

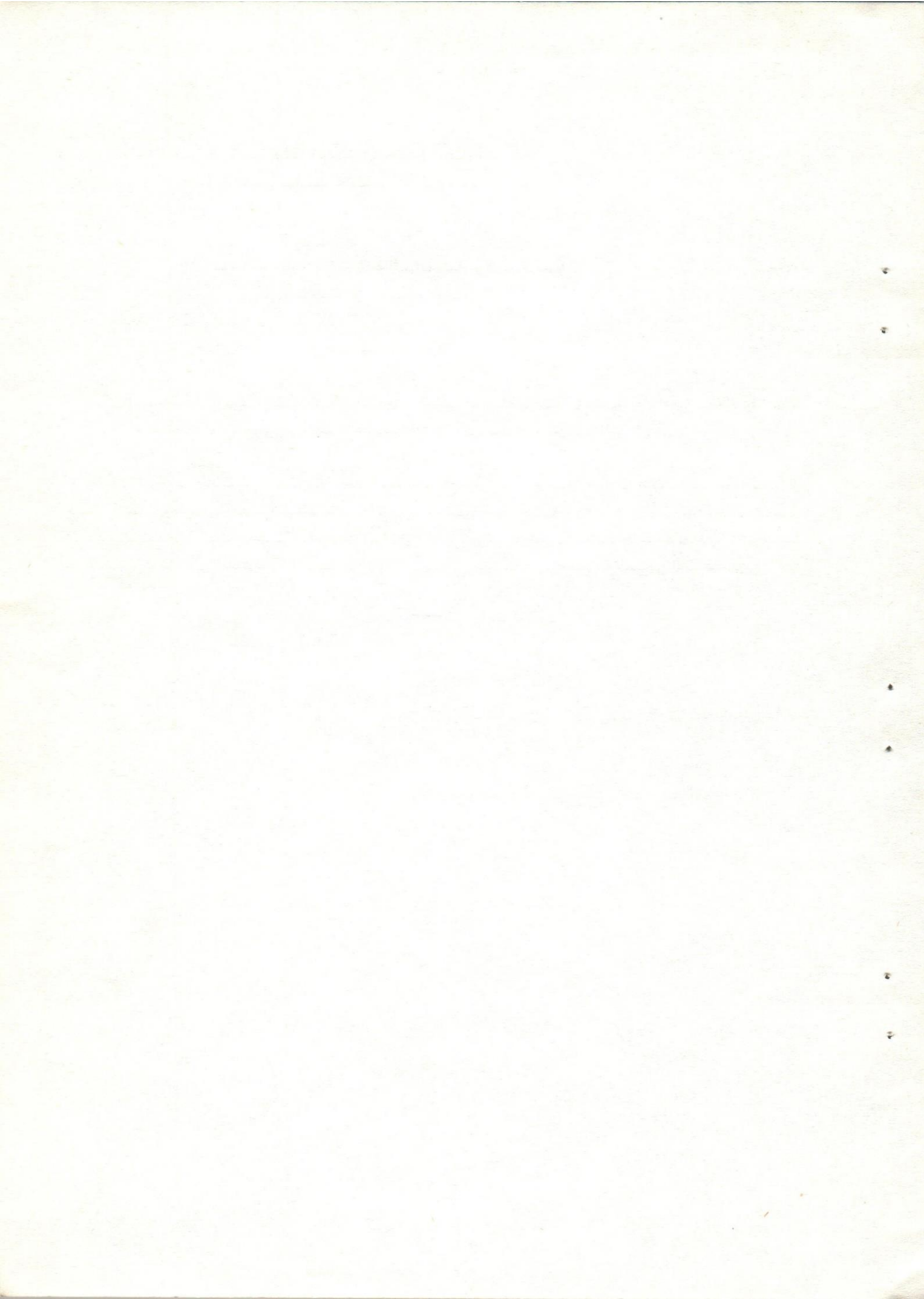
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مدى حيوية ميكروبات السالمونيلا والايشريشيا
فى سـجق الفرنكفورتر

حسين يوسف

درس تأثير حرارة تصنيع سجق الفرنكفورتر على السالمونيلا والميكروبات العسوية ، وكانت
أقصى درجة حرارة التجارب أثناء عملية التدخين تتراوح من ٦٨ الى ٠٧١ .

