

## Effect of storage of surfactant gels on the bread making quality of wheat flour

M.H. Azizi <sup>a,\*</sup>, G.V. Rao <sup>b</sup>

<sup>a</sup> Department of Food Science and Technology, College of Agriculture, Tarbiat Modares University, Tehran, Iran

<sup>b</sup> Flour Milling Baking and Confectionery Technology Department, Central Food Technological Research Institute, Mysore, India

Received 18 July 2003; received in revised form 21 January 2004; accepted 21 January 2004

### Abstract

Sodium stearoyl-2-lactylate (SSL), diacetyl tartaric acid esters of monoglyceride (DATEM), glycerol monostearate (GMS) and distilled glycerol monostearate (DGMS) surfactant gels were made with water and varying shortening contents. The SSL, DGMS, GMS and DATEM gels, with and without shortening in them, were stored for 3, 6, 9 and 15 days and their effects on bread-making quality were studied. All the gels improved the bread-making quality, to varying extents depending on the surfactant. On storage of gels, the improving effect was gradually reduced with increasing time, for all the gels made, with or without shortening. The adverse effect of storage on gels with shortening on bread-making quality was greater than that on gels without shortening and it varied from surfactant to surfactant. The results brought to light the adverse effect of storage of gels in improving the quality of bread.

© 2004 Elsevier Ltd. All rights reserved.

**Keywords:** Surfactant; Bread quality; Staling; Gel

### 1. Introduction

Labell (1983) has reported the effect of addition of surfactants to dough on bread staling. The mechanism by which the surfactants retard the firming process of crumb is based on their ability to form complexes with amylose. The abilities of various surfactants to form inclusion complexes with amylose vary (Destefanis, Ponte, Chung, & Ruzza, 1977; Morad & D'Appolonia, 1980; Osman, Leith, & Fles, 1961; Tamstorf, 1983) and consequently, their contributions to a reduction in the staling rate are different (Conde-petit & Escher, 1991). Rao, Nussinovitch, and Chinachoti (1992) found that different types, levels and HLB values of surfactants had varying effects on amylopectin recrystallisation and loaf volume of bread. The reduction in crumb firming rate with surfactants has been reported by a few workers (Joensson & Toernase, 1987; Krog, Olesen, Toernaes, &

Joensson, 1989). Destefanis et al. (1977) found that Sodium stearoyl-2-lactylate (SSL) not only complexed with amylose but also with amylopectin. Conde-petit and Escher (1991) demonstrated (with DSC) that complex forming surfactants had a strong efficiency to retard crumb firmness. The staling process involves three factors, namely, firming of the crumb, loss of flavour, and loss of crispness in the crust, with resultant leathering (Knightly, 1977). Surfactants, do not soften bread, they inhibit the firming of the crumb, associated with staling, by retarding the rate at which starch crystallizes (Knightly & Lynch, 1966). Crumb firming has been attributed, primarily, to changes in the starch fraction. It is theorized that the complex is formed by the surfactants and the amylose fraction during baking, and the complex retards the firming or retrogradation of the branched amylopectin fraction after the product is baked (Krog, 1979). The function of surfactants, as crumb softening agents, is closely related to their interaction or complex formation with starch, particularly the linear amylose fraction, to retard bread staling. Surfactants may also slow the rate of bread firming by

\* Corresponding author. Tel.: +98-21-4196-522; fax: +98-21-41-96-524.

E-mail address: [azizit\\_m@modares.ac.ir](mailto:azizit_m@modares.ac.ir) (M.H. Azizi).

forming a complex with the amylopectin fraction within the starch granule (Kamel & Ponte, 1993). Improvement in the bread crumb softness with surfactants has been reported by many workers (Joensson & Toernase, 1987; Krog et al., 1989; Langhans & Thalheimer, 1971; Lorenz, 1983; Roach & Hosene, 1995; Rogers & Hosene, 1983). Changes in characteristics of surfactant gels during storage and their interrelationship with quality of bread were investigated in this study.

