قســـــــم : الصحة ومراقبة الأغذية - كلية الطب البيطرى - جامعة أسيوط

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احتمالات وجود البكتريا اللاهوائية فى بعض منتجات اللحـــوم

حســـين يوســـف

فى دراسة أجريت للكشف على مدى وجود البكتريا اللاهوائية فى ٧٦ عينة من بعض منتجات اللحوم المعروضة للبيع فى مدينة ميونج ، استطاع الباحث أن يعزل بعض الميكروبات اللاهوائية التاليـــــة :

Cl. Sporogenes, Cl. histolyticum, Cl. Sordelli, Cl. fallax and Cl. carnis.

ولم يستطع الباحث عزل الميكروب اللاهوائى والسبب للتسمم الغذائى وهو Cl. botulinum وفى تجربة أجريت لدراسة تأثير حرارة تصنيع سجق الفرانكفورتر على على بعض الميكروبات اللاهوائية وقـد وجد أن حرارة التصنيع (٥ر٦٥°م) لها تأثير يذكر عـــلى تقليل الميكروبات اللاهوائية ، وقد وجد أيضا أن هذه البكتريا اللاهوائية تنمو بسرعة على مجموعة السجق المخزن فى درجة حرارة ٢٠°م عن تلك المجموعة المخزنة فى درجة جرارة ٤°م .

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PROBABLE OCCURANCE OF PUTREFACTIVE ANAEROBES IN SOME MEAT PRODUCTS

(With 4 Table)

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SUMMARY

Study on the prevalence of putrefactive anaerobic spores of 76 samples of some meat products from several supermarkets in Munich city, western Germany were investigated and pointed that the level of contamination was low. Isolation of Clostridium botulinum failed to be detected in the examined samples. The types of clostridia isolated were: sporogenes, histolyticum, sordelli, fallax and carnis. Thermal processing of frankfurters sausage (internal temp. 65.5°C) had an effect on reducing the spore count. Cold storage of frankfurters (4°C) had more effect on slowing the rate of the growth of putrefactive anaerobic spores than storage at room temperature (20°C).

INTRODUCTION

Putrefactive anaerobes play an important role in spoilage of food. Few reports indicate the low prevalence of Cl. botulinum in meat products. KERSTIN et al., (1970) registered five samples contained Cl. botulinum type A and one sample type B out of 372 samples of semiprsserved meat products. INSALATA et al., (1969) found that Cl. botulinum type B in a sample of frankfurters among 400 samples of delicatessen type foods. FRANKSEN et al.,(1969): recorded that sulphite-reducing clostridia were found in 66% of frankfurters sausage, their number vary between 1 and 24 per gram. He suggested that the highest number of sulphite reducing clostridia would be 2×10^1 per gram. Greenberg et al., (1966) isolated clostridial spores from 2358 samples of raw meat. Out of the 19.727 putrefactive anaerobic spore formes isolated, one was confirmed as Cl. botulinum type C. The maximum spore count found in the samples tested was 51 spore per gram. Heiszler et al., (1972) registered that the greatest increment in reduction in numbers of microorganisms in frankfurters occuring in the smokehouse when the frankfurters were heated to an internal temperature of 60°C.

This investigation was planned to study (1) the incidence of putrefactive anaerobic spores, aw and pH in meat products, (2) effect of thermal processing of frankfurters sausage on clostridum sporogenes ATCC 7955, and (3) effect of storage temperature (4°C & 20°C) fo frankfurters sausage on Most Probable Number (MPN) of putrefactive anaerobic spores.

MATERIAL AND METHODS

Samples of preserved meat products were collected seperatelly from different supermarkets in Munich city. Collected samples were immediately transferred to the laboratory, where they were examined for:

I - Determination of incidence of spores:

Method recommended by STEINKRAUS (1963) using 3 series, each consisting of 3 test tubes (18 x 150 mm) having 10 ml liver broth medium (Hersum and Hulland 1969).

The MPN of spores was determined by referring the combination of positive tubes to MPN tables devised by DE MANN. (1977).

II - Identification of isolated anaerobes:

The method used is that recommended by NASR (1958).

- preperations and cooking of frankfurters containing sporgenes ATCC 7955:

As recorded by PALUMBO et al.,(1974) the cutter method for inoculation of the raw emulsion with Cl. sporgenes ATCC 7955. was used The temperature control settings of the smokehouse was 30 minutes at 150°F (65.5°C)

III - Effect of thermal processing on MPN of putrefactive anaerobic spores. Samples of already prepared Frankfurters were examined the Frankfurters were placed in plastic pallets, which were then loosely wrapped with plastic film and incubated at both 4°C & 20°C.

To detect the effect of storage temp. (4°C & 20°C) on MPN of putrefactive anaerobic spores, the sampling times were 0,2,4 & 6 days. At each sampling date, two whole Frankfurters (about 45 g each)were aseptically removed.

- Clostridium sporogenes ATCC 7955 obtained from the stock collection of laboratory of Meat technology; Munich University, and were grown for 48 hours in liver infusion broth incubated at 37°C. 10 ml. If diluted liver infusion broth were used to inoculate 1kg raw emulsion.This dilution gave an approximatt MPN 15 per gram.

IV - Measurment of aw of the samples: by using aw Wert. Messer (Rodel and Leistner, 1971).

- Measurment of the pH value; was by using ph-meter L-Pusl Munchen 15.

RESULTS

The incidence of Putrefactive anaerobic spores; aw & PH were determined & results are summarised in Table (1 & 2).

