

Detection, growth and survival of enteropathogenic *E. coli* in spreadable fermented Mettwurst after a typical „short fermentation“

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Background and Objectives: Fresh Mettwurst, a sausage eaten after quite short fermentation (24 to 48 hours), is the subject of investigation. Fermented sausage caused beneath other raw meat products some outbreaks of EHEC infections, mostly in USA, Japan and Australia. Two outbreaks were directly linked with fermented meat products, like dry cured salami and fresh spreadable Mettwurst. The *E. coli* serovars which caused the infections, isolated from the mentioned fermented products were *E. coli* O157:H7 and O111:(1, 2). Therefore fermented sausage can be regarded as a potential source of EHEC in human nutrition, especially regarding the fact that less than 100 organisms in toto can cause severe infection. (3, 4) These infections can lead to severe health problems such like haemolytic uremic syndrome (HUS) or haemorrhagic colitis (HC). The investigations were done in order to evaluate the impact on growth and survival of EHEC in a fresh Mettwurst type sausage.

A further aspect was to compare different systems for the detection of EHEC in Food, therefore a new developed indicator substrate (Enterohämolysin-Agar with Vancomycin EAV) was used. (5)

Methods: In trials there was produced typical „fresh Mettwurst“ with starter-cultures. To parts of a batch 2.1 % and 3.0 % Lactat was added. The Mettwurst was inoculated with different levels (1 to 1000 per g) and various serovars of enterohaemorrhagic *E. coli* (EHEC). These EHEC (O157:H7, O157:H, O111:H, O26:H11) originated from the strain-collection of the Robert Koch-Institut. The Mettwurst was fermented 2 days (at about 20 °C) and subsequently stored for 2 or 4 weeks at 4 °C. The different investigations were done on the day of production as well on day 5 and 15 (some even on day 28).

To check the state of fermentation and the hygiene of the fresh Mettwurst the plate counts of Lactobacillaceae, Micrococcaceae, Enterobacteriaceae, Pseudomonaceae as well as the total plate count were determined. The pH-value, a_w -value and the content of D-lactic-acid were measured and color and spreadability were also assessed.

The EHEC were detected and confirmed with following indicator substrates, Fluorocult® *E. coli* O157:H7-Agar, MacConkey-Sorbit-Agar and the new developed Enterohämolysinagar with Vancomycin. For enrichment and further confirmation was applied the immuno-magnetic separation (IMS), O-Serotyping (slide agglutination) and a Shiga-Like-Toxin test. In addition, the sensitivity of the IMS was compared to the sensitivity of the Enterohämolysinagar with Vancomycin.

Results and discussion: In spite a typical Mettwurst-fermentation was observed; it was found that the EHEC survived but did not increase in number during fermentation and storage. The studies revealed, that there was hardly an impact on the behavior of EHEC. Regardless Lactat was used what kind of EHEC were inoculated. Even the level of organisms inoculated (between 2 and 1000 per g) had no influence on the result.

EHEC contaminated fresh Mettwurst may cause potential risk of infection to the consumer. Therefore manufacturers are expected to observe most stringent hygienic rules of GMP and HACCP. For the determination of low EHEC numbers the Enterohämolysinagar with Vancomycin seems to be the better alternative compared to the IMS.

Pertinent Literature: Anonym (1995): „*Escherichia coli* O157:H7 outbreak linked to commercially distributed Dry-Cured Salami-Washington and California, 1994“; Morbidity and Mortality Weekly Report 44, NO. 9. - 2. Cameron, S.; Walker, C.; Beers, M.; Rose, N.; Aneer, E. (1995): „Enterohaemorrhagic *Escherichia coli* outbreak in south Australia associated with the consumption of Mettwurst“; Communicable Disease Intell. 19, 70-71. - 3. Anonym (1994): „*Escherichia coli* O157:H7. Issues and Ramifications“; US Department for Agriculture and US Center for Epidemiology and Animal Health, Fort Collins Colorado. - 4. Reida, P.; Wolff, M.; Pöhls, H.-W.; Kuhlmann, W.; Lehmann, A.; Karch, H.; Bockemühl, J. (1994): „An outbreak due to *Escherichia coli* O157: H7 in a children day care center characterized by person to person transmission and environmental contamination“; Zentralblatt für Bakteriologie 281, 534-543. - 5. Beutin, L.; Gleier, K.; Zimmermann, S.; Geier, D. (1994a): „Zur Identifizierung von Verotoxin-bildenden und enterohämorrhagischen *Escherichia coli* (EHEC) auf Indikatormährböden“; Klinisches Labor 40, 193-201.

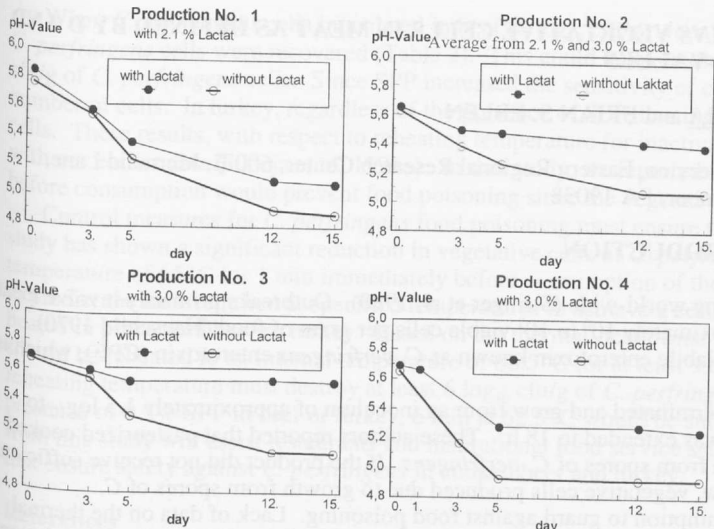


Fig 1: pH-value of different batches fermented sausage during first 15 days, produced with starter culture, with and without lactat.

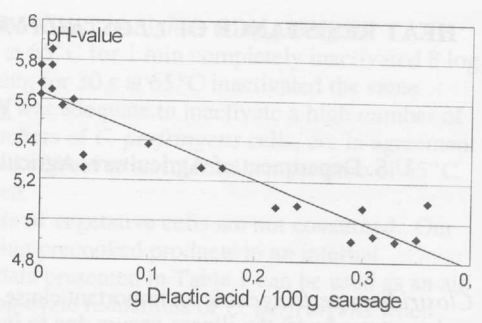


Fig 2: Correlation between pH-value and the amount of D-lactic acid in fermented Mettwurst during first 15 days.

