

Sodium lactate to inhibit growth of *L. monocytogenes* in meat products

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Introduction

The consumption of traditional fresh meat at home has been largely replaced by the consumption of further processed meat products—chilled and value added products in particular. Food safety is of paramount importance in the food industry. Although sanitation and good manufacturing practice are the most important factors in controlling microbial contamination in the meat industry, it is hardly possible to prevent contamination with bacteria in every product before the product is consumed. Retailers are more and more demanding that producers take responsibility for the quality of the end product and ensure food safety standards. Many research has been done by universities, institutes and meat companies to find a method to give intrinsic safety to meat products. One of the ways to build intrinsic safety in a meat product is the use of sodium lactate. Sodium lactate is widely used in the processed meat industry as a natural antimicrobial agent to extend shelf life and to inhibit the growth of pathogens in fresh and cooked, cured and uncured meat products. Sodium lactate is the sodium salt of lactic acid which occurs naturally in the tissue of animals at a level of about 1%. This poster focuses on the inhibitory effect of sodium lactate on the growth of the pathogen *Listeria monocytogenes* in processed meat products.

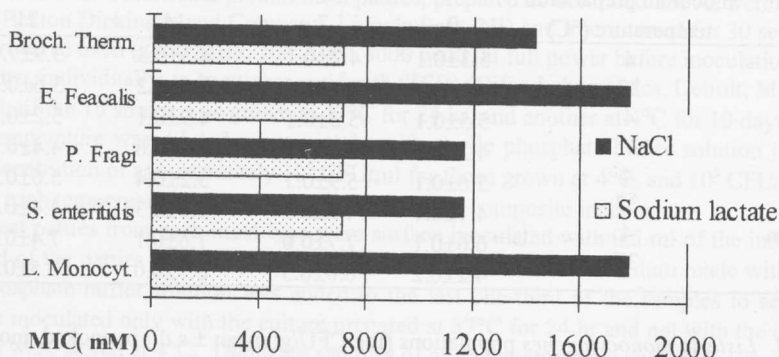
Lactate working mechanism

Studies on the specific action of lactate are limited, but at least two possible mechanisms have been proposed:

1) the ability of weak lipophilic acids (e.g. lactic acid) to pass across the cell membrane in their undissociated form, dissociate within the cell interior; and 2) specific ability of sodium lactate to lower the water activity (Aw). (Shelef)

Houtsma investigated the antimicrobial activity of sodium lactate in a PhD.D. thesis.

Minimum inhibitory concentration (MIC) of sodium lactate and NaCl in broth at 20°C. Houtsma 1993



separate research (data not shown) was also proven that MIC value for sodium lactate was unaffected by storing temperatures, whereas the effect of pH-media affected MIC values at different extend depending on the bacteria strain.

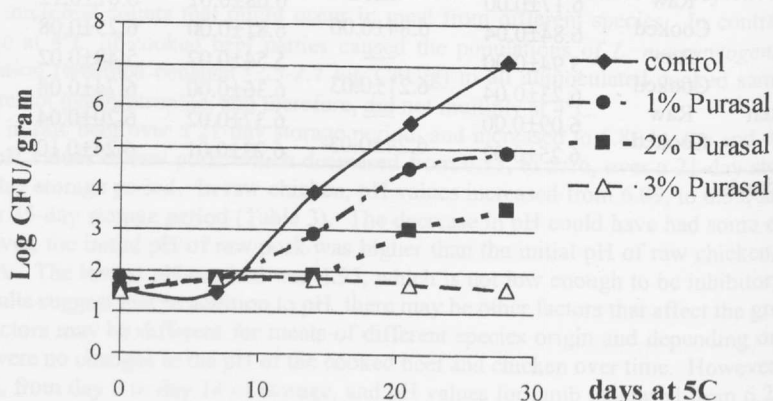
Consolidated research Results

Many researchers investigated the working spectrum of lactic acid and lactates in meat systems. They proved that sodium lactate is not a bactericidal, but a bacteriostatic agent. It inhibits the (out)growth of different pathogens as *Clostridium botulinum*, *Salmonella thyphimurium*, *E. coli 157:H7* and *Listeria monocytogenes*. The anti listerial effect of lactate is showed in beef, pork and poultry products, cured as well as uncured. In the meat research institute at Kulmbach and at TNO the Netherlands they did recently unpublished research on the anti listerial effect of sodium lactate in respectively sliced bologna type sausages and in cooked ham. The results are shown in the next graphs.