Usually, less than 0.3 Putrefactive anaerobic spores per gram were recovered from fermented sausage, the maximum count of spores per gram of sample of fermented sausage was 21 spores per gram. The average of putrefactive anaerobic spores in liver sausage was 0.9 per gram, the maximum spore count count was 29 putrefactive anaerobic spores per gram. In 12 samples Frankfurtersausage the range of incidence of putrefactive anaerobic spores were 0.4 - 21. While in smoked pork from less 0.3 to 29 putrefactive anaerobic Spores per gram were recorded. Commercially prepared minced meat were also secured from supermarkets, the minimum of spore count of each sample were 0.4 while the maximum were 7 putrefactive anaerobic spores per gram. In corned beef the spore count of each of the 9 samples tested were from less 0.3 to 0.9 putrefactive anaerobic spore per gram.

TABLE (1)

Occurance of putrefactive Spore former in some preserved meat products from Munich super markets

	Number of samples containing spore counts						
	Fermented sausage	Liver sausage	Frankfurters sausage	Smoked pork	Mincid meat	Corned beef	To.
Below 0.3	1			4		7	
0.3 - 0.9		3	4	2	5	2	
0.9 - 1.5	2	1	2		2		
1.5 - 2	3	2	3		1		
2 - 4	4	2		1	1		
4 - 7	3	1	1		1		
7 - 12	3	1					
12 - 20	1	1	1	3			
20 - 24	4	1	1				
24 - 29		1		1			
Total	21	13	12	11	10	9	76

In relation to aw & PH of preserved meat products, table (2) the minimum mean value of aw was 0.82 and the maximum mean value was 0.93. The minimum mean value of pH was 5.2, while the maximum was 6.3.

The type of clostridia isolated were: Cl. sporogenes, Cl. histolyticum, Cl. sordelli, Cl. fallax and Cl. carnis.

TABLE (2)

aw & pH values of preserved meat products

	aw			pH		
	Maximum	Minimum	Mean	Maximum	Minimum	Mean
Fermented sausage	0.915	0.82	0.88	6.4	4.5	5.2
Liver sausage	0.93	0.91	0.92	6.4	5.8	5.7
Frankfurter sausage	0.95	0.90	0.92	6.3	6.0	6.1
Smoked pork	0.94	0.82	0.87	6.3	5.3	55.8
Mincid meat	0.97	0.93	0.93	6.0	5.6	5.8
Corned beef	0.94	0.93	0.82	6.8	6.8	6.8

The effect of thermal processing of frankfurter sausage on combination of meat and spores MPN (Table 3), pointed that the thermal processing (internal temp 65.5°C) of frankfurters sausage affect the MPN and decreased from 15 to 2 spores per gram.

TABLE (3)

Effect of thermal processing of Frankfurters sausage on Cl-sporogenes ATCC 7955

	MPN spore/gm. before add. anaerobic spores	MPN spore/gm. afteradding of anaerobic spores	Temp. °C	Time in mimutes
Raw emulsion	0.4	15		
after frankfurter Processing		2	65.5	30

In respect to the effect of storage temperature (4°C and 20°C) of Frankfurters sausage the MPN of putrefactive anaerobic spores at 0,2,4 and 6 days (tables 4), showed that the spore count per gram was 2 at 0°C, while at 4°C the count increased slowly and reached 4,9 and 15 spores per gram at 2,4 and 6 days respectively.

TABLE (4)

Effect of storage temperature (4°C & 20°C)
of frankfurter sausage on MPN of putrefactive anaerobic spores

Days	MPN Spore/gm.	
	4°C	20°C
0	2	2
2	4	20
4	9	50
6	15	110

DISCUSSION

Results recorded in table (1) indicated that the level of contamination of preserved meat products with putrefactive anaerobic spores was low. The lowest level of contamination was in corned beef as this product was commercially sterile. Since this product was kept at room temparture, a low spore count was expected (STEINKRAUS et al., 1963) The relatively highest level of contamination was noticed in liver sausage and fermented sausage. In Frankfurter sausage the MPN of spores per gram varied from 0.4 to 24. The results agree with that stated by FRNKSEN et al., (1969).

Isolation of Cl. botulinum failed to be detected in the whole samples examined due to the expected low prvelance of Cl. botulinum in meat products (KERSTIN et al., 1970 & INSALATA et al., 1969), Moreover, the growth and toxin production of Cl. botulinum type E is inhibited below an aw of 0.97 (SEGNER et al., 1966, OHYE & CHRISTIAN, 1966, PIVNICK, et al., 1968).

The thermal processing of frankfurters sausage had effect on lowering the MPN spores of Cl. Sporegenes ATCC 7955. Similar findings were reported by HEISZLER et al.,(1972) GIBBONS et al., (1954). The data presented by GROSS et al.,(1946) proved that, the thermal death time decreased with lower concenterations of putrefactive anaerobic spores 3679. Meat contained 109 spores per gram required heating 121.1°C for 15.1 minute for freeing meat from these organisms, while meat contained 10 spore per gram required 6 minute in the same temperature to become free from spores.

The effect of storage temperature (4°C & 20°C) of frankfurter sausage on MPN of putrefactive anaerobic spores pointed that the cold storage (4°C) had more effect on slowing the growth of putrefactive anaerobic spores than that of frankfurters stored at room temperature (20°C). The rate of high growth of putrefactive anaerobic spores of frankfutres sausage stored at room temperature was expected. HEIZSLER et al., (1972) registered that during subsequent storage of the frankfurters at 5°C it was observed that there was an inverse relationship between internal temperatures of smoking and the capability of bacteria to multiply during storage. The higher the temperature of smoking, the lower the counts during storage.

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