

Shortening, a mystery: Unravelling the Effects on Baked Delights

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Shortening is an agent that is used in baking to provide aeration and make the baked products more tender. Shortening is a semisolid food product and it usually consists of 100% fat which is solid at room temperature. Shortening usually does not contain water and ensures that the baked good remains sturdy and crunchy. The fat is mixed with the other ingredients of baking and it forms an emulsion. Water when added to flour forms gluten which are elastic fibers and give food a chewy texture. The fat in the shortening reduces the formation of gluten and breaks it down into smaller pieces which gives a crumbly texture after baking. Shortening coats fat crystals that entrap air bubbles formed during the emulsification process (Demirkesen and Mert 2020). The fat crystals melt during baking and release the entrapped air which results in a light and airy texture of the baked goods. The high-fat content in shortening also prevents the product from going stale and helps to extend its shelf life. The functional ability of a shortening is determined by the ratio of solid to liquid phase in the shortening and the oxidative stability of the shortening. SFI or solid fat index is an analytical tool which is used to determine the content of solid fat in oils. SFI is a good index for determination of the plasticity of a shortening (Yazar and Rosell 2022). Shortenings can be formulated with vegetable oil and animal fat. Lard and ghee are traditional products that contain 100 % animal fat in comparison to margarine which contains 80 % fat. The most used shortening agent is margarine. Margarine can either be used alone or in combination with other vegetable shortenings to achieve the desired effects. Today most of the shortenings used are derived from vegetable oils like palm, vegetable, or cottonseed oil and they undergo hydrogenation to remain solid at room temperature.

Classification of shortenings

The majority of shortenings have a considerable amount of saturated fatty acids and trans-fat and they widely contribute to the rising obesity and a number of lifestyle diseases. Vegetable

shortening is subdivided into all-purpose shortening, emulsified shortening, and high-stability shortening on the basis or form of the product. It is subdivided into baking, frying, confectionery, pastry, and others on the basis of application. It is subdivided into Butter, Margarine, Vegetable oils, Lard and other processed shortening fats based on the type. Shortenings are classified based on the functional requirements into different types (Ghotra, Dyal, and Narine 2002).

1. All-purpose shortening
2. Fluid shortening
3. Cake shortening
4. Icing shortening
5. Filler fat shortening
6. Bread shortening
7. Frying shortening
8. Pie crust shortening
9. Pastry shortening
10. Confectioner's fat
11. Dry shortenings

Effect of shortenings in bakery products

A series of physiochemical changes happen in baking along with the formation of various compounds. Some changes are desirable such as improvement of texture, water retention as well as flavour enhancement. Undesirable compounds which may be potentially carcinogenic, mutagenic, or cytotoxic are also formed. Shortening agents contain MCPD esters and glycidyl ester which are potentially carcinogenic (Goh et al. 2021). Under favorable conditions during the baking process, it can decompose and form harmful components.

Future prospects

There is an increasing demand for bakery products among customers. The rise in demand is the driving force behind the vegetable shortening market. Moreover, the changing preferences of consumers for healthy baked goods have created a positive impact on the worldwide vegetable shortening market. The

surge in demand for low-calorie foods among health-conscious people and the rising trend of people embracing a vegan lifestyle will also create an impact in the shortening market.

Table 1. Composition of different types of shortening and effect on its properties (Manaf et al. 2019; Pădureț 2021)

Properties	Vegetable shortening	Butter	Lard	Margarine
Water content	No water	18 %	12-18 %	10-20 %
Fat content	100 %	80 %	82-88 %	80-90 %
Source of fat	Hydrogenated vegetable oil	Butter fat	Animal fat	Hydrogenated vegetable oil
Protein content	0 %	1-2 % of milk protein	0 %	0 %
Flavor	Flavorless	Creamy and rich	Slightly similar to pork	Flavorless
Texture	Crunchy & crumbly	Tender & thin	Extra crispy	Soft and dense

The manufacturers of shortenings should work on formulating the trans fatty acids content which are used in baked goods. In the end, the functionality of shortening is one of the most important reasons why shortenings are used in baking. The growth curve in the market and the future development of shortening depends on formulations of shortenings that are easily accessible, which do not compromise the health of the

consumers and the functionality of the shortening. There is a rise in the popularity in the use of vegetable oil which is polyunsaturated and free of cholesterol among health-conscious people. Vegetable oil fortified with a surfactant system appears to be on the rise in the foreseeable future because it does not pose much of a health risk and there is no compromise in the functionality.

Conclusion

The concern over trans fats in shortening is growing due to their adverse health effects. The challenge lies in discovering trans-fat-free alternatives that maintain product quality without compromising health.

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