## 2. Materials and methods

### 2.1. Materials

Glycerol monostearate (GMS) was obtained from M/s Fine Organic Industries, 15/2, Neelkanth Market, M. G. Road, Ghatkopar (East), Mumbai-400 077, India. Distilled GMS, sodium stearoyl-2-acylate and diacyl tartaric acid esters of monoglycerides (DATEMs) were obtained from M/s Enzyme India Pvt. Ltd., No. 7, Briethpet Road, Vepey, Chennai-600 007, India. A commercial aestivum wheat flour, procured from the local market, was used for the studies. Shortening

(Hindustan lever limited, 165/166, Backbay reclamation, Mumbi 400 020) was procured from the local market. All other chemicals, reagents and solvents used in the present study were of analytical grade and these were obtained from reputed companies. Distilled water (twice distilled) was used in all the experiments throughout the study.

### 2.2. Methods

#### 2.2.1. Chemical characteristics

Moisture, total ash, wet and dry gluten, Hagberg falling number, Zeleny sedimentation test, damaged starch and Kent Jones colour grade value were determined according to the standard procedures of AACC (1990). Nitrogen content was determined by the micro-Kjeldahl procedure. A conversion factor of 5.7 was used for calculating the protein content.

#### 2.2.2. Preparation of surfactant gels

Gels were prepared using surfactant and water in the ratio of 0.5:2 and surfactant, water and shortening in the ratio of 0.5:2:1 and 0.5:2:2 using the surfactants SSL, distilled glycerol monostearate (DGMS), GMS and

Table 1  
Influence of storage of gels<sup>a</sup> from ssl<sup>b</sup> on bread-making quality<sup>c</sup> of wheat flour

Parameters	Shortening <sup>d</sup> (%)	Storage of gel (days)					SEM ( $\pm$ ) <sup>e</sup>
		0	3	6	9	15	
Volume (ml)	0	555a	555a	545b	540b	530c	2.87
	1	565a	560b	550c	545c	535d	3.41
	2	585a	575b	570b	560c	550d	3.23
Specific volume (ml/g)	0	4.11a	4.07b	4.04b	3.97c	3.96c	0.02
	1	4.17a	4.09b	4.06b	3.98c	3.97c	0.04
	2	4.33a	4.23b	4.15c	4.05d	4.04d	0.07
Texture (g. force)	0	309a	339b	347c	362d	370e	2.73
	1	295a	308b	329c	356d	358d	3.13
	2	271a	281b	302c	343d	351e	3.88
Crumb value score	0	39.5a	39.5a	29.0b	29.0b	13.0c	0.82
	1	39.5a	39.5a	29.0b	29.0b	13.0c	0.74
	2	45.0a	39.5b	39.5b	39.5b	29.0c	0.96
Baking quality score	0	168.6a	168.6a	155.3b	153.0b	140.3c	3.53
	1	173.4a	171.0a	157.5b	155.3b	142.4c	2.75
	2	192.5a	178.0b	175.5b	171.0c	157.5d	3.71
Overall quality score	0	208.0a	208.0a	184.3b	182.0b	153.3c	3.31
	1	212.9a	210.5a	186.5b	184.3b	155.4c	2.64
	2	237.5a	217.5b	215.3b	210.5c	186.5d	3.28
Crumb colour ( $\Delta E$ )	0	29.9a	31.1b	32.1c	32.9d	33.1d	0.22
	1	29.7a	31.0b	31.6c	32.5d	32.7d	0.19
	2	29.6a	29.8a	31.5b	32.3c	32.5d	0.27

<sup>a</sup> Prepared with surfactant, water and with or without shortening.

<sup>b</sup> Surfactant added at 0.5%, on flour basis.

<sup>c</sup> Values in the same row followed by different letter differ significantly.

<sup>d</sup> Added on flour basis.

<sup>e</sup> Standard error of mean at 17° of freedom.

Download English Version:

<https://daneshyari.com/en/article/10544115>

Download Persian Version:

<https://daneshyari.com/article/10544115>

[Daneshyari.com](https://daneshyari.com)