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BACTERIOLOGICAL STUDIES ON THE LOCALLY MANUFACTURED CANNED MEAT

BY

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Nowadays meat processing is highly regarded because of its widely purchosed due to its convenience and variety imparted to the meat portion of the diet. Canning is the important method of meat preservation, which provide with wholesome product that have the desirable flavor, texture, and appearance.

Canned beef is a semisolid food product in the form of compact mass which is prepared from beef, curing agents, seasonings and other optional ingredients. The bacteriological quality of canned meat is highly dependent on the condition of the raw meat, additives, equibments, washing water, empty cannes and finally the cooling water of the ratorts. Even through that; the spoilage micro-organisms couse deterioration may be destroyed during processing (Hersum and Hulland, 1969; and Nasr et al., 1972).

Spoilage of canned meat can be attributed to massive contamination, storage at an inappropriate temperature storage for an excessive periods, or due to under processing (Telegdy 1970).

Recently, meat canning industry established in Egypt by some compamies in the form of canned beef, therefore this work aimed to evaluate the bacteriological quality of such important meat product.

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MATERIALS AND METHODS

Fifty cans of locally manufactured canned beef were collected from the supermarkets of Giza and Cairo. The samples firstly were subjected to intensive examination for evidence of spoilage, as noted by end distortion of the cans. According to this step, the fifty cans were divided into 2 groups:

Group A (20 cans): cans apparently defective
Group B (30 cans): cans apparently sound.

Cans of both groups were superficially sterilized by flaming before opening of each. Ten gramms from the center of each can were prepared according to the techniques recommended by ICMSF (1978). Samples were then examined for:

1. Aerobic plate count: isolation and identification of these organisms according to ICMSF (1978).
2. Total anaerobic count: isolation and identification of the anaerobic bacteria according to ICMSF (1978).

RESULTS AND DISCUSSION

It is evident from the results given in Table (1) that the mean value of aerobic and anaerobic counts obtained from cans of both groups (A) and (B) were $3.3\times10^{6} \pm 1.8\times10^{5}$, $4.5\times10^{6} \pm 2.7\times10^{5}$, $1.4\times10^{3} \pm 0.97\times10^{2}$ and 2.8×10^{2} 0.18×10^{2} respectively.

It is also clear that the total colony counts obtained from 14 out of 20 cans of group A (70%) ranged from 4×10^{4} to 12×10^{6}, while the total colony counts obtained from 8 cans out of 30 cans of group B (26.67%) ranged from 10^{2} to 11×10^{3}. Such counts disagree with the standard specifications for meat and meat products. Ministry of Industry, cairo (1966). At the same time, the recorded aerobic counts in Table (1) were higher than those obtained by El-Razaz (1976).

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Table (1): Statistical analysis of APC and Anaerobic counts of the examined two groups of canned beef.

Groups	Aerobic plate count (APC)					Anaerobic count				
	No. of +ve sample %	Min	Max	Mean	(S.E.M)	No. of +ve sample %	Min	Max	Mean	(S.E.M)
Group A (20 cans)	14 (70%)	$4x10^4$	$12x10^6$	$3.3x10^6$	$\pm$ $1.8x10^5$	14 (70%)	$4x10^5$	$1x10^7$	$4.5x10^6$	$\pm$ $2.7x10^5$
Group B (30 cans)	8 (26.67%)	10^2	$11x10^3$	$1.4x10^3$	$\pm$ $0.97x10^2$	8 (26.67%)	10^2	$8x10^3$	$2.8x10^2$	$\pm$ $0.18x10^2$

Table (2): Incidence of aerobic and anaerobic organisms among the examined cans

Cans groups	No. of samples	Positive in both aerobic & anaerobic counts		Positive in aerobic & negative anaerobic counts		Positive in anaerobic & negative in aerobic counts		Negative in both aerobic & anaerobic & anaerobic counts	
		No.	%	No.	%	No.	%	No.	%
Group A	20	10	50	4	25	4	25	0	0
Group B	30	4	13.33	4	13.33	4	13.33	18	60

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Kilsby (1982), mentioned that higher numbers of mesophilic spore formers in non-acid shelf-stable canned meat indicated the possibility of under processing because the required heat treatment was sufficient to reduce the vegetative microbial flora to very low levels.

Kramlich et al., (1973) attributed the spoilage of canned meat to the presence of the aerobic spore-formers which were frequently present in raw materials used in canning. They added also that most members of this group are meosophilic and many were thermophilic, and some of them are strect aerobic and the others were facultative anaerobes.

Pearson & Tauber (1984), explained that a safe commercial process does not necessarily require complete destruction of microbial life, as it depending on salt and nitrite contents. In practice, complete steility was seldom achieved. Usually, the thermal processing required to assure absolute sterility was so severe that the organoleptic characteristics of canned meat were affected adversely.

Anaerobic counts recorded in Table (1) were obtained from 70% and 26.67% of the examined cans of group A and B respectively. Such counts ranged from $4x10^5$ to $1x10^7$ of mean $4.5x10^6$ and from 10^2 to $2x10^3$ of mean $2.8x10^2$ in both groups respectively.

Sadek and Sayour (1966), Elrazaz (1976) and Roushdy et al., (1981), could isolate anaerobic micro-organisms from corned beef but they did not mention to their counts.