ووجد أن ميكروبات السالمونيلا والعسوية لا تستطيع أن تقاوم حرارة التصنيع وتختفى نهائيا
بعد التصنيع . ودراسة علاقة نسبة الدهون المختلفة (١٥ % ، ٣٠ %) المستخدمة فى
صناعة السجق وتأثير حرارة تصنيع السجق على ميكروبات السالمونيلا والعسوية ووجد
أن نسبة الدهون المختلفة لا تحمى الميكروبات من حرارة تصنيع سجق الفرنكفورتر .



VIABILITY OF SALMONELLA SENFTENBERG, SALMONELLA PARATYPHI AND ESCHERICHIA COLI IN FRANKFURTERS

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SUMMARY

Effect of thermal processing of frankfurter sausage on *Salmonella senftenberg*, *Salmonella paratyphi* and *Escherichia coli* were studied, the maximum internal temperatures of the experiments during the smoking process ranged from 68°C to 71°C. The three strains: *Salmonella senftenberg*, *Salmonella paratyphi* and *Escherichia coli* could not resist the heating process of frankfurters and completely destroyed. With respect to the relationship between the fat content (15% and 30% fat) of frankfurters and thermal destruction of *Salmonella* and *E. coli*, the fat content found to have no protection *Salmonella* and *E. coli* from the heating process given to frankfurters.

INTRODUCTION

Food poisoning strains of *Salmonella* and harmless spoilage *E. coli* are recovered from various raw meat and meat products (FLOYD *et al.*, 1953, WEISMAN *et al.*, 1969, SHOUP *et al.*, 1976 and WESTHOFF *et al.*, 1976).

The resistance of genus *Salmonella* to thermal processing discussed by some authors. HENRY *et al.*, 1969, recorded that *Salmonella* are sensitive to heat with the exception of *Salmonella senftenberg* 775 W, while the observations of BELOION *et al.*, 1963 and PALUMBO *et al.*, 1974, pointed that the heat given to frankfurters destroyed *Salmonella senftenberg* 775 W. On the other hand, SURKIEWICZ *et al.*, (1976), isolated one case of *E. coli* from 690 packaged frankfurters samples.

The effect of fat on thermal destruction of microorganisms were studied in milk and fish by KAPLAN *et al.*, 1954 and LANG *et al.*, (1934), while in meat and meat products, FLIPPA *et al.*, (1974), stated that the polivirus in ground beef is resistant to heat commonly employed during cooking of the meat containing 30% fat.

The present work was planned to investigate the following:-

- 1- The effect of thermal processing given to frankfurter sausage on *Salmonella senftenberg*, *Salmonella paratyphi* and *E. coli*.¹
- 2- The effect of fat content (15% and 30%) of frankfurters on thermal destruction of *Salmonella senftenberg*, *Salmonella paratyphi* and *E. coli*.¹

MATERIAL AND METHODS

The experiments were carried out at the Institute of Meat Technology and Hygiene of Munich University.

Meat preparations of frankfurters sausage: Lean pork and pork fat were obtained from the slaughter house and were ground, packed and stored at -17°C. Frozen emulsion representing nearly 1 Kg of lean pork and 0.5 Kg pork fat were divided into several batches. Each batch was chopped with 0.5 Kg Ice and curing agents 30 g sodium nitrate, 4.5 g sod. phosphate, 0.75 g Ascorbate, 6.0 g Dextrose and 8.0 g spices.

Emulsion were prepared in a kotter model Dian werk 69050, all component were added to cutter bowl, the mixture was chopped until the temperature of the emulsion was 0°C. The frankfurters were cooked in a smoke house for 45 minutes, the maximum internal temperatures of frankfurter sausage recorded by a thermometer inserted into the product ranged from 68°C to 71°C. After removing from the smoke house, the frankfurters were immersed in hot water at 70°C for 15 minutes followed by immersion in an ice-water slurry to cool rapidly.

Preparations of the frankfurters containing tested organisms:

- 1- The tested organisms; *Salmonella senftenberg*, *Salmonella paratyphi* and *E. coli*¹ were obtained from the stock culture of the Institute of Meat Technology and Hygiene of Munich University. The organisms were added and mixed separately with the raw-emulsion of frankfurter.

II- The samples were minced in peptone broth, and diluted till 10 folds and streaked on phenol red lactose agar (Merk. Art. 7236). The colonies were counted after 24 hours at 37°C, where routinely subjected to serological analyses (PALUMBO *et al.*, 1974).

III- The samples were prepared as above but plated on crystal violet bile agar (Oxoid cod 107), and incubated at 37°C for 24 hours.

