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ميكروب باسيلس سيرليس في منتجات اللحوم

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تضمن البحث فحص عدد ٢٢٠ عينة عشوائية من منتجات اللحوم في محافظة
أسيوط بواقع ٧٠ عينة لحم مفري مصنع، ٥٠ عينة سجق، ٥٠ عينة لانشون و ٥٠ عينة
بسطرمة وذلك لفحص مدى تواجد ميكروب الباسيلس سيربوس في هذه المنتجات
وذلك بعزلها وحصر عددها فيها •

وقد شمل الجزء الثاني من البحث تعيين انزيم **Thermonuclease** الثابت
والمحطم بالحرارة •

شمل الجزء الثالث من البحث مدى حيوية ميكروب الباسيلس سيريس لتعرضه
للحرارة التي تتراوح ما بين ٢٢ درجة مئوية الى ٨٨ درجة مئوية (داخلية) •

كما نوقشت الأساليب الصحية لتواجد الميكروب في لحوم ومنتجاتها وطسرق
التخلص منها حفاظا على صحة المستهلك ودرءا للاخطار الناجمة عنها •

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INCIDENCE OF BACILLUS CEREUS IN MEAT PRODUCTS (With 3 Tables)

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SUMMARY

A total of 220 random samples of meat products include (70 manufactured raw minced meat, 50 sausage, 50 luncheon and 50 Pasterma) were examined for enumeration and isolation of Bacillus cereus. The mean values of B. cereus count per gram in minced meat, sausage, luncheon and pasterma were 2×10^2 , 1×10^6 , 6×10^5 and 4×10^5 respectively, on the other hand B. cereus could be detected with varying percentage of meat products in minced meat 74.3%, in sausage 56%, in luncheon 48% and in pasterma 28%. The grilling process of manufactured raw minced meat had decreased the count of B. cereus from 10^7 to 10^2 per gram, while the organisms could not be detected in minced meat subjected to boiling and roasting processing. DNase and TNase for the isolates were carried out as well as the public health importance and sanitary measures for improving meat and meat products were discussed.

INTRODUCTION

Bacillus cereus is recognized as one of the potential organisms for human food poisoning GOEFPFERT *et al.* and MOSSEL, 1982. The number of such organisms required to produce disease in man is generally of the order 10^6 - 10^8 , MOSSEL, 1982, however in compromised consumer a dose 1.2×10^3 may cause illness, GIANELLA and BRASILE, 1979.

The purpose of this investigation is to study the incidence and enumeration of Bacillus cereus in meat products (raw minced meat, sausage, luncheon and Pasterma as well as testing the isolated strains of B. cereus for production of thermolabile and thermostable DNase. Finally the study of the effect of thermal processing on the survival of the organisms in raw minced meat.

MATERIAL and METHODS

A total of 220 samples of meat products (50 samples from pasterma, luncheon and sausage and 70 samples from minced meat) were collected from supermarkets. 10 -fold serial dilutions technique were made from 1:10 dilution of the original sample up to 10^{-3} . Each sample was subjected to the following examination:

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A. LOTFI, *et al.*I- Enumeration of B. cereus :

KG agar media was used for isolation and enumeration of the organism. KIM & GOEPFERT (1971 b).

II- Identification of B. cereus :

Isolated organisms were identified morphologically and biochemically according to COWAN and STEEL (1974).

III- Surveying the isolated strains for production of DNase and TNase :

Toluidine blue-O-DNA agar (TDA) was used for testing the production of DNase and TNase by the isolates according to LACHIA *et al.* (1971).

V- Effect of thermal treatment on the survival of B. cereus

Lean meat and fat with onion, spices (fat must be 10%) were minced and thoroughly mixed with over night growth of B. cereus (B 105) in nutrient broth $10^6-10^7/1$ gm. The mixed mass is then turned into finger like cones "Kofta" and then grilled over charcoal for 0, 8, 10 and 15 minutes and on the same times the maximum internal temperatures were recorded. Sausage are also experimentally prepared according to EL-KHATEIB (1982), then divided into two groups after inoculated by the testing organism. The first group is treated by roasting for 0, 5 and 15 minutes while the second group is boiled for 0, 5, 30 minutes. The samples were examined at the a forementioned periods during the grilling, roasting and boiling processes, viable count of B. cereus were carried out on kG agar and the suspected colonies were subjected to biochemical reactions.