Spore forming anaerobes were often associated with spoilage of canned meat products, these orgganisms were derived principally from soil and quite widely distributed in food materials and were frequent contaminants of meat.

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A prominent member of the anaerobic spore formers is the pathogenic organisms. The clostridia which were biochemically active, some members induce different types of unfavourable changes in the form of proteolytic properties in canned meat. Moreover other strains have been implicated in cases of food poisoning (Davis et al., 1973; Willis, 1977, ICMSF, 1978 and Brown, 1982).

The mesophilic anaerobes which were of greatest significance to the canned meat industry were the proteolytic or putrefactive anaerobes which was of the gaseous type, and usually the contents were least partially disintegrated (Kramlich et al., 1973).

From the achieved results in Tables (1,2) it is clear that 70% of the cans showed end distortion (group A) contain anaerobic organsms of the gaseous type and 50%of them contain aerobic and anaerobic organisms. On the other hand, it was found that 13.33% of the apperantly sound cans (group B) contains both anaerobic and anaerobic organisms.

Number of microorganisms in canned food and their activities will affect the acceptance and shelf-life of such food.

The results included in Table (3), showed the isolated organisms from both groups A & B and their incidence. It is proved to be B. megaterium (15 and 20%), B. subtilis (20 and 23.33%), B. cereus (20 and 20%), B. coagulans (20 and 30%), Cl. thermosaccharolyticum (5 and 10%), Cl. nigrificans (5 and 6.66%), Cl. perfringens(10 and 13.33%), Cl. carins (5 and 6.66%) and Cl. novyi (15 and 20%). Such results were going with those obtained by Roushdy et al., (1981).

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Table (3): Isolated organisms from the examined cans and their incidence

Isolates	Group A (20 cans)		Group B (30 cans)	
	(+)ve cans	%	(+)ve cans	%
B . megaterium	3	15	6	20
B . subtilis	4	20	7	23.33
B . cereus	4	20	6	20
B . coagulans	4	20	9	30
Cl. thermosaccharolyticum	1	5	3	10
Cl. nigrificans	1	5	2	6.66
Cl. perfringens	2	10	4	13.33
Cl. carins	1	5	2	6.66
Cl. novyi	3	15	6	20

It should be taken in consideration that the required measurements for improving the bacteriological condition of the locally manufactured canned food as monitoring the hygienic performance of production units and especially processing lines so that the hazards associated with particular stages of process can be recognized, checked and controlled on robine basis. The hazard analysis and critical control points (HACCP) approach to quality control shifts the emphasis from final product testing to process and raw material control. The aspect of the process which is closely monitored to ensure that control is mintained will not always be a microbial count. It can be another aspect of production, such as measurement of temperature or compelent management control over various activities e.g hygiene, stock, rotation in chill or prevention of staff movement from areas handling raw meat to those handling cooked meat.

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SUMMARY

Fifty cans of locally manufactured canned beef were collected from Giza and Cairo. the samples firstly subjected intensively for physical examination searching for outer manifestation of internal spoilage and according to this step the cans were divided into two groups, group A includes apparently defective cans, while group B includes apparently sound cans. Both groups then subjected to bacteriological examination for detection of aerobic and anaerobic counts. The mean aerobic and anaerobic counts for both groups A & B were 3.3×10^6, 4.5×10^6, 1.4×10^2 and 2.8×10^2 respectively.

REFERENCES

1. Brown, M.H. (1982): Meat microbiology. Applied science publishers LTD London and New York.

2. Davis, R.D.; Dulbecco, R.; Eisen,H.N.Hinsberg, H.; Row, S. and Wood, W.B. (1973): Microbiology, 2nd Ed. Harper and Ro, N.Y.

3. Elrazaz, M. (1976): Studies on canned meat M.V.Sc. Thesis, Faculty of Vet. Medicine, Assiut University.

4. Hersum, A.C. and Hulland, E.D. (1969): Canned foods, J, & A Churchill Ltd. London.

5. International Committee of Microbiological Specification for Foods (1978): Mciroorganisms in foods Vol. I Univ. of Toronto, Press, Toronto and Buffalo, Canada.

6. Kilsby, D.C. (1982): Sampling schemes and limits meat microbiology, Eds, Brown, M.H. Applied Science publishers LTS and New York (1982).

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7 . Kramlich, W.E., Pearson, A.M. and Tauber, F.W. (1973): Processed Meats. 2nd edition. Westport, connecticut. The AVI pubishing Company, INC.

8 . Nasr, S., Elmossalami, E. and Lotfi, A. (1972): Student Notes on meat hygiene, Vet. Med., Assiut Univ.

9 . Pearson, A.M. and Tauber, F.W. (1984): Processed meats 2nd edition. AVI publishing company, INC. Westport, connecticut.

10. Roushdy, S., Sedik, M.F., Ziedan, A. and Ghoneim, N.H. (1981): The hygienic quality of locally manufactured canned meat with vegetables. Egypt. Vet. Med. J. Cairo University 28, 185.

11. Sadek, I.M., and Sayour, E.M. (1966): Vet. Res. Lab., Dokki, Cairo, food central session papper No. 28.

12. Telegdy, I. (1970): Food sci and tech. Abst. 2, 1033.

13. Willis, A.T. (1977): Anaerobic bacteriology. Clinical and laboratory practice. 3th ed., Butterworth, London,

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