

## 7 Summary

### **Microbiological status of industrial and handicraft produced minced meat from pork and „Frischer Zwiebelmettwurst“**

Until now two different legal standards apply to the productions of minced meat. On the one hand, the meat-hygiene-regulation contains instructions for EU-licensed meat-processing plants, on the other hand the national minced-meat-regulation forms the legal ground for craft-made minced meat. “Frische Zwiebelmettwürste” (a fresh spreadable German fermented pork-sausage) don't come under the latter regulation only if they have completed their fermentation. According to the meat-hygiene-regulation they count as a meat product and therefore not as minced meat, unless there aren't any features of fresh meat left in the core. As a basis for appraisal of adequate ripening the ALTS (1996) defined several criteria. To check the influence of this two legal standards and various operating forms on the microbiological condition of minced meat and “Frische Zwiebelmettwurst” and to determine the extend of contamination with vancomycin resistant enterococci, a total of 207 samples of minced pork meat and 144 “Zwiebelmettwürste” has been analyzed bacteriologically with an extensive plate set.

The results of the researchs showed the microbiological condition of the minced meat resp. the “Frische Zwiebelmettwurst” and the operating forms are tightly connected. Minced meat that was processed according to the meat-hygiene-regulation had a lower contamination with microorganisms at nearly all checked parameters. It was followed by minced pork meat that was processed in butcher shops. The highest bacterial rates (more than hundred times as high as to those rates of EU-minced meat) were found in minced meat that had been processed at meat sections of supermarkets. The results with the “Frische Zwiebelmettwurst” were similar. Here also the samples taken from industrial processing showed a distinctively lower bacterial contamination in nearly all tested parameters than the raw sausages produced at butcher shops. Only those microorganisms that are used as starting cultures had been counted at nearly equally high rates.

If the limit M for the mesophilic aerobic plate count from the meat-hygiene-regulation is used for appraisal of the minced meat samples, 18.8 % of all samples collected from butcher shops and 47.2 % of all samples collected from meat sections of supermarkets exceeded the limit, compared to 4.5 % of all samples consisting EU-minced meat.

By assessing the “Zwiebelmettwurst” samples according to the ALTS-criteria (pH factor  $\leq 5.6$ ; content of D-lactic acid  $\geq 0.2$  g/100 g; dominating fermentation flora with at least  $10^7$

lactic acid bacteria/g), 68.0 % of the EU samples achieved all parameters, with only 52.2 % in the category of comparison. 33.3 % of the craft-made raw sausages didn't achieve these three criteria and therefore would have been declared as unfermented minced meat due to the regulations. In the category of sausages from EU-licensed companies 20 % of the samples didn't fulfil the three criteria for ripening.

The verification rate of salmonellae in minced pork meat showed itself at a relatively low level, reaching only about 3 percent. The rate didn't differ between meat with industrial origin and craft origin. "Frische Zwiebelmettwurst" and also minced meat taken from meat sections of supermarkets were free of salmonellae, compared to the sausages from butcher shops that showed 1.4 % positive tests.

The detection rate of *Listeria monocytogenes* revealed strong differences between the categories. Looking at the minced meat, this microorganism could be isolated at 6.1 % of the EU samples, compared to 14.5 % (butcher shops) and 19.4 % (supermarkets) of the craft samples. The rates with the raw sausages were similar: here *Listeria monocytogenes* was cultivated from 5.3 % of the EU sausages and 11.6 % of the butchery samples.

Vancomycin resistant enterococci were detected neither in minced meat nor in spreadable fermented sausages.