RESULTS and DISCUSSION

The results given in table (1) showed that out of 70 samples minced meat B. cereus could be isolated from 52 (74.29%) with the mean counts per gram was 2.2×10^5 therefore the results obtained nearly agreed with the findings obtained by HEFNAWY *et al.* (1984). Out of 50 samples from sausage, pasterma and lunchoen B. cereus could be isolated from 56%, with mean value 7.8×10^5 , (28%), with mean value of 3.8×10^5 and 48% with mean value of 5.8×10^5 respectively the results obtained in case of sausage nearly agreed with that reported by GREENWOOD *et al.* (1984). On the other hand the curing procesing of pasterma play a role in lowering the incidence of microorganisms BEGANOVIC *et al.* (1981). In case of lunchoen similar observations were obtained by HEFNAWY *et al.* (1984).

The obtained results pointed that the meat products contained high B. cereus count, and this may be attributed to contamination of flesh used for manufacture, mincing machine, grinders, equipments and knivess also consider as a sources of contamination of meat during processing. Moreover, addition of spices lead to increase in bacterial population including B. cereus HEFNAWY *et al.* (1984).

The incidence of DNase producing B. cereus recovered from 118 samples of meat products was shown in table (2). The incidence of thermolabile DNase positive B. cereus at pH (9.0) was greatest in raw minced meat 23 (44.23%) followed by pasterma 5 (35.71%), sausage 3 (10.71%) and lunchoen 1 (4.17%), while thermolabile DNase positive B. cereus at pH (6.7) was 80.77%; 66.67%; 50% and 28.57% in case of minced meat, lunchoen, pasterma and sausage respectively. Moreover, the incidence of thermostable DNase was recovered only in raw minced meat 5 (9.6%) and sausage 2 (7.14%) at pH 9. GOEPFERT *et al.* (1972) mentioned that the pathogenic character of B. cereus to a toxic protein like component, secreted by the organism during growth, this exotoxin was described to be thermolabile.

B. CEREOUS IN MEAT PRODUCTS

Table (3) showed that the survival of B. cereus within 15 minutes and variation in temperature 22°C, 73°C, 86°C and 89°C during the grilling processing of raw minced meat and pointed that B. cereus count 2×10^7 to 2×10^2 . On the other hand roasting and boiling of manufactured raw minced meat in the form of sausage had marked effect on viability of B. cereus and completely destroyed after 15 minutes and 30 minutes of roasting and boiling process respectively.

TERRANOVA and BLAKE (1978) mentioned that diarrheagenic toxin activity was destroyed by heating to 55°C for 20 minutes or 80°C for 10 minutes, however, it survived 35°C for 60 minutes and was reduced at 45°C for 30 minutes and 50°C for 20 minutes and also recorded that B. cereus spores were heat resistant and could be isolated from cooked or bioled food and could grow over a wide range of temperature 25°C to 42°C.

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A. LOTFI, *et al.***Table (1):** Incidence and count of *Bacillus cereus* in examined samples of meat products.

Products	No. of examined samples	Postive samples		Count/g		
		No.	%	Maximum	Minimum	Mean
Row minced meat	70	52	74.29	8×10^5	4×10^3	2.2×10^5
Sausage	50	28	56	3×10^6	1×10^3	7.8×10^5
Pasterma	50	14	28	2×10^6	6×10^3	3.8×10^5
Lunchoen	50	24	48	3×10^6	2×10^3	3.8×10^5

Table (2): The incidence of isolated strains of *B. cereus* producing deoxy-ribonuclease from meat products.

Meat products	No. of strains tested	Deoxyribonuclease-producing <i>B. cereus</i> (thermolabile)				Thermostable D Nase at pH (9.0)	
		pH (9.0)		pH (6.7)		No.	%
		No.	%	No.	%		
1) Raw minced meat	52	23	44.23	42	80.77	5	9.62
2) Sausage	28	3	10.71	8	28.57	2	7.14
3) Luncheon	24	1	4.17	16	66.67	-	-
4) Basterma	14	5	35.71	7	50	-	-
Total	118	32	27.12	73	61.86	7	5.93

Table (3): Effect of grilling, roasting and boiling on the survival of *Bacillus cereus* inoculated into raw minced meat and sausage.

Internal temperature °C	Minced meat		Effect of Boiling
	Grilling	Roasting	
Zero	22	Count of <i>B. cereus</i> 2×10^7	Count of <i>B. cereus</i> 2×10^7
5	--	--	8×10^2
8	73	7×10^2	-
10	86	6×10^2	-
15	88	2×10^2	2×10^2
30	--	-	$< 10^2$

