Strategies to increase food safety in sliced, cured ham

A study conducted by Spanish researchers from the IRTA Food Safety Program evaluated the effect of biopreservation and high hydrostatic pressure of sliced and vacuum packed cured ham against Listeria monocytogenes.

Research showed that the combination of both antimicrobial obstacles may substantially contribute to the control of micro-organisms in the ready to eat (RTE) product.

L. monocytogenes is the bacterium responsible for listeriosis, an infection caused by ingestion of contaminated food that originates mainly from RTE products.

Currently, countries like USA, Japan, Canada or Australia, apply a 'zero tolerance' policy in relation to the presence of L. monocytogenes in RTE products, including those that do not encourage the growth of the pathogen (such as cured ham).

In order to meet these health safety demands, the food sector usually applies post-processing treatments for the reduction or disposal of bacteria, or antimicrobial agents to inhibit their growth during the product's shelf-life period.

In this context, current trends in treatments to ensure the safe consumption of RTE products are application of high hydrostatic pressure (HHP) and addition of natural biopreservative bacteriocins which are protein substances produced by some microbial strains that are able to inhibit the growth of certain pathogen bacteria.

Choosing a treatment

One of the most studied bacteriocins is nisin, an antibacterial produced by the micro-organism Lactococcus lactis subsp. lactis and used in dairy and cheese production. Thanks to a broad spectrum antibacterial activity, its application can be done by inoculating the source bacterial culture, by direct attachment to the meat or by incorporation on the surface of the product, either directly or through the so called 'active packaging'.

Although the effectiveness of nisin against L. monocytogenes has been proved in fresh meat and cooked or fermented products like sausages and ham, there are few studies done in relation to cured ham.

For years, the treatment of RTE meat products by high pressure has been internationally recognised as a very valid post-packaging and listericidal process.

This technology allows the cold pasteurisation of the product, helping to preserve organoleptic properties, enhance safety and extend the shelf life of foods, especially of those with heat sensitive nutritional, sensory or functional characteristics.

Antimicrobial strategies

IRTA researchers assessed the combined effect of both treatments in cured ham from both white and Iberian pork. The first was submitted to a drying-ripening period shorter than the second, so it was less dry than the Iberian one (0.92 and 0.88 water activity, aw, respectively).

After inoculation with L. monocytogenes three lots of each type of vacuum-packed sliced ham: without adding bioconservant (control batch) and with the direct incorporation of nisin to the surface of slices and indirectly through films separating slices (active packaging). Half of each sample group was also processed by high pressure equipment at 600 PMA for five minutes.

The control batches, stored in refrigeration (8°C) for two months, confirmed that cured ham does not allow the growth of L. monocytogenes, even when the product is not very dry.

However, direct application of nisin to the surface of slices demonstrated a significant bactericidal action, with an immediate reduction in the pathogen count, most important for the drier product.

Finally, the use of bacteriocins by packaging also played an active listericidal effect on ham during storage, although it was minor compared to the direct application of the bioconservant, without significant differences regarding the maturity of the product.

HHPs treatment study revealed an immediate reduction in the levels of L. monocytogenes, although the magnitude of the effect was higher in the less cured product. Nisin in the pressurised samples also increased the inactivation of the pathogen, especially in the case of direct application of the bioconservant on the surface of ham.

In addition, values obtained after the combined treatment were higher than the amount of inactivation obtained by theoretically adding both their separate inactivation.

However, the additional effect was not observed when applying nisin through active packaging, since the inactivation observed was similar to that obtained after HHPs treatment in the control batch.

Research results show that nisin, applied in one or another form is a valid strategy to improve microbial safety of sliced and vacuum packed cured ham, as stated in the USA regulations concerning the control of L. monocytogenes in ready-to-eat products.

Benefit of combination

In contrast, HHPs as post-processing anti-listeria treatment are more effective (both immediate and long term), than the application of the antimicrobial agent nisin, although the combination of both procedures will help even more significantly to control L. monocytogenes in RTE cured ham. ■

USDA approves processing aid against listeria

The USDA has approved Micreo's Listex as an antimicrobial processing aid to combat Listeria monocytogenes. Listeria is considered one of the most important food safety threats, due to its high mortality rate of over 20% and its risk to pregnant women.

USDA's decision will enable food processing companies to deliver safer clean label products to the marketplace, without the need for reformulation or compromise on quality. The approval is in line with Health Canada's decision last September to approve Listex as a processing aid.

Listex eliminates listeria, rather than merely inhibiting its outgrowth. As such it can be used as an Alternative-2 or as part of an Alternative-1 compliance under the USDA 2003 final rule for post-lethality exposed RTE meat products.

It is certified USDA organic and does not affect the taste, texture or other organoleptic properties of treated food products. It can therefore be used for natural as well as organic foods. Listex is highly consistent in eliminating listeria and easy to apply by topical spraying.

Benefit to processors

"Consumers and food processors alike will benefit from the USDA's decision," Mark Offerhaus, Micreos' CEO, told International Meat Topics. "Phages are abundant in our environment and foods, but thanks to today's technology we can harness their power and help prevent unnecessary suffering, economic losses and environmental strain."

The threat from listeria is real and not to be ignored, Centers for Disease Control and Prevention (CDC) and USDA emphasise. "About one of five patients with lis-

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teriosis dies," Benjamin Silk of the CDC's Enteric Diseases Epidemiology Branch told us.

Listeriosis and cold cuts were ranked as the third worst combination of a food and a pathogen in terms of the burden they place on public health, costing $US1.1 billion a year in medical costs and lost work days, according to a study published last April by the University of Florida's Emerging Pathogen Institute.

Despite the increased legal and sanitary measures, the trend in listeriosis cases has not seen a downturn. In the USA, the CDC estimates that 2,500 people become seriously ill with listeriosis each year, with several hundred deaths each year. Latest information by the CDC reports an increase of 19%. This is consistent with the trend in the EU as reported by EFSA (European Food Safety Authority), confirming listeria as a major public health threat. ■

Quick guide to phages

- Phages are essential for life on earth, killing roughly half of all bacteria every two days.
- They are the most common micro-organisms on our planet, present in abundance on our food, skin and in our gut.
- Phages are harmless to plants and animals (and humans).
- They are bacteria-specific, enabling targeted bacterial control.
- Phages are approximately 100 times smaller than bacteria and outnumber them 10:1.
- Phages are specific for their target bacterial host, and will not affect:
  • Desired bacteria in foods (for example, starter cultures).
  • Commensals ('good bacteria') in our gastro-intestinal tract.
  • Accompanying bacterial flora in the environment.
- Phages are generally composed entirely of proteins and nucleic acids, and their eventual breakdown products consist exclusively of amino acids and nucleic acids. Thus, they are not xenobiotics and do not leave an ecological footprint.

Quick guide to Listex

- Listex is the winner of FI Europe's Best Innovation in Food Gold Award.
- Many research institutes have demonstrated the efficacy of Listex against listeria.
- The phages in Listex do not affect 'good' bacteria – but are lethal to only listeria which, despite rigorous cleaning controls, can hide in the nooks and crannies of processing equipment, and can be present on skin of cattle, in gills of fish or on people.
- Harmless to humans, high numbers of phages are routinely consumed with our food, without any impact on human health or taste or enjoyment of the food product.
- Applied during processing, phages can kill the susceptible bacterial hosts rapidly without interruption of production.
- Listex is an innovative processing aid that does not affect the organoleptic properties of the food in any way nor provide any other function – indeed the food product's integrity is fully protected and, best of all, Listex is completely organic and natural.

Irish look at Video Image Analysis technology

Video Image Analysis (VIA) technology is now used in most of the major abattoirs in the Republic of Ireland and is being considered in Northern Ireland. The Irish Livestock and Meat Commission (ILMC) is now evaluating how VIA compares with manual grading.

Initially, one VIA machine has been calibrated against three licensed graders from Britain and tested against the official standard. This is done by a jury of five licensed experts, two from the UK and three from other EU member states, as required by the EC Regulation for classification. The VIA machine satisfied the requirements of the EU legislation and formal certification is expected soon.

ILMC says it will be necessary to accept that the machine is correct as it meets with the correct grade as determined by the EU experts.

Interestingly, an overall conclusion from the test is that if payments for beef carcases in the two week period had been based on the VIA machine grades the net effect would have been an average reduction in the combined steer and heifer price of approximately 1.5p/kg.

A downward shift in conformation grading was seen and the most likely explanation for this downward shift in conformation grades given by the machine, is that the VIA machine cannot give the 'benefit of doubt' on borderline cases. Historically, ILMC manual graders have, with the approval of industry, given the benefit of doubt.

The Department of Agriculture and Rural Development had previously estimated that ILMC graders were giving 'benefit of doubt' in approximately 6% of cases, and this is confirmed by the almost equivalent reduction by the VIA method.

The debate in Northern Ireland now is likely to be not what the grade is, but what price is paid for what grade! Perhaps it could be more appropriate to devise a new price structure under which the price differentials between grades more accurately reflects variances in meat yield and primal yields, which determines the financial value of the carcase. ■

American salmonella outbreak

A salmonella strain, which is resistant to many commonly prescribed antibiotics, in ground turkey has so far killed one person and affected 76 across 26 states in the USA. The illnesses date back to March and the CDC has confirmed that cultures of ground turkey from four retail locations between 7th March and 27th June showed salmonella contamination. Three of the samples have been linked to the same production establishment. At the time of going to press the USDA, who oversees meat safety and would be the agency to announce a recall, has only sent out an alert about the illnesses that tells consumers to properly cook their meat as this can decrease the chances of salmonella poisoning. The cases are spread across the USA. The states with the highest number were Michigan and Ohio with 10 cases each, while nine cases were reported in Texas. Illinois had seven, California six and Pennsylvania five. The remaining 19 states have between one and three reported cases linked to the outbreak.

STOP PRESS 32 million lbs of turkey products recalled!