

Customer Communication Sheet

CCS-08-060520

Effect of NaProLup P52 in Fermented Sausages

General Remark

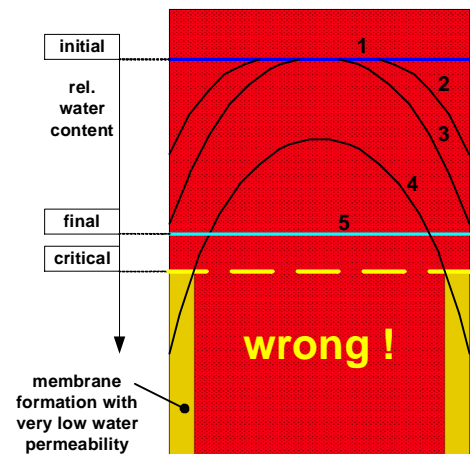
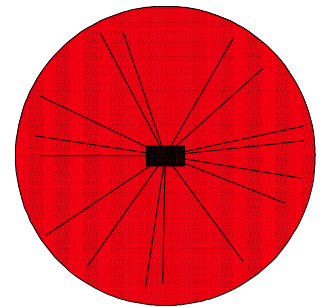
It is well known in meat industry and in butchery that fermentation and esp. drying of fermented sausages is a rather sensitive procedure. On the one hand, meat preparation is exposed to micro-biological digestion at high pH and humidity, on the other hand, temperature cannot be reduced too much (for preservation purposes) since starter cultures activity rate (for decreasing pH) and water loss rate (for decreasing water activity) strongly decrease with declining temperature.

So, fermented sausage preparation has to be balanced with the help of several parameters such as product composition (salt, sugars etc.), temperature, rel. humidity of drying air and air flow rate across the product.

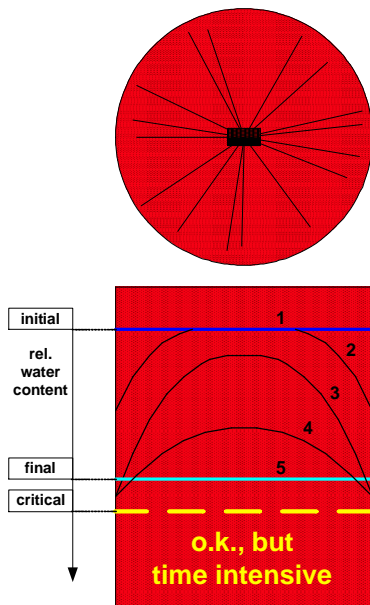
The "Burn-out" phenomenon

As a matter of fact, too low drying and acidification rates as well as a too fast drying lead to substantial hygienic risks for the final product.

In the first case, exposure time at high pH and water activity results in significant growth of undesirable micro-organisms. In the second case (see graph on the right hand side), "burn-out" of the surface occurs. Depending on the particular formulation there is a relatively precisely defined water concentration ("critical" water content) which leads to formation of a sort of surface membrane with a very poor water permeability. The inner part of the sausage will then retain the water and thus will be contaminated and digested by (potentially harmful) micro-organisms. Therefore surface water concentration has carefully to be supervised during drying.



Water concentration profiles of fermented sausages during drying/fermentation procedure: Fast drying (higher temperature, lower air rel. humidity, increased air flow rates) leads to falling below critical surface water concentration and results in formation of a membrane with a poor water permeability. Therefore, steep profiles like the number 4 have carefully to be avoided.



Proper Drying

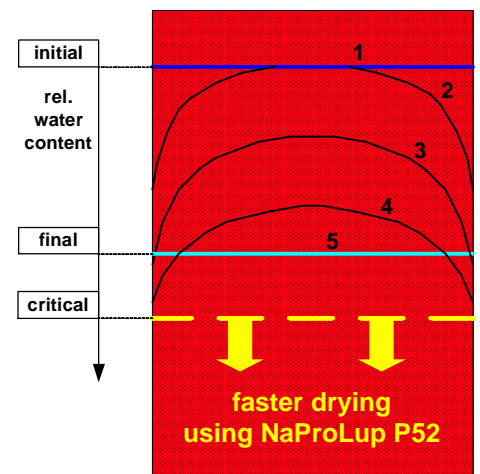
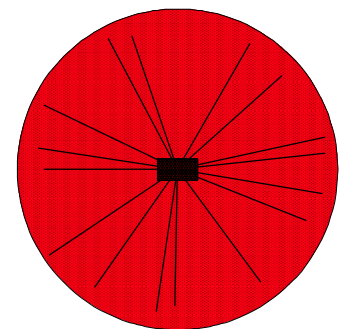
Today, fermentation and drying of fermented sausages are often automatically controlled with respect to temperature and drying air condition and flow rate. Scanned programs rather than constant parameter values are applied. In case, surface water concentration will become critical, air flow is reduced or even stopped and air rel. humidity can be adjusted towards the actual aw-value of the product. Moreover, it is sometimes necessary to interrupt drying or to package the product in plastic film under vacuum in order to grant time for equalising humidity profile inside the product ("passive drying"). This is performed simply to keep the surface water concentration of profile no. 3 and 4 (see left) above the critical value. As long as this is fulfilled the product will be in good hygienic condition after finalising fermentation.

Integral drying rate, however, is not as high as it could be.

Faster drying with the help of NaProLup P52

NaProLup P52 acts as a *humidity profile moderator* when applied in fermented sausages. This means that

- water removal from the internal part of the sausage is accelerated due to a higher water transportation rate from the macroscopic meat particles into the matrix phase – the profile's "zenith" falls under its maximum at an earlier state,
- critical water concentration for "burn-out" is slightly decreased but with a significant impact on drying rate, namely: steeper humidity gradients on the surface. This allows the operator to apply higher air flow rates for a longer time or at least to save passive drying time intervals and thus faster drying rates will be obtained,
- free fat areas which act as water permeation barrier are reliably prevented by NaProLup P52.



It seems that NaProLup P52 acts

- as a "water sucking agent" in fermented sausages, at least towards macroscopic meat particles

which makes water more readily available for permeation, and, at the same time, it acts

- as a softener in the matrix phase of the mass

which results in an increased water permeation rate at a given humidity level inside the product.

As far as spreadable fermented sausages are of interest, NaProLup's softening effect is valuable for formation of an improved consistency and texture of those products. In addition, a certain proportion of plant oil can be applied and pre-emulsified with NaProLup P52 in order to improve softness or creaminess of spreadable fermented sausages.

There is no disturbing interaction between softening effects and sliceability since both phenomena act on a significantly different humidity level in the final product.

Simply spoken:

Softening effect of NaProLup P52 is valuable

- **during processing** for dry fermented sausages (sliceable products), and
- **for the mouthfeel improvement of the final product** for spreadable fermented sausages with a shorter drying phase and a higher final water concentration.

Furthermore, it seems reasonable that NaPropLup P52 also accelerates acidification of fermented sausages (dry/sliceable or spreadable ones) through providing de-natured proteins as a ready-to-digest substrate for the starters.