In the Kulmbach research the sausages where produced with 2% salt containing nitrite, cooked and sliced and inoculated with a low level of *Listeria monocytogenes*. As can be seen in the graph 3% sodium lactate (60%) is able to inhibit growth completely under these conditions. But 1 and 2% are inhibiting growth also significantly.

In the TNO research cooked ham was produced. Afterwards every batch was comminuted in a cutter and inoculated with *Lactobacillus curvatus* at a level of $10E4$ and *Listeria monocytogenes* at a level of $10E3$. Afterwards the batches where vacuum packed and stored.

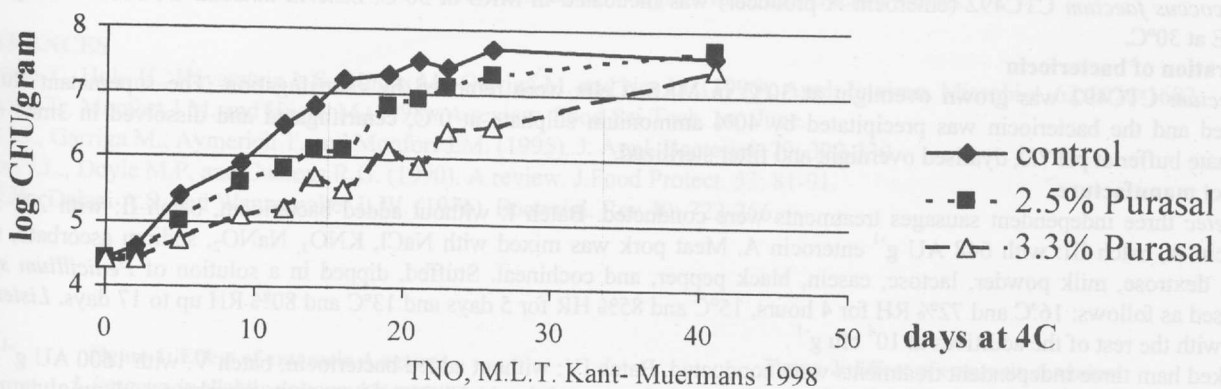
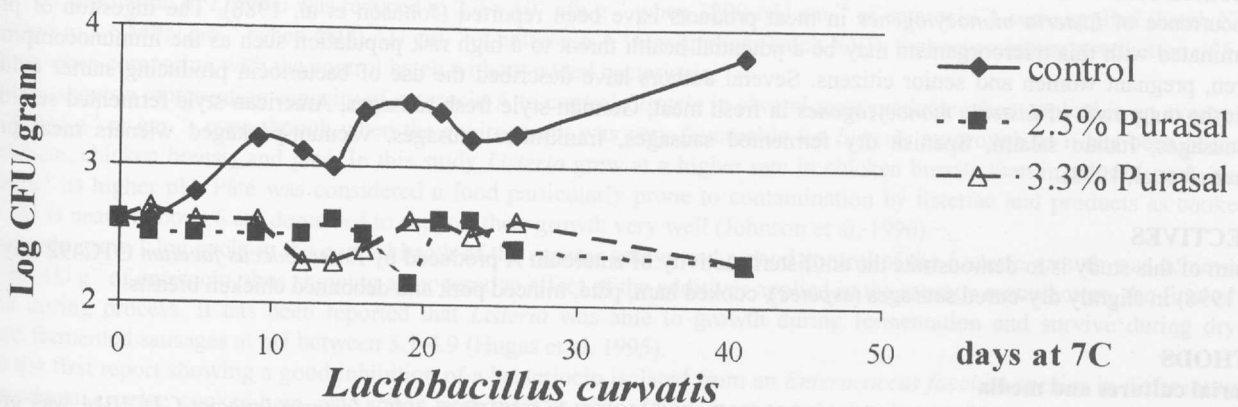
Listeria monocytogenes growth in vacuum packed sliced bologna sausage



Kulmbach, H. Hechelmann 1995



Vacuum packed sliced ham, growth inhibition by sodium lactate (60%) *Listeria monocytogenes*



TNO, M.L.T. Kant-Muermans 1998

The results show that shelf life based on the growth of the lactic acid bacteria *Lactobacillus curvatis* is extended with respectively 50% at a 2.5% addition level to 100% at a 3.3% addition level. Although the *Listeria monocytogenes* in the control is not growing very fast, the difference between the hams containing lactate and without is very clear. Sodium lactate(60%) from a level of 2.5% is enough to inhibit growth of *Listeria monocytogenes* completely.

Conclusion

It is proven by different researchers that sodium lactate(60% solution) at a level of 2-3% is able to inhibit the growth of *Listeria monocytogenes* in cooked meat products such as ham, frankfurters but also in poultry and beef products.

Literature

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