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MICROBIOLOGICAL STUDY OF CHICKEN BOUILLON / STOCK CUBES

(With 2 Tables)

By

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دراسة ميكروبيولوجية على مكعبات مرق (شوربة) الدجـــــاج

رمضان رفاعي ، عبد الحكيم أبو العلا ، بهاي الجمال جـــلال

تم جمع ٨٠ عينة من مكعبات مرق الدجاج المتداولة في أسواق أسيوط المختلفة لأربع أنواع مختلفة (أ/ ب / جـ / د /) وذلك لفحصها بكتريولوجيا وما قد يوجد بها مـــن ميكروبات مختلفة · دلت النتائج على أن متوسط العد الكلي للميكروبات الهوائيـــــة لعينات (أ / ب / جـ / د /) هو : ـ ٣ر١ × ١٠^٦ / جم ، ١ر١ × ١٠^٧ / جم ، ٧ر١ × ١٠^٧ / جم ، ٤ر١ × ١٠^٥ / جم على التوالي · وللميكروبات المعوية هو : ـ ١ × ٩٠ / جم ، ٦ر٢ × ١٠^٥ / جم ، ٤ر٢ × ٨٠ / جم ، ٨ر٢ × ٩٠ جم على التوالي وقد أمكن عزل الميكروبات الآتية : ـ

Hafnia alvei, Enterobacter spp. and Klebsiella spp.

وكانت المكعبات المفحوصة خالية من الميكروبات الآتية : ـ

Enterococci, Salmonella and Shigella.

وقد تم مناقشة الشروط الواجب توافرها في تجهيز واستهلاك هذه المكعبات وكذلـــــك مناقشة الأهمية الصحية للميكروبات المتواجدة بمكعبات مرق الدجاج ومدى خطورتها على المستهلك ·

SUMMARY

Eighty samples of chicken bouillon/stock cubes were collected from different super markets in Assiut City. The average values of the brand A,B,C and D were $3.1x10^6$, $1.1x10^7$, $1.7x10^7$ and $4.1x10^6$ /g respectively for Aerobic plate count & $1x10^5$, $6.2x10^4$, $2.4x10^5$ and $2.8x10^5$ /g respectively for Enterobacteriaceae count. The Enterobacteriaceae which could be detected in the examined samples were Hafnia alvei, Enterobacter spp. and Klebsiella spp.

Enterococci, Salmonella and Shigella could not be detected in the examined chicken bouillon/stock cubes samles. The hygienic importance of the isolated organisms were discussed.

INTRODUCTION

Food dehydration refers to removal of moisture from a food product. There are many objectives for dehydration of food products. Preservation of food through dehydration is the most evident one. By reducing the moisture content of the product, the dehydration process makes it possible to limit microbial growth or other reactions. In addition to preserving the food from a microbiological standpoint, this process also enables preservation of its flavor and nutritional characteristics. Another obvious objective of dehydration is the significant reduction in product volume, which promotes efficiency in transportation and storage of the food product (HELDMAN, 1975).

Dehydrated soup mixes are relatively new product for the house wife. Already, home economists are developing recipes using these new soup mixes as ingredients for other foods. As yet, no special attributes other than organoleptic excellence and convenience have been brought to the attention of the homemarker. Dehydrated soups could be relatively free from many of the problems of microbial origin which affect foods. Nevertheless, once the processor's container has been opened, and particularly after reconstitution, these soups become, like all other foods, a perishable product (FANELLI, et al. 1965 a).

In Egypt, the concentrated chicken bouillon/stock cubes as well as the other dry soup mixes are considered "new product". This product is used either as a flavouring agent added to the food ingredients during cooking of meals or as a ready-to-eat soup immediately consumed after rehydration with boiled water without further cooking.

The concentrated chicken bouillon/stock cubes is made by simmering parts of chicken meat and skin with added dry vegetables, corn starch, beef and chicken fat, yeast extract, spices, sugar, salt and monosodium glutamate. After a cooking period 12-24 hrs., the paste is usually formed as "cubes" and packed in special containers (MALESZEWSKI, 1976 and OCKERMAN, 1978).

Total bacterial numbers and other counts have been used not only as indices of safety, but more important, as indicative of the sanitary conditions under which the product has been prepared and the care the product has received (FANELLI, et al. 1965 b).

MALESZEWSKI (1968) pointed out that the concentrated soups (cubes) had higher contamination of aerobic microorganisms particularly the aerobic sporeformers, and that 28% of the examined samples contained 10^3-10^4, 34% contained 10^4-10^5, 26% contained 10^5-10^6, and 8.6% contained 10^6-10^7 organisms/g. He also isolated Coliforms, Enterococci, Rhizopus, Mucor, Aspergillus and Penicillium species from the same product.

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MATERIAL and METHODS

Four different processors locally manufactured soups, mainly chicken bouillon/stock cubes, composed of 20 packages of each brand with a total of 80 packages of brand A,B,C & D representing four different processors were purchased individually from different supermarkets in Assiut city.

Preparation of sample:

10 gm of each cube were aseptically placed in a waring blender with 90 ml of sterile 0.1% peptone water. The sample was blended for 3 min. at a high speed. Serial dilutions were made and then the bacteriological analysis were performed.

Bacteriological analysis:

Aerobic plate count. Standard plate count agar was used for the aerobic plate count according to A.P.H.A. (1972).

Enterobacteriaceae count. 0.1 ml of each dilution was plated onto violet red bile glucose agar (VRBG) according to MERCURI and COX (1979). Biochemical tests were done on the isolated colonies according to EDWARD and EWING (1972).

Enterococci count. Enterococci count was carried out according to EFTHYMIOU, et al. (1974).

Detection of Salmonella and Shigella organisms. Was carried out according to CRUICKSHANK, et al. (1980).

RESULTS

Obtained results were recorded in Tables 1 and 2.

DISCUSSION

The results recorded in Table 1 show that the aerobic plate count of the brand A ranged from $1x10^4$ to $2x10^7$/g, with an average of $3.1x10^6$/g. The aerobic plate count of the brand B,C and D ranged from $2x10^4$ to $2x10^8$/g, $1x10^4$ to $1x10^8$/g, and $4x10^4$ to $3x10^7$/g with an average of $1.1x10^7$/g, $1.7x10^7$ and $4.1x10^6$/g respectively.

The bacterial count values of specific components in the dehydrated soup mixes having high bacterial contents can be the major contributors to the total microbial

population of the completed mix. By their presence, these ingredients skew upward drastically the microbial content of the completed mix (KARLSON and GUNDERSON, 1965).

ADESIYUN (1984) showed that although dried fish and dried beef have low water activity, Staph.aureus has been known to survive, grow and even produce enterotoxins under such conditions.

With respect to the observations obtained by SAAD, et al. (1989) that all the examined chicken bouillon/stock cubes were free from Enterobacteriaceae, the results obtained in the present study (Table 1) pointed that the Enterobacteriaceae counts of the brands A,B,C & D were detected with avarages $1x10^5$/g, $6.2x10^4$/g, $2.4x10^5$/g, and $2.8x10^5$/g, respectively.

The presence of certain types of microorganisms, such as Coliforms, may only indicate that specific foodstuffs such as onions or garlic have been used in formulating the soup mix.

Types of Enterobacteriaceae isolated from the examined samples were Hafnia alvei, Enterobacter spp. and Klebsiella spp.

Dry soup mixes generally contain a wide variety of organisms such as Enterobacteriaceae, Coliforms, Staphylococcus aureus, aerobic spores, Bacillus cereus, Clostridium perfringens and moulds and yeasts (FANELLI, et al. 1965; NAKAMURA and KELLY, 1968; KADIS, et al. 1971; KEOSEYAN, 1971 and FALLESEN, 1976).

Enterococci count could not be detected on the plates ($> 10^2$). Moreover, Salmonella, Shigella could not be detected