Glucono Delta-Lactone In Meat

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Introduction

Glucono Delta-Lactone, also called GDL, is an inner ester of gluconic acid. GDL has a unique property; when used in aqueous systems GDL hydrolyzes gradually to gluconic acid. This causes an acidification of the system and with a corresponding drop in pH. This unique property is key in some applications such a cheese, yogurt, and tofu where gradual acidification is required to maximize yields and to achieve targeted texture. This same gradual acidification property is exploited in the making of processed meat products.

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The traditional method of raw sausage manufacture uses sodium nitrate in a process that was as long as three months from start of production to time of sale.

Due to increasing demand for sausage, changes were made in the process by the introduction of sodium nitrate and sugar in order to shorten the production time to 8 to 14 days. However, this modification resulted in many failures due to adverse bacterial fermentations leading to discoloration, to poor texture and poor taste. This undesirable fermentation being the result of the slow and uncontrollable fall in pH produced by lactobacilli fermentation of sugar.

GDL solved this issue, through its hydrolysis to gluconic acid by providing a controlled drop in pH. That is in the sausage mix GDL hydrolyses to gluconic acid, the pH value drops gradually over a few hours and inhibits the fermentation of those bacteria that are responsible for faulty production. In addition, the gluconic acid coagulates the protein and stabilizes the final product, improving its sliceability.

Since acidification accelerates color development, GDL also improves color formation, an attribute that is very important for cut sausages. GDL allows faster ripening and provides bacterial stability in the first stage of ripening.

In boiled sausage, for example, Kochwurst, Leberwurst and Zungenwurst manufacture, the protein is coagulated by heat rather than by acid. This type of sausage requires conditions that are completely different from those for raw sausages. The added water has to be bound and so a meat emulsion of high pH value is required during emulsion preparation, the first stage of boiled sausage manufacturing. GDL added to the meat emulsion at this stage does not lower the pH due to its slow hydrolysis to gluconic acid. Only later, during cooking, the second stage of sausage production, when a lower pH is required to improve formation will GDL hydrolyze to gluconic acid and provide the desired pH. Thus, in boiled sausage production, the desired neutral conditions needed are maintained during the emulsion phase even after GDL addition. The subsequent cooking process releases the acidity from the GDL. This speeds the cure and produces better color intensity and greater stability.

Regulatory status

In the USA, glucono delta-lactone is GRAS, Generally Recognized As Safe, as per 21 CFR 184.1318 for use in food with no limitation other than current good manufacturing practice as a curing and pickling agent, leavening agent; as pH control agent and as sequestrant.

Glucono delta-lactone is cleared by the Meat Inspection Division for use at 8 ounces for each 100 pounds (0.5%) of cured, comminuted meat or meat food product to speed up the color-fixing process and to reduce the time required for smoking and at 16 ounces to each 100 pounds (1%) of meat as a curing agent for Genoa salami.

It is also cleared by the Meat and Poultry Inspection Division as an acidifier in meat and poultry products, and as an alternative to encapsulated lactic acid in a binder matrix containing sodium alginate and calcium carbonate used in the production of restructured meat food products, with GDL not to exceed 0.3%.

In the EC, glucono delta-lactone, E 575, is approved quantum satis unless otherwise restricted for use as an acidity regulator and a sequestrant.

Samples of Glucono Delta-Lactone, FCC are available on request.

This food ingredient is Generally Recognized As Safe (GRAS 21 CFR 184.1318) and complies with all the compendial requirements of the Food Chemical Codex.