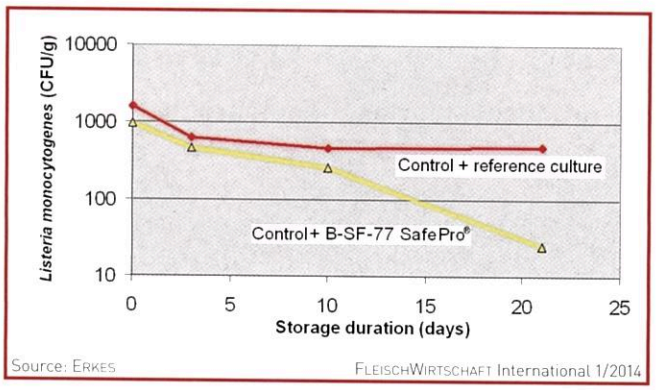
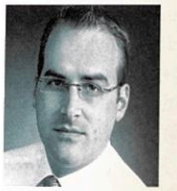


Fig. 4: Behaviour of *Listeria monocytogenes* in cold-ripened fresh onion mettwurst with the addition of B-SF-77 SafePro® by comparison with a reference culture during the 21-day storage period at +4 °C (day 0 to day 2) and +7 °C (day 2 to day 21) (mean values of double measurements)

and *Staphylococcus carnosus*. The *Leuconostoc carnosum* used is psychotropic and reproduces up to 2 °C. Furthermore, it is able to form D(-)lactic acid in the temperature range between 2 °C and 7 °C and has a strong anti-listerial effect. *Staphylococcus carnosus* is characterised by its high salt tolerance and enzymatic activity at low temperatures and thus promotes in particular the colour development and stable colour formation of "cold ripened" products in which a classic fermentation phase is not desired, in order to maintain the desired fresh character. The products were inoculated at the start of storage (day 0) with a two-strain cocktail of *L. monocytogenes* (DSM-strain and wild strain) with a concentration of about 1000 CFU/g and examined over a period of 21 days (2 days at +4 °C, 19 days at +7 °C) in accordance with §64 LMBG L00.00-22 and L 00.00-32. A double determination was carried out per batch and examination day. As is shown in Figure 4, the reference batch (red) displays only a weak reduction of *L. monocytogenes*, while the batch with the addition of B-SF-77 SafePro® (yellow) displays a sustainable inactivation of *L. monocytogenes* over the entire shelf life right up to the end of the shelf life, which is ultimately attributable to the psychotropic properties and the high enforcement capability of this culture in the prevailing milieu.

The examples set out above illustrate that with the targeted use of selected ripening and protective cultures it is possible to substantially reduce the risk posed by *L. monocytogenes* especially for short-ripened dry sausages such as teewurst, smoked dry sausages and fresh onion mettwurst that generally lie outside the definitions for food category 1.3, and to achieve sustainable inactivation during the production process as well a throughout the entire shelf lif period. It is crucial here that ripening and protective cultur coordinated for the respectiv application be used that is als coordinated with both the milie in the product and the proces conditions.



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Ripening and protective cultures in dry sausage

Active mechanisms and inactivation of *L. monocytogenes* and *Salmonella*

The targeted use of selected ripening and protection cultures today makes a crucial contribution to the process control of fermented foods and improves their product safety naturally. The active mechanisms of the microorganism cultures in the course of dry sausage ripening are very complex and offer opportunities for inactivating *Listeria monocytogenes* and *Salmonella*.

