مدى حيوية ميكروبيات السالمونيلا والبيشترية في سجق الفرنكفورتر

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درس تأثير حرارة تصنيع سجق الفرنكفورتر على السالمونيلا والميكروبيات العصبية، وكانت أقصى درجة حرارة التجفاف أثناً على التجارب بين 68 إلى 71 درجة مئوية.

وجد أن ميكروبيات السالمونيلا والعصبية لا تستطيع أن تقاوم حرارة التصنيع وتختفي نهائياً بعد التصنيع. ودراسة علاقة نسبة الدهون المختلفة (15%، 20%) المستخدمة في صناعة السجق وتأثير حرارة تصنيع السجق على ميكروبيات السالمونيلا والعصبية وجد أن نسبة الدم المختفلة لا تحمي الميكروبيات 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, Salmo-
rella 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%) 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, re-
corded that Salmonella are sensitive to heat with the exception of Salmonella senftenberg 775 W, while the obser-
vations of BELDIN et al., 1963 and PALOMBO et al., 1974, pointed that the heat given to frankfurters destroyed
Salmonella senftenberg 775 W. On the other hand, SUEKINICIS 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., (1974), 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 para-
typhi and E.coli.

2- The effect of fat content (15% and 30%) of frankfurters on thermal destruction of Salmonella senftenberg,
Salmonella paratyphi and E.coli.

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 mix-
ture was chopped until the temperature of the emulsion was 0°C. The frankfurters were cooked in an 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 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 10 folds and streaked on phenol red lactose agar (Merk. Act. 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 no. 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 x 10^6/g on raw emulsion cured with NPS 2% and 29 x 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 Salmonella 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 I was mixed with the raw emulsion of frankfurter, the experiments repeated two times, the count was 35 x 10^6/g and 20 x 10^6/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 x 10^7/g and 8 x 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, SHOOF 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 senftenberg 775 W) and Salmonella paratyphi support for and confirmation of the observations of BOLOJON 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 destruction 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

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

REFERENCES