RESULTS AND DISCUSSION

Salmonellae:

The experiments recorded in this work were done on *Salmonella senftenberg* and *Salmonella paratyphi*. Two groups of raw emulsions cured with nitrate pickling salts (NPS 2%) and sodium chloride (NaCl 2%) contained $10^7/g$ *Salmonella senftenberg*. After smoking the frankfurters with a maximum internal temperature 68°C; *Salmonella senftenberg* completely destroyed on the two groups of frankfurters cured with NPS and NaCl. In the other experiments with *Salmonella paratyphi*, the count of *Salmonella paratyphi* was $14 \times 10^6/g$ on raw emulsion cured with NPS 2% and $29 \times 10^7/g$ in the group cured with NaCl 2%. After smoking the frankfurters with a maximum internal temperature 71 °C. *Salmonella paratyphi* could not be recovered. The results indicated that the heating process of frankfurters is sufficient to destroy *Salmonella senftenberg* and *Salmonella paratyphi* and this agree with the observations of WEISMANN *et al.*, 1969, PALUMBO *et al.*, 1974 and SURKIEWICZ *et al.*, 1976 that cooking of frankfurters produced *Salmonellae* free frankfurters, and the presence of *Salmonellae* in finished products indicate recontamination after processing or insufficient heating during processing.

To detect the effect of fat on thermal destruction of *Salmonella* in frankfurters, the experiments were done with two groups of frankfurters containing 15% and 30% fat, and the count of *Salmonella senftenberg* and *Salmonella paratyphi* in the two groups were $10^6/g$. After complete cooking the frankfurters, *Salmonellae* were completely destroyed and this proved that the fat percentage play no role of microorganisms protection from thermal destruction, and the results agree with the findings of SMITH *et al.*, (1976), that the fat content of sausage products played a minor role in heat destruction of bacteria.

Escherichia Coli:

Strain of *Escherichia coli* 1 was mixed with the raw emulsion of frankfurter, the experiments repeated two times, the count was $35 \times 10^7/g$ and $20 \times 10^8/g$ in the raw emulsion, and after smoking with maximum internal temperatures ranged from 68°C to 71°C in the two experiments followed by cooking in a water bath at 70°C for 15 minutes, *Escherichia coli* could not be detected in the end product, and the heating process of frankfurter is sufficient to destroyed harmless spoilage *Escherichia coli*. The observations recorded here agree with that found by SURKIEWICZ, *et al.* 1976, that from 690 packaged frankfurter unit only one was positive for *Escherichia coli*.

With respect to the relationship between the fat percentage and thermal destruction of *E.coli* in frankfurter sausage, the count of *E.coli* in raw emulsion contained 15% and 30% fat were $11 \times 10^7/g$ and $8 \times 10^7/g$ respectively, after complete of frankfurters, *E.coli* totally destroyed in the end product and consequently the fat percentage had no protection to the microorganisms from the thermal processing of the product. Although the finding of YESSAIR *et al.*, (1946) and ZUCCARO *et al.* (1951), stated that fat content have a role in protection of bacteria and yeast from thermal destruction the results recorded here agreed with the finding of SMITH *et al.*, (1976).

Various raw meats containing food poisoning strains of *Salmonellae* (FLOYED *et al.*, 1953, SHOUP *et al.*, 1976 and WESTHOFF *et al.*, 1976), and the contamination may be due to post treatment process.

The results recorded here on thermal destruction of *Salmonella senftenberg* (other than *Salmonella senfteberg* 775 W) and *Salmonella paratyphi* support for and confirmation of the observations of BOLOION *et al.*, 1963, WEISMANN *et al.*, 1969, PALUMBO *et al.*, 1974 and SURKIEWICZ *et al.*, 1976, that the heat given to meat products, produce *Salmonella* free products, the destruction of *Salmonellae* are equal either in groups of frankfurters cured with NPS 2% or in the other groups cured with NaCl 2%. At the same time *E.coli* were destroyed completely by the heating given to frankfurters.

The effect of fat on thermal destructions of microorganisms were studied, and although YESSAIR *et al.*, 1946) and ZUCCARO *et al.*, (1951), recorded that fat content played a minor role in protecting microorganisms from the heat - destruction, the results recorded in this work, indicated that there is no relationship between fat content

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of frankfurters and thermal destruction of both Salmonellae and E.coli organisms and the results supported with the observations of SMITH et al., (1976).

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