SHORT-TIME BAKING SYSTEMS

by

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Introduction

Approximately 45% of the bread produced commercially in the United States today uses some form of short-time or no-time fermentation process. Most agree that the bread produced by those processes differs in such attributes as flavor aud structure from that of conventional or long fermentation time processes. Initial rapid success of the short-time systems has leveled off over the last several years, presumably because of consumer resistance.

Most short-time baking systems have a minimum amount of fermentation. Presumably the need for fermentation has been replaced by high-speed mixing and high levels of strong oxidants. Although the factors affecting fermentation are well known, little work on the effect of various amounts of fermentation on bread characteristics has been reported. Therefore, this study on the effect of total fermentation on bread characteristics was undertaken with the hope that it would shed new light on the problems of short-time baking systems.

Because fermentation may be critical, we studied formulations of various short-time systems, attempting to hold fermentation constant. This allowed us to view certain of the critical relationships as a function of fermentation. Using response surface methodology (RSM) and computer technology we sought to better understand the relationships of $KBrO_3$, yeast concentration, and fermentation time of baking systems. Commercial short-time processes are using slightly higher amounts of yeast and relatively high levels (near the legal limit) of various combinations of oxidizing agents. Studies clearly showing the effects of those oxidant combinations on short-time systems were not found. Using RSM, and a

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commercial-type formula we studied the effects of certain oxidants, combinations of oxidants, and fermentation times.

Literature Review

Since the beginning of civilization, bread has constituted a major part of the human diet. Today in many parts of the world, it is relied upon for the main source of nutrition and energy. However, since automation of the baking industry, more specifically since the advent of short-time and continuous mixing processes, man has once again sacrificed quality for quantity.

Science tells us that a fermenting dough is a complicated biochemical system that must be balanced and optimized to produce the best results. Individual components and molecules that comprise the living organisms conform to the physical and chemical principles governing the behavior of matter. Furthermore, they react and interact in accordance with set principles.

For bread to have the best possible flavor aud texture, it must be produced under the most favorable conditions. That means, at least in part, that fermentation must be optimized. This paper will attempt to review the pertinent literature as it applies to the term "optimum fermentation."

Yeast--Fermentation. Yeast was discovered by Leuwenhoeck in 1680, but he did not associate them with the phenomena of fermentation. In fact, early researchers regarded fermentation process as one of spontaneous decay (1).