Meat cultures

INTERVENTION SUMMARY	
Status	Currently available
Location	Retail
Intervention type	Surface treatment or mixed into product
Treatment time	Storage life of product
Regulations	Acceptable as part of a starter culture that meets FSANZ definition Novel foods include microorganisms (including probiotics) however none are currently listed in Schedule 25-Permitted novel foods A number of *Lactobacillus* cultures have GRAS status in the US (particularly for dairy products) and are therefore not required to obtain permission as additives. GRAS status is maintained only if the culture is used under the conditions of its intended use
Effectiveness	Effective reduction of *Listeria monocytogenes*
Likely cost	Difficult to ascertain
Value for money	Difficult to ascertain
Plant or process changes	Minimal to medium – can be incorporated into processing eg. included in product mixing, or equipment added in-line for spraying or dipping RTE product.
Environmental impact	Minimal
OH&S	None identified
Advantages	May offer a natural alternative to chemical additives
Disadvantages or limitations	May not be suitable for products in which the processing conditions fall outside of the growth conditions of the meat culture

Meat cultures

Meat producers are challenged with producing safe food with an increasing consumer trend towards minimally processed, ready to eat refrigerated foods. There is therefore a demand for natural alternatives to chemical additives. Chr. Hansen produces a variety of cultures within its SafePro® range, specifically selected and developed to provide increased food safety through a positive flora of lactic acid bacteria. Other cultures may be used as part of a starter culture if they meet the FSANZ Standards Code, Standard 4.2.3 Production and processing standard for meat, definition of starter culture (1).

Bioprotective cultures can be used on cured whole muscle products such as bacon and cured meats, minced products such as fermented sausage, non-cooked sausages and ready to eat products such as cooked sliced ham, Mortadella and frankfurters. Utilising the products of Chr. Hansen typical results of bioprotective cultures are listed:

- *Brochothrix thermosphacta* commonly found in high numbers on low temperature, low oxygen stored meats, can be significantly reduced in number by the addition of a bioprotective culture of *L. sakei* (B-2, Chr. Hansen), 1 log on day 4 and up to 3 log by day 7 at 7 °C, on smoked fillet (2).
- A single strain mix of *Leuconostoc carnosum* 4010,patented by the Danish Meat Research Institute, commercialised by Chr. Hansen, B-SF-43 (3), has been shown to grow at 2 to 10 °C, produce two bacteriocins and reduce *L.monocytogenes* by at least 4 log in frankfurters after 21 days storage at 7 °C (2). The incorporation of B-SF-43 into a model fermented meat product reduced *Listeria* counts by 0.56 $\log_{10}$ cfu/g after 3 days (4). Application of *Leuconostoc carnosum* 4010 to a frankfurt type product reduced the number of *L. monocytogenes* with the reduction dependent on the initial level of bioprotective culture (5). Inoculation levels of 6.78 $\log_{10}$ cfu/g caused initial reduction of *Listeria* from 4 log cfu/g to a detectable level of 10 cfu/g after 21 days storage (5).
- SafePro® B-LC-48 is a single-strain culture of *Lactobacillus curvatus* in a freeze-dried form that can grow at 4-40°C. Due to competitive exclusion and bacteriocin production *Lactobacillus curvatus* contributes to suppressing growth of indigenous lactic acid bacteria and *Listeria monocytogenes*. When using SafePro® B-LC-48 in sliced cooked ham and emulsion sausages, the culture is applied by dipping, dripping or spraying a culture suspension onto the surface after cooking. For fresh sausages, the culture can be added by directly mixing it into the

product together with the dry ingredients. The manufacturer's instructions and should be followed on dosage.

- Incorporation of SafePro B-LC-20 (*Pediococcus acidilactici*) into a model fermented meat product reduced *Listeria* counts by 0.72 and 1.21 $\log_{10}$ cfu/g after 3 and 21 days respectively (4). *P. acidilactici* produces pediocin which is a bacteriocin with strong antagonistic properties against *L. monocytogenes*. SafePro® B-LC-20 is recommended as an extra culture added on top of the normal starter culture in the production of European style sausages fermented below 26°C. At these conditions the addition of SafePro® B-LC-20 to the normal recipe provides at least 1 log difference in *Listeria* counts compared to a control by day 7 of drying (2). This difference continues through the drying period. The acidification profile did not differ significantly. In terms of product application, when SafePro® B-LC-20 is to be added to sausage mince the contents of the pouch should be added directly to the bowl chopper early in the process together with the dry ingredients. The manufacturer's instructions and recommendations should be followed on dosage and fermentation temperature.

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