تأثير حرارة نضيف اللحم المغزى "كوفته" على مركبات السالمونيلا

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تم فحص أربع محامع من اللحم المغزى المحتوى على نسبة عالية من الدهن بمركبات السالمونيلا تبيعوريم وسالومونيلا سيرورت وكورن البخاري مع كل مجمع من ثم من وقود وجد أن مركبات السالمونيلا لم تقتل جميعها عند ما وصلت درجة الحرارة إلى 67.7 درجة مئوية، بينما لم يتمكن عزل هذه المركبات عند ما وصلت درجة الحرارة إلى أعلى من 67.7 درجة مئوية. وجدت أن سالمونيلا العالية في اللحم المغزى لم تحمي مركبات السالمونيلا من تأثير حرارة التصنيع.
EFFECT OF THERMAL PROCESSING OF MINCED MEAT "KOFTA" ON SALMONELLA

(With 4 Figures)

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SUMMARY

Four groups of raw minced meat with high fat content were artificially inoculated with Salmonella typhimurium and Salmonella newport. Experiments with each group were repeated three times. Thermal processing of minced meat up to 70°C does not lead to complete destruction of Salmonellae. Salmonellae were completely destroyed when minced meat heated internally to much higher than 70°C. The fat content of the samples proved to have no protective effect for Salmonellae throughout the heating process given to minced meat.

LITERATURE

Presence of Salmonellae are recorded in raw meats (WILSON et al., 1961). In Egypt, the level of contamination of slaughtered carcasses with Salmonellae reaching 8.4% result in human infection due to their survival during inadequate cooking (FLOYD et al., 1953). Cooking does not always provide complete protection as has been shown in several outbreaks of food poisoning (NEVOT, 1949). It has been pointed out that the penetration of heat into meat is slow and that the interior often may not reach sterilization temperature (JOHNS et al., 1948). This fact is of particular importance in Egypt, since some of meat dishes are not thoroughly cooked and outbreaks of food poisoning to meat are not uncommon (SANDIFORD 1943, EL-DIN et al., 1948 and AHMED 1950).

SADEK et al. (1962), in an investigation on samples of raw "Kofta" minced meat, collected from old districts of Cairo, isolated a strain of S. dublin from 2% of the samples examined.

EL-AGROUDI et al. (1963), recorded that the incidence of Salmonellae in raw "Kofta" were 7.5%. The isolated strains were S. typhimurium, S. newport and S. paratyphi var odense.

SADEK (1965), isolated a strains of S.chester from one sample of marked grilled minced meat "Kofta" (1.33%).

This work was planned to study the effect of thermal processing (Time-temperature) of minced meat "Kofta" on Salmonellae.

MATERIAL and METHODS

Lean meat and fat were obtained from butcher shops and were minced and mixed with onion, spices and greens. Fat content was nearly 30%.

A strain of S.typhimurium was obtained from the Department of Poultry, Faculty of Veterinary Medicine, Assiut University, while a strain of S. newport was obtained from the stock culture of the Institute of Meat Technology and Hygiene of Munich University.

Raw minced meat were mixed thoroughly and artificially inoculated with an appropriate number of Salmonellae suspended in nutrient broth. The mixed mass is then turned into finger like cones "Kofta" and then grilled over charcoal for 10 minutes. The maximum internal temperatures of minced meat were recorded at interval period 0,2,4, 6,8 and 10 minutes by a thermometer inserted into the product. The samples were examined at the foregoing mentioned periods during the grilling process, Viable count of salmonellae were carried out on Brilliant green agar. Suspected colonies were subjected to serological examination.

RESULTS and DISCUSSION

Minced meat may play an important role in transmitting Salmonellae especially if such raw meat is prepared and handled under sanitation. S. typhimurium is the most frequent cause of Salmonella type of food poisoning in

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and its importance to detect the lethal effect of combined time and temperature on S. typhimurium destruction due to minced meat processing, because of this importance, the bacteriology of the process was studied in details. The experiments were done using two different concentrations Log 9.9 and Log 6.1, each concentration repeated three times.

Figures 1a + 2a, shows within 10 minutes the variation in the temperatures response of minced meat processing during three experiments (from I to III). The causes of differences attributed to the external conditions of temperatures, humidity ... etc. which could not be controlled under our experimental conditions.

Figure 1b gives survivors curves for S. typhimurium in minced meat heated to temperatures Fig. 1a. The decrease of log cycles in number of S. typhimurium were 7 and 7.2 in experiments I and III, respectively. Results obtained at Fig. 2b, the decrease of log cycles in number of S. typhimurium were 3.2 and 4.3 in experiments I and III respectively, while in experiments III Fig. 1b and 2b, S. typhimurium was completely destroyed and the survivors curve reached to 0.

Variation in time required to reach various internal temperatures was observed. PALUMBO et al., (1974) stated that the lethal temperature of Salmonella was 68.3°C, and no viable salmonellae were detected in products heated more slowly to 65.6°C, on the other hand, Salmonellae were detected in the product heated hastily to 68.3°C, moreover, his results indicated that, incomplete destruction of Salmonellae occurred if the sausage took short time (4 minutes) during the smoking process to reach 68.3°C, while complete destruction of Salmonellae occurred if the product took long time (35 minutes) to reach the lethal temperature. In the present work, high log cycles Killing of Salmonellae were occurred during the normal processing of minced meat. Incomplete destruction of S. typhimurium explained by the heating curves. After 8 minutes of thermal processing (Fig. 1a), the internal product temperature were 69°C in experiment I and 70°C in experiment II. The results proved that incomplete destruction of Salmonellae due to the internal product temperature reached to the thermal point within short time. In Fig. 2b, the survivors curves of the first two experiments decreased nearly at the same pattern on Fig. 1b, incomplete destruction of S. typhimurium occurred and the rise of internal product temperature go to the thermal point within short time, in experiment I the temperature raised to the thermal point within two minutes, while in experiment II, the rise of temperature to thermal point took four minutes, this explain why the decrease of log cycles is more in experiment II than I. Our results were supported by the observations of SANDIFORD 1963, EL-DIN et al. 1948 and PALUMBO et al. 1974 that insufficient heat steps of the product as well as short time elapse to rise the temperature thermal point give the chance for incomplete destruction of Salmonellae.

Complete destruction of S. typhimurium occurred in experiments III, attributed that the internal temperature of minced meat raised too much higher than the thermal temperature and reached 75°C (Fig. 1a) and 83°C (Fig. 2a).

Raw minced meat used in this work contained 30% fat. The results pointed that fat content had no role of protection for S. typhimurium from thermal destruction, the observation agree with the findings of BAYNE (1966) and SMITH et al., (1976).

As EL-AGROUDI et al., (1963), registered S. newport in raw minced meat, experiments with S. newport were carried out in the same pattern of S. typhimurium, using two different concentrations Log 9.2 and Log 5.6. Similar findings were obtained Figures 3 and 4.

REFERENCES


STUDIES ON PROCESSING OF MINCED MEAT


Influence of processing on the number of viable S. Newport in internal product temperature.

Figure 4 (a) Internal Product Temperature

Experiment number

Figure 4 (b) Log S. Newport / gm

Figure 3 (a) Internal Product Temperature

Experiment number

Figure 3 (b) Log S. Newport / gm