NOTE

Laboratory Dough Molder for Flat Breads[1]

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ABSTRACT

Because a major factor influencing the quality of Middle-Eastern style flat breads baked is the thickness to which the dough is rolled in preparation for baking, a molder was designed and constructed to minimize this factor in laboratory testing. The molder is adjustable from 0 to 12 mm, in increments of 0.01 mm, and therefore is usable in preparing doughs for all flat breads.

Flat breads are very popular, especially in parts of the world where bread constitutes a major source of dietary protein and calories. Consumption and production of flat breads (including "pocket types") is rising in the U.S. and consequently this type of bread is a relatively new area of interest for researchers. At present, laboratory methods for evaluating flour quality for these breads are quite variable and poorly standardized.

Flat bread production procedures usually include mixing, fermenting, rounding, resting, molding (flattening and sheeting), proofing, and baking. One of the most crucial steps in flat bread production is the flattening and sheeting of the dough. The optimum dough thickness varies from 2 to 10 mm, depending upon the particular bread. Each type has a very small range of dough thickness that produces an optimum bread, and small variations change bread quality significantly. This is true in traditional bakeries (Dalby 1963, 1966; Faridi and Finney 1980) and automated systems (Schnee 1979), as well as in laboratory production (Eggum and Duggal 1977, Faridi et al 1981, Maleki and Daghir 1967, Mousa et al 1979, Patel and Johnson 1975). The purpose of the present study was to design a laboratory molder to minimize problems associated with experimental baking of flat breads.

MATERIALS AND METHODS

Construction Details

A piece of aluminum 29.2 cm square × 4.5 cm thick was turned down to a 29.2-cm diameter and then reamed out at a level 2.75 cm above the bottom to give an inside diameter of 25.5 cm. The top was reamed out to 24.2 cm in diameter (Fig. 1). The bottom portion of the open cylinder was then threaded to 10 mm/cm. A disk was formed by laminating a piece of Delrin[3] 7 mm × 25.5 cm in diameter with a piece of aluminum 1.25 cm × 24.1 cm in diameter and a piece of maple 1.15 cm × 24.1 cm in diameter. The Delrin disk was then similarly threaded (10 mm/cm) to fit the base ring. The maple was saturated with mineral oil for preservation as well as to prevent adhesion of the dough. A thumb set screw was installed through the side of the base ring to hold the adjustable inner disk in a selected position. A ⅛-in. PVC fusible belt was then fitted into a 3-mm groove in the bottom of the base ring to provide a cushion and nonskid surface. The aluminum ring was anodized to preserve the surface and to prevent the aluminum from discoloring the dough or the user's hands. An index on the bottom of the base ring and on the disk provides a reference for 1.00-mm increments; ie, one revolution of the disk equals a 1.00-mm change up or down. The molder is adjustable from 0 to 12 mm at any fraction of a millimeter and is readable to 0.01 mm.

Application

The molder was designed for use with any 10–12-in. hard wood rolling pin. It was made circular to permit cross-rolling in any direction without first having to turn the dough. Dough can either be uniformly shaped or cut with any selected cutter up to 9 in. in diameter. A rolled dough and rolling pin are shown in Fig. 2.

White Arabic Bread

Bread for the study was made from 100% flour, 57% water, 1.5% NaCl, 1% baker's yeast, and 50 ppm ascorbic acid. Ingredients were mixed to optimum, fermented for 30 min at 30°C and 95% rh, sheeted at 2–7 mm dough thickness, proofed for 45 min at 30°C and 95% rh, and baked at 470°C for 1 min.

RESULTS AND DISCUSSION

Consistent dough thickness is essential for evaluation of the baking performance of flours in most flat breads, but particularly so in those breads that puff during baking (pocket type). Figure 3 illustrates the wide variation in bread characteristics (pocket

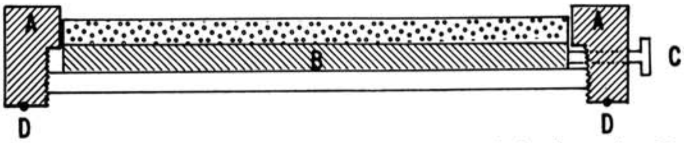

Fig. 1. Cross section of dough molder parts: **A,** turned aluminum ring; **B,** laminated adjustable disk (top is maple, center is aluminum, bottom is Delrin); **C,** set screw; **D,** ⅛-in. fusible belt.

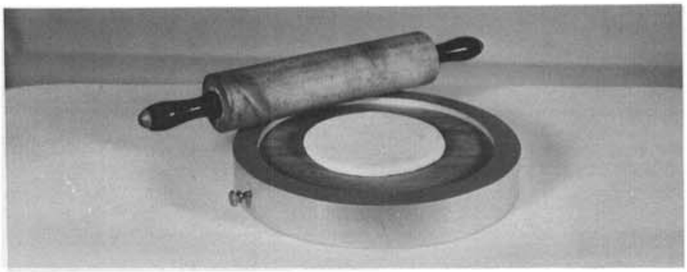

Fig. 2. Molder, rolling pin, and molded dough.

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[3]Delrin is a Dupont trademark for acetal resin.

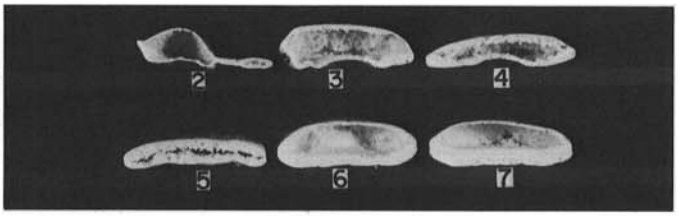

Fig. 3. Effects of rolled dough thickness on white Arabic bread development. Numbers indicate millimeters of dough thickness before baking.

development, upper and lower crumb, and crust formation) that result in white Arabic bread when the dough thickness is varied from 2 to 7 mm. Other subtle differences not shown are changes in crust and crumb color. When the dough thickness was 2 mm, the desirable pocket formation did not occur. When the dough thickness was increased to 5–7 mm, the optimum crust-crumb ratio was not typical of traditional white Arabic bread. The bread produced from the 3- and 4-mm moldings had all the desirable characteristics. Quality evaluation of wheats for flat bread production or investigation of biochemical changes during baking (browning, starch gelatinization, etc.) may thus be influenced by small variations (1 mm or less) in dough thickness that are likely to effect the physical and biochemical characteristics of the bread. Therefore, use of the molder may help in laboratory studies.

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