistically analyzed (Bender et al 1981).

RESULTS AND DISCUSSION

Wet gluten dried for different periods at various power levels indicated that the optimum time required to dry the gluten (free of moisture) decreased with increases in the power level. The time required to dry the gluten at 420, 490, 560, and 630 W was 11, 8, 7, and 6.5 min, respectively. The dry gluten values obtained were not significantly different according to the *F*-test. This indicated that variation in power levels did not make any considerable difference in drying time at higher power levels of 560 and 630 W. Hence, power of 560 W was used in further studies. The puffing was full and complete when gluten was dried at higher power levels. A similar trend was observed in all the samples dried at higher power levels.

The values of dry gluten obtained for 10 different, commercial,

refined flour samples by air-oven as well as microwave-oven drying did not show any significant difference. The regression line and coefficient of variation between the two methods are shown in Figure 1. Standard deviation from the regression line was 0.12. The protein content of gluten was 81.87% (air oven) and 81.63% (microwave oven), indicating slightly higher moisture in gluten dried in microwave oven.

Drying of wet gluten individually and in four replicates simultaneously showed slightly higher values in the latter. Upon increasing the drying time by 2 min, there was no difference in the dry gluten values. When gluten was separated by hand washing 25 g of flour, the drying time increased from 7 to 9 min, indicating that sample size did have an effect on drying time.

CONCLUSION

Microwave-oven drying could be conveniently used as a rapid analytical technique for estimation of dry gluten. With this method, drying time can be reduced to 7-9 min, depending on the sample size. This is in contrast to 24 hr drying time in the

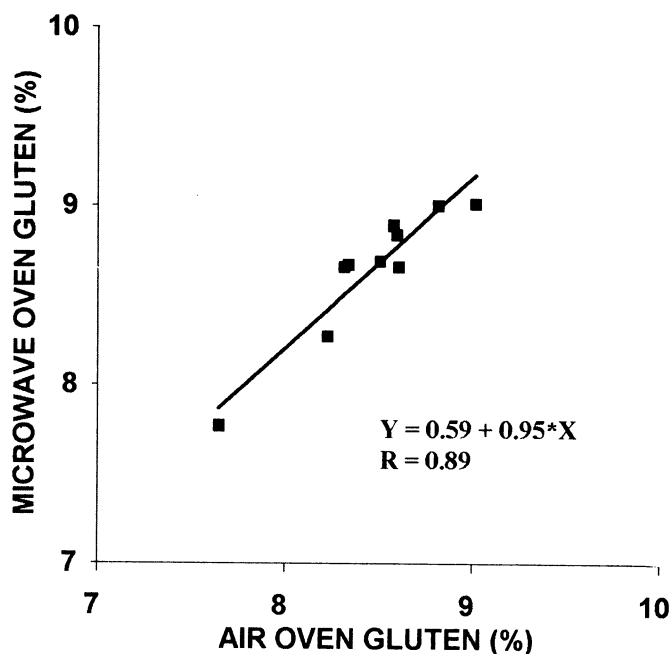


Fig. 1. Determining gluten content by drying in an air oven versus microwave oven.

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