By Michael Erkes

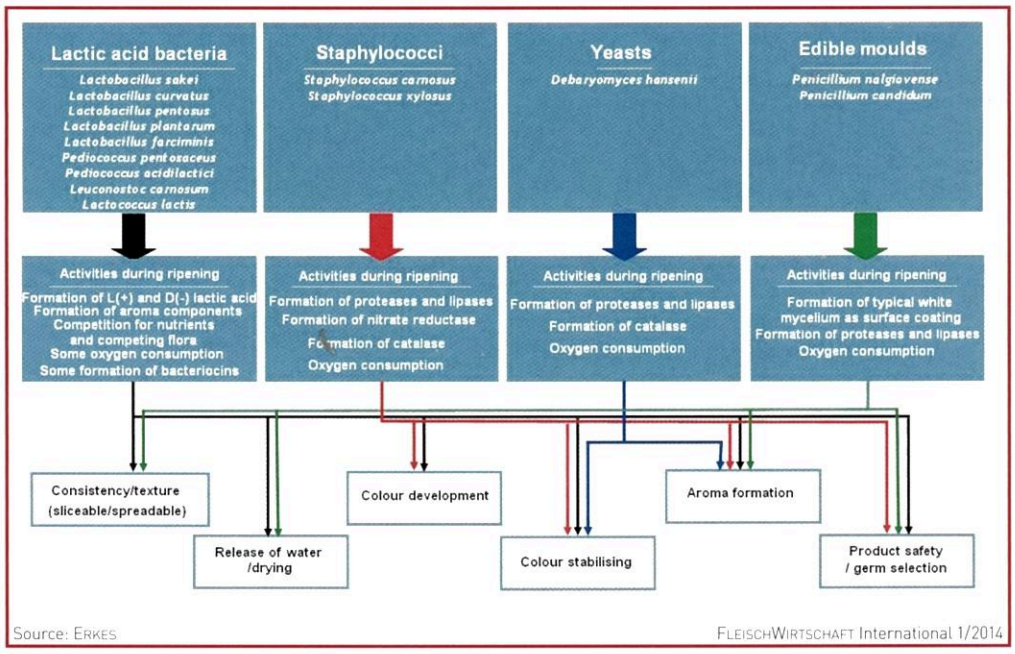

Fig. 1: Overview of the influence of selected microorganism cultures on dry sausage ripening

Current estimates assume that about one third of foods currently consumed are fermented (SKLM 2010). In this connection fermented means that the foods pass through a ripening process in which there is a change of product properties due to metabolic activities of microorganisms. Since biblical times and beyond, humans have been using spontaneous fermentation processes to produce foods, lend them their characteristic properties (aroma, consistency, appearance etc.), and not least to make them more lasting (acidification, alcoholic fermentation etc.). Fermentation, alongside salting and drying, is thus one of the oldest known food production and conservation methods.

With the discoveries of Louis Pasteur concerning lactic acid fermentation, in 1857 mankind began to understand details of the complex procedures and interactions in fermentation processes and to use them specifically for producing foods. Already just 17 years later Christian D.A. Hansen founded his company in Copenhagen. He had developed a method with which for the first time a purified, standardised rennet enzyme could be obtained for cheese production. In the following years he discovered the significance of the fermentation flora for aroma formation in cheese and began to produce selected ripening cultures which were purposively isolated from foods and produced under controlled conditions.

Selection and production of microorganism cultures

Today extensive screenings are conducted when selecting appropriate strains in order to first ensure their safety. For example the risk of a transmissible antibiotic resistance or the formation of biogenic amines and toxins through the strains used are ruled out. Furthermore, the inoculation material used by Chr. Hansen, is subjected to genetic identification. With the aid of the DNA fingerprint, and where appropriate by comparing the plasmid profiles for corresponding reference, mutations at the level of the inoculation material (PIM = Pre Inoculation Material) are ruled out. This ensures that the strain properties remain identical.

The constant functionality of the starter culture in the final application is assured by checking and standardising germ counts and activities, while freedom from contaminations is secured by observing strict purity criteria. Against the background of these measures, dry sausage producers are provided with a maximum of reproducibility. The addition of a defined quantity of selected cultures with standardised activities thus makes a key contribution to process control, product safety and the quality of fermented meat products. Thanks to these critical advantages, the use of selected ripening cultures within the production of dry sausage and raw cured products has advanced increasingly since the beginning of the 1960s (Erkes, 2011) and is now fully established.

Influence of selected ripening and protective cultures

In the course of dry sausage ripening, the use of selected ripening and protective cultures supports and optimises the complex microbiological and enzymatic processes in a number of ways (Fig. 1). With the aid of the target