

The Role of Sodium in Baked Grain Products

Part I: Preservation and Sodium Reduction Efforts



Food scientists today are challenged with achieving an optimum level of sodium in baked goods—such as breads, muffins, and crackers—that maintains food safety and extends shelf life, while at the same time meets sodium reduction targets and achieves desirable taste and texture for consumers.¹

Food Preservation: A Balancing Act

Sodium plays an essential role in preserving baked grain products². Salt, by nature, reduces the amount of water activity in foods and thereby inhibits growth of undesirable microorganisms, such as mold and harmful bacteria³. While the emergence of modern day refrigeration and other techniques to preserve food have curtailed the need to use salt for preservation, salt continues to be used extensively for extending the shelf life of products, and also for enhancing flavor and texture⁴.

“Food safety cannot be compromised,” says Janice Johnson, Ph.D., Technical Service at Cargill, when considering a reduction of sodium⁵. Rather, when salt is reduced, other ingredients may need to be added or increased to compensate for the decrease in salt⁶. The ideal formulation for a food product creates a desirable, stable, and safe product that keeps the growth of harmful microorganisms at bay⁷. “The thing about salt is that it does so many things, that to pull it out and try to find another ingredient that has all of that functionality is impossible,” says Johnson⁸.

1 Johnson, Janice. Sodium and the Sensory Characteristics of Grain Products. 22 September 2015. Accessed on 8 Mar 2016. Retrieved from <https://www.youtube.com/watch?v=BM0pmGM1710>

2 Johnson, Janice. 22 September 2015.

3 Institute of Medicine (US) Committee on Strategies to Reduce Sodium Intake, Henney JE, Taylor CL, Boon CS, editors. Strategies to Reduce Sodium Intake in the United States: Preservation and Physical Property Roles of Sodium in Foods. National Academies Press (US). 2010. Accessed on 8 Mar 2016. Retrieved from <http://www.ncbi.nlm.nih.gov/books/NBK50952>

4 Institute of Medicine (US) Committee on Strategies to Reduce Sodium Intake. 2010.

5 Johnson, Janice. 22 September 2015.

6 Johnson, Janice. 22 September 2015.

7 Institute of Medicine (US) Committee on Strategies to Reduce Sodium Intake. 2010.

8 Johnson, Janice. 22 September 2015.

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Salt is rarely used as the singular strategy for modern food preservation; rather, notes the Institute of Medicine (US), salt is one component of “multiple hurdles” that can help control microbial growth⁹. For example, in order to preserve a product, salt may be combined with high- or low-temperature processing and storage, redox potential, pH, or other additives¹⁰. When these hurdles are combined, the potential for microbial growth decreases at each hurdle, and the product is thereby protected from spoilage¹¹.

Sodium Reduction Methods

According to the Centers for Disease Control and Prevention, 89% of adults and greater than 90% of children consume more than the recommended daily intake of sodium¹². And, processed foods is the top source of sodium for consumers¹³ as these products tend to be consumed at multiple eating occasions throughout the day¹⁴. Therefore, many food manufacturers are looking at ways to reduce sodium by reformulating their products. The use of salt alternatives, additives, and salts with different physical properties may aid food scientists in reducing sodium in certain baked foods¹⁵.

Manufacturers may also enhance the saltiness a consumer perceives as they bite into a product by changing the type of salt used. Johnson explains that the physical properties of salt, that is the shape and size of the salt molecules, can be important when striving for sodium reduction and maximum flavor¹⁶. For example, the use of regular table salt, which has a typical granule shape, may actually give off a less salty taste profile compared to flake salt, such as Cargill's Alberger® Fine Flake Salt products¹⁷. The flake salt not only has a larger surface area

9 Institute of Medicine (US) Committee on Strategies to Reduce Sodium Intake. 2010.

10 Institute of Medicine (US) Committee on Strategies to Reduce Sodium Intake. 2010.

11 Institute of Medicine (US) Committee on Strategies to Reduce Sodium Intake. 2010.

12 Jackson, Sandra, et al. Prevalence of Excess Sodium Intake in the United States—NHANES, 2009-2012. 8 Jan 2016. Centers for Disease Control and Prevention Morbidity and Mortality Weekly Report. Accessed on 8 Mar 2016. Retrieved from http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6452a1.htm?s_cid=mm6452a1_w

13 Jackson, Sandra, et al. 8 Jan 2016.

14 Johnson, Janice. 22 September 2015.

15 Johnson, Janice. 22 September 2015.

16 Johnson, Janice. 22 September 2015.

17 Johnson, Janice. 22 September 2015.

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to stick to the product, but also its rapid solubility aids in a quick burst of saltiness for the consumer¹⁸. In one Cargill test, replacing regular table salt with Alberger® Fine Flake Salt achieved a 75% reduction in the amount of salt product used while maintaining the same taste profile, and with 30% less sodium.^{19,20}

In addition, Cargill's studies show that the adherence rate of Alberger® Fine Flake Salt was 95.8%, compared to 75% for standard evaporated salt, allowing for more homogenous distribution of the Alberger® salt on the surface of a product²¹. Alberger® brand Flake Salts come in different varieties that may include anti-caking agents or other additives to aid in solubility, dust control, or consistent flow, depending on the desired application²².

Sodium reduction will likely continue to be a challenge when developing baked grain products. However, by optimizing the balance between salt and other sodium-containing ingredients, and adjusting the type of salt used, food scientists can work to achieve a desirable product.

18 Cargill. Reducing Sodium with Unique Salt Crystal Structures. Accessed on 8 Mar 2016. Retrieved from <http://www.cargillfoods.com/na/en/product-development/reduced-sodium/unique-salt-structures/index.jsp>

19 Johnson, Janice. 22 September 2015.

20 Cargill Salt; Food Processing InPerspective. Alberger Fine Flake Salt: A great salt choice for salty satisfaction and lower sodium. Accessed on 8 Mar 2016. Retrieved from <https://cargillsaltinperspective.com/alberger-fine-flake-salt-2/>

21 Johnson, Janice. 22 September 2015.

22 Cargill. Alberger® Brand Flake Salts. Accessed on 8 Mar 2016. Retrieved from <http://www.cargill.com/salt/products/food-manufacturing/alberger-brand-flake-salts/index.jsp>