PhageGuard Listex Application Data Sheet Meat

PhageGuard Listex

PhageGuard Listex is a highly concentrated solution containing Phage P100. Phages are the most abundant microorganisms in the world and can be used for targeted bacterial control.

The phage used in PhageGuard Listex is selected for its killing ability against *Listeria monocytogenes.* PhageGuard is effective against all Listeria strains.

Products that reduce Listeria contamination are useful in the food industry as Listeriosis has a 20-25% mortality rate. Listex can effectively be applied as surface intervention against Listeria contamination in ready to eat meats. PhageGuard Listex has no effect on the colour, texture or taste.

Product supply

Listex is supplied in 100ml and 1 ltr bottles at a concentration of $2x10^{11}$ phages per ml.

Approvals

PhageGuard Listex is USDA/FDA GRAS approved. It is further accepted as a processing aid in Australia, New Zealand, Israel, Switzerland, The Netherlands (EU) Canada and others. It is organic certified (OMRI USA and SKAL EU). As a processing aid no labelling is required.

Application

Listeria contamination is typically found on the outside of Meat products. RTE products are especially at risk since Listeria continues to grow at refrigeration temperatures.

A sufficient amount of phages need to be present to ensure the statistical probability that the phage encounter the bacteria. The number of phages required depends on the type of surface. A smooth hot dog surface requires less phages than a rough roast beef surface.

PhageGuard Listex can be applied using various methods:

- Spray onto product prior to packaging
- Spray into package
- Spray onto slicer blade/dicer blades
- Dipping/immersion into a solution containing Listex

We work closely with major spray equipment suppliers to offer an optimal application solution.

PhageGuard Listex can also be applied in combination with other anti-microbial interventions. Listex can be used in combination with growth inhibitors, enabling to move from Alt 2 to Alt 1 protection (USDA FSIS 9 CFR 430).

PhageGuard Listex is effective in solution between $+0^0$C and 35^0C. Phage Guard Listex is diluted with clean water prior to application

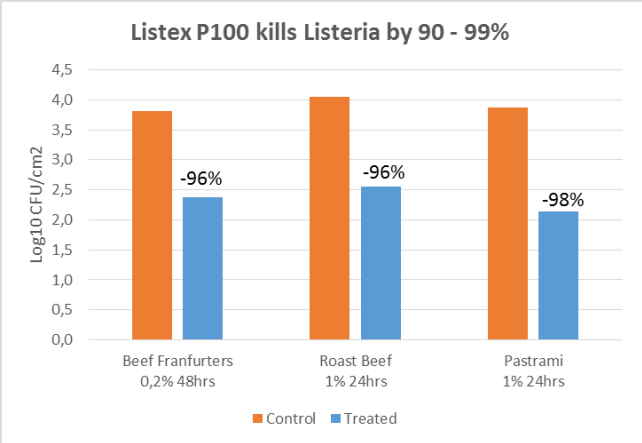
Concentration	PFU/(phage forming units) per ml
100% Listex	$2x10^{11}$
1%	$2x10^{9}$
0,2%	$4x10^{8}$

A typical application is on the meat slicer (photo insert)

PhageGuard Listex is applied at the point of slicing which potentially is a vulnerable point of contamination.

Benefits

Below graph shows the result of tests on Frankfurters, Roast Beef, and Pastrami with inoculation of 10.000 cfu/cm².



Effect of PhageGuard Listex after 48hrs on Frankfurters using a 0.2% solution, and after 24hrs on Roast Beef and Pastrami using a 1% solution of Listex sprayed at 10µml/cm².

Typically we observe a 1 log reduction within minutes and a 1.5-2 log reduction in cell count after 24hrs

Detection

The concentration of phages in PhageGuard Listex can be measured via titration using the double agar overlay (DLA) method or using an optical density measuring device.

Literature

2013: **Efficacy of bacteriophage LISTEX™P100 combined with chemical antimicrobials in reducing Listeria monocytogenes in cooked turkey and roast beef.**
Chibeu A1, Agius L, Gao A, Sabour PM, Kropinski AM, Balamurugan S.,Int J Food Microbiol. 2013 Oct 15;167(2):208-14

2012 **Eliminating low numbers of L. monocytogenes on sliced deli meat using bacteriophages**
Flemming Hansen (fh@dti.dk) & Tomas Jacobsen; Danish Technological Institute, Danish Meat Research Institute, 2 Maglegaardsvej, DK4000 Roskilde Denmark

2010 **Challenge studies used for validating towards USDA the effect of LISTEX™ P100 bacteriophages against Listeria monocytogenes on beef franks, roast beef and pastrami**
Micreos Food Safety, Phage Technology Center.

2009 **Virulent Bacteriophage for Efficient Biocontrol of Listeria monocytogenes in Ready-To-Eat Foods,** Guenther, S., Huwyler, D., Richard, .S., Loessner M.J. **,**Applied and Environmental Microbiology, Jan. 2009, Vol. 75. No. 1. pp 93-100