

## Overview

Fresh, unprocessed meat and poultry products by their nature contain very low levels of salt. However, salt is added when products are processed to enhance flavor and extend shelf life. In fact, salt has a rich history of use in ensuring meat safety before refrigeration.

Today, the meat industry offers a variety of different formulations to meet different nutrition needs. Salt levels are listed on the ingredient panel of all processed meat products. This information is also provided in the meat department for fresh meat products sold in the meat case.

## Historical Impact of Salt

Salt is one of the oldest, most ubiquitous food ingredients known to man. What is remarkable is that this age-tested ingredient is still being utilized today in food production systems from your kitchen to restaurants to commercial food companies.

The value of salt has been documented as a trade commodity or as a salary for a Roman soldier. The impact of salt in food products can be measured as words like sausage were derived from the Latin word "sal." Historically, salt was not only an ingredient, it also was utilized as a food preservative. The impact of salt on food availability has been linked to political strife and has contributed to the development of today's civilized cultures.

The salting of meat, whether in dried products like jerky or other products such as sausages and hams, was the most common method of preserving meat products prior to the advent of industrial refrigeration. Salt was also a fundamental ingredient for flavor and functionality in most classical European meat products, such as sausages, hams, bacon, bologna, salami and pepperoni. At the time, although the chemistry was not intimately understood, butchers and sausage makers recognized that adding salt to their products prevented spoilage, helped the meat proteins bind together during cooking to improve product texture and made their products taste better. These fundamental functions of salt have not changed from when it was used by ancient Egyptians and Romans to

colonists who settled America to today's modern meat producers.

## Types of Salt

The term "salt" is a generic description of the compound formed from an acid and a metal ion like sodium, potassium, magnesium, or calcium. However, when most people hear "salt" they think of sodium chloride or table salt. Sodium chloride is composed of approximately 40 percent sodium and 60 percent chloride molecules or ions. It is a solid crystalline structure that may be white or grayish-pink in color.

Although consumer exposure to salt is mainly in the form of sodium chloride, there are many different types of salts used in food products, including potassium chloride, sodium acetate, calcium citrate, sodium phosphate and potassium citrate, just to name a few.

It is common to cook with flavored salts like garlic and onion salts. These ingredients not only add to the functionality of salt in food, but also deliver unique flavor profiles to the dish. There are also many different varieties of salt available for consumer purchase:

- Rock salt -- salt products from dried, underground sea beds;
- Table salt -- rock salt that has been refined and fortified with iodine and contains anti-caking compounds to prevent clumping or caking;
- Kosher salt -- unfortified rock salt without anti-caking ingredients that can be used when cooking, but will need roughly 1/3 more when replacing table salt in recipes;
- Sea salt -- salt obtained from evaporated sea water.

## Benefits

### *Role in maintaining good health*

Salt is essential for human health and development, particularly in regulating the body's electrolyte balance, preventing dehydration and maintaining many of the body's cellular functions. Electrolytes are minerals that work in and around cells in the body that conduct electrical charges. As sodium chloride or salt is dissolved in water, the sodium and chloride molecules are essential in regulating the mechanisms for maintaining a fluid balance in cells within the body. Similar to a magnet, the water molecules are attracted

to the charges on the sodium and chloride molecules. The human body uses the electrolytes to transport water to needed areas in the body. If the body's water balance is upset, which can occur during exercise, illness, or not drinking enough water, dehydration and an imbalance of electrolytes is possible. To replenish the lost fluid, rehydration is necessary. Long term dehydration can lead to serious health issues in the kidneys and heart.

Salt has also become a vehicle for preventing nutrient deficiencies. Salt was chosen for a delivery system as salt is consumed world-wide. Salt can be fortified with iodine to help prevent, now seemingly archaic diseases here in the U.S. such as goiter.

More importantly, fortified salt is used to prevent other Iodine Deficiency Disorders, such as cretinism in children. Purchasing and consuming iodized salt helps fortify the consumer diet to maintain needed iodine levels. In populated areas where other nutrient deficiencies exist, e.g. low levels of iron, salt can be fortified with those deficient nutrients to maintain healthy nutrient levels.

### ***Functionality in meat products***

The role of salt in meat products has essentially remained the same for thousands of years. Salt is added to foods to assist in reducing and preventing microbial growth, aid in extracting salt-soluble meat proteins for emulsion stability, increase the ability of the meat to bind during cooking, increase the water-holding capacity of meat products and enhance basic meat taste and flavor.

### **Impact on flavor**

The functionality of salt in food products is diverse, but the most common to consumers is the role salt has on flavor. Along with sweet, sour, bitter, astringency, and umami (savory/meaty), salt is one of the tastes detected in food through the tongue. The addition of salt to food can also enhance or mask certain flavors or tastes. For instance, the addition of salt can reduce the bitterness of a drink or food, whereas a dash of salt can enhance the sweetness of a food.

### **Food Safety**

Salt plays an important role in ensuring meat products are safe. In some meat products, salt is added to help lower the water activity within the meat product. Water activity is a measure of the amount of water that is available for microbial growth and other chemical reactions. Water activity is reported on a scale from 0.0 to 1.0 with 1.0 being a soft moist food product and 0.0 being hard and crisp. Typically, most

fresh meats have a water activity of 0.985 with beef jerky having a water activity of less than 0.85.

Like other living organisms, the microbes that can cause foodborne illness need water to survive. Meat processors can use salt as an ingredient with other food safety interventions to control the water available and thus prevent microbial growth. For example, one technique utilizes salt with other functional ingredients to cure meats like ham, bacon and hot dogs. Curing serves a vital public health function as it blocks the growth of botulism-causing bacteria and prevents spoilage. Curing meats also gives their characteristic pink color and flavor.

### **Role as a functional ingredient**

In most of today's meat and processed meat products the concentration of salt is too low to preserve the product without other food safety interventions, but the impact of salt is fundamental to the production of meat products. In whole muscle products like chops, roasts, or hams, salt is used to decrease the loss of moisture during cooking and storage.

In a processed meat product, salt helps to bind the meat proteins together and acts as a binding agent between meat and fat emulsions. In sausages, hot dogs, and deli meats, using salt stabilizes the meat structure during cooking so that the final product sold to the consumer has a uniform texture and does not crumble or fall apart during storage.

### **Other uses in the kitchen**

Salt is also a tool in the kitchen. It can be used to raise the boiling temperature when cooking pasta, potatoes, etc. and salt crusting has now become a common technique used in cooking roasts. Salt crusting involves covering a meat roast in a salt paste then roasting it in a dry heat oven. The salt crust creates a sealed environment that uses the natural meat juices to steam cook the roast.

This is an ideal way to utilize meat cuts that are typically tougher and more economical to purchase, but still produce a tender and flavorful center-of-the-plate entree. Salt crusting is a great alternative method of preparing a meat roast.

## **Regulatory Status**

The basis for modern food law was the Federal Food, Drug, and Cosmetic Act of 1938 and as food law and technology advanced the Food Additives Amendment of 1958 was enacted requiring approval of ingredients prior to the addition into food. Ingredients

such as salt were exempted from this process because the Food and Drug Administration (FDA) and the United States Department of Agriculture (USDA) already had deemed salt safe prior to 1958. Salt is considered a generally recognized as safe (GRAS) food ingredient, which means based on the extensive historical use in food and published scientific evidence, such ingredients are generally recognized as safe by experts for use in foods. Salt, along with sugar, spices, vitamins, and hundreds of other food ingredients are considered GRAS and can be used in food products. At anytime should FDA or USDA believe a GRAS ingredient is unsafe they can review scientific evidence and decide whether the ingredient's GRAS status should be changed or if further studies are needed to determine its safety.

### Nutrition Issues

Although salt is a necessary nutrient for health and keeps normal fluids in balance, doctors often recommend low-sodium diets for people diagnosed with hypertension. This recommendation is made to prevent excess fluid build-up that can cause heart problems. *The Dietary Guidelines* recommend no more than 1,500 mg of sodium per day for those on salt restricted diets. The guidelines recommend no more than 2,300 mg for the general population. For reference, 2300 mg is roughly equal to one teaspoon of salt.

- A product is considered “**reduced sodium**” if the formulation features a 75 percent reduction of sodium from the original formulation.
  - A product is low sodium if it contains 140 mg or less per serving.
  - A food is considered very low sodium if it contains less than 35 mg per serving.
  - A food is considered no sodium if it contains less than five mg per serving.

### Salt Levels in Meat Products

Fresh red meat cuts are naturally low in sodium and typically have 100 mg per serving or less. A broiled, 3.5 ounce hamburger, for example, contains 77 mg of sodium.

Salt is added when meat products are processed into lunch meats, franks, bacon, and other products. Salt is part of the product's “identity” just as it is part of the taste associated with a pretzel or smoked salmon. However, the processed meat category is extremely varied and meat processors produce an array of reduced sodium products, such as:

- Hot dogs with 250 mg of sodium or less;
- Low sodium deli meats, bacon, ham and breakfast sausage with 140 mg of sodium or less; and
- Very low sodium deli meats with 35 mg of sodium or less.

### Efforts to Reduce Sodium Intake in the American Diet

Because average sodium intake in the United States is estimated to be above dietary recommendations, a number of organizations and entities, including the American Medical Association and the City of New York, for example, have embarked on efforts to encourage reduced sodium intake.

An analysis of the top 20 sodium contributing foods consumed by Americans shows that only three of these foods are meat products or contain meat. The other 17 are salty snacks, cheeses, milk, white bread, and other non-meat foods (Source: NHANES, 2003-2004).

Still, the meat industry is responding with efforts to offer reduced-sodium products. Product introduction data show that reduced sodium foods are a key trend. Across the board, there has been an increase in the number of new low-salt products on the market. According to Mintel's Global New Products Database (GNPD), there were 428 such launches in the U.S. in 2006; 542 in 2007 and 533 in 2008.

More dietary research is needed to better understand the role of sodium in health outcomes and to determine reduced-sodium product formulations that will be acceptable to consumers.

*Reference: Murano, PS. 2003. Understanding food science and technology. Wadsworth/Thomas Learning, Belmont, Calif.*

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### Helpful Links/Experts

**LowSaltFoods.com:** [http://www.lowsaltfoods.com/food\\_center/lfoods/meat.htm](http://www.lowsaltfoods.com/food_center/lfoods/meat.htm)

**U.S. Dietary Guidelines:** <http://www.health.gov/DietaryGuidelines/>

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