Sodium: Too Much OR Too Little

It seemed that for years marketing low-sodium foods was a thing of the past, but suddenly low-sodium and reduced-sodium foods have re-appeared in the limelight. By Henk Hoogenkamp

SALT is an important nutrient for the human body. Sodium, potassium and calcium salts are essential for all nerve cell activity, for muscle movement, and for osmotic balance of the body fluids.

OVER the last 50 years, use of salt has skyrocketed mainly caused by increased consumption of processed foods and meats. On a molecular weight basis, sodium chloride is 39, 34 percent sodium and 60, 66 percent chloride. The Food and Drug Administration (FDA) standards allow regular table salt to contain up to two percent additives such as anti-caking agents and processing aids.

Convenience motivated consumers want fresh flavour, while at the same time demanding all-natural ingredient labels. Time tested additives and ingredients such as salt, phosphate and nitrite are now often challenged and removed from the formula. Yet, the removal of these components might have unwanted side effects such as the increased risk of oxidative rancidity that leads to off-flavour development and unattractive discolouring.

In most developed countries, salt intake has risen to 150 mmol (=3,600 mg of sodium) per day or some nine grm. This is about double what the body needs to sustain optimal health. American men between the ages 30 and 39 are by far the highest consumers of sodium, ingesting an average of about 4,500 mg per day. Processed foods and meats are the primary source of salt overconsumption, hidden in pizza, salad dressings, deli-meat, formulated hamburgers and chicken foods.

Dubravko Sori, Zagreb, Croatia

TO SALT OR NOT TO SALT

Salt content is another front in the healthy food fight. Of course, it is not the saltshaker, but processed foods that are the source of most of the dietary salt consumed on a daily basis. An estimated 70 percent of total dietary sodium chloride (NaCl) intake comes from processed foods, such as canned soups, bread, snack foods, deli meats, cheese and condiments.

Salt or sodium chloride reduction will not be an easy task to accomplish. For starters, virtually every replacement option is markedly more costly. Furthermore, many people would say no when asked if salt reduction or elimination is switching to an alternative synthetic or chemical additive.

It is unrealistic, however, to expect the food industry to lower the sodium content in food products overnight. Aside from the fact that consumers are accustomed to a certain flavour profile, many technical hurdles to removing salt from food formulations are still unsolved. For healthy people a consumption of six grm of salt is an attainable goal. Perhaps, salt intake can eventually be further reduced to 2,000 mg a day.

It is valid to ask if processed meat products fit the parameters of lifestyle foods, and the answer is a resounding, 'yes'. Not only are meat products a universal favourite in nearly all cultures, but meat is also a center-of-the-plate food that is versatile, wholesome and a source of protein and minerals, like iron and zinc.

SIDE-STEPPING PHOSPHATE

It is also expected that phosphate additives used for meat and food manufacturing will regain new discussions. Of course, in Germany the use of phosphates in processed meat products is strictly regulated and even forbidden in most meat products. In most other countries, the use of phosphates is vaguely regulated to inclusion levels up to 0.5 percent.

Elevated serum phosphate concentrations are possibly correlated with mortality in people with chronic renal failure that exposes organ calcification, while high levels of phosphates in healthy people have been associated with cardiovascular disease.

Stoonn, Thailand

Processed foods and meats are the primary source of salt overconsumption, hidden in pizza, salad dressings, deli-meat, formulated hamburgers and chicken foods.

For starters, it is necessary to distinguish between natural (organic) phosphate and chemically-derived phosphates. Natural or organic phosphates are found mainly in protein-rich foods such as meat, fish, eggs and dairy.

In contradiction to organic phosphate, industrially processed food has much higher levels of added (poly) phosphate in order to obtain certain product modulations and or cost advantages.

For example, chemically derived phosphates are used as preservatives, yield manipulating agents, acidity buffers, emulsifying support as well to intensify flavour and reduce warmed-over-flavour in cooked meat products. Phosphates are also frequently used as 'melting salt' in soft or spreadable cheese, not to mention its use in soda's and dry-blended powdered beverages.

Depending on legislation, specifically in the processed meat industry, phosphate is probably the most frequently used additive in nearly all categories: emulsified, coarse, enhanced and whole muscle meat products.

All these combined industrial uses have doubled the average daily intake since 1990's: from just under 500 mg/day to 1,000 mg/day. Perhaps time has come for the collective food and meat industry, to label the presence

Ove Topfer, Østfold, Norway

of added phosphate not only qualitative, but also quantitative.

SALT SOLUTIONS

For meat processors, salt offers yield, product stability, and antimicrobial and spoilage reduction, shelf-life extension, while consumers prefer the flavour sensations of salt. Salt also blocks the growth of botulism-causing bacteria and prevent premature spoilage.

There are a number of methods to reduce and/or replace sodium. It is important, however, to implement a strategy to gradually reduce sodium levels in food and meat products to allow consumers to adjust their palates over time. There are basically three options to reduce sodium levels:

Straight Salt Reduction

Straight salt reduction can be achieved to a certain point and by using other ingredient hurdles like lactate and diacetates, as well as by considering process systems, such as high-pressure and packaging.

Although research is still in the early stage, there is growing evidence that umami flavours can boost the perception of saltiness. Umami often is described as savoury and hearty flavour. By reducing sodium, the void can be filled by increasing certain herbs and spices. Beyond flavour, replacing salt entails challenges such as food preservation and texture.

Optimised Salt

The use of optimised salt, such as flake salt is another possibility. Flake salt crystals generally have a larger surface area that might be beneficial especially when speeding up interaction processing time.

Both processors and suppliers agree that the use of potassium chloride is by far the best way to mimic sodium chloride reduction, which allows some 50 percent substitution. It should be taken into consideration, however, that potassium chloride can negatively influence taste by creating bitter notes and 'metallic' tastes. This usually requires the necessity of masking with flavour enhancers such as hydrolysed proteins, yeast extracts, sugars and spices.

Salt and sausage are intimately linked, and the extraction and solubilisation of myofibrillar proteins is achieved by sodium chloride. Reducing sodium levels may negatively impact emulsion stability and texture, as well as sensory quality. When lean sausage meat is emulsified, extreme care should be given to avoid an overdose on sodium chloride that could cause water to be drained from the meat muscle fibers, instead of solubilising the protein.

Salt Substitute

Replacing common salt with alternative ingredients, such as potassium chloride, monosodium glutamate (MSG) or hydrolysed vegetable protein (soy sauce) is not only much more expensive, but also has inherent drawbacks. Ingredient suppliers are developing multi-layered formulations and exploring the use of pseudo-sodium alternatives to help food formulators enhance salt perception.

As a general rule, most sausage formulations specify for every 100 kg of raw meat emulsion, two kg of salt and 1 kg of sugar. In Europe, these levels are somewhat lower and are typically 1.6 kg of salt and 0.5 kg of sugar. The exception of this is Scandinavia, where typically higher amount of carbohydrates (skim milk powder) is used in frankfurter-type sausage.

These levels, however, provide a good starting point when reformulation projects require lower sodium levels. In this respect, it should also be noted that functional ingredients like soy protein usually have hidden levels of sodium. These undeclared levels should be factored in and become part of the total salt analysis. APFI

Daniel Andres Forero, Cundinamarca, Colombia

For meat processors, salt offers yield, product stability, and antimicrobial and spoilage reduction, shelf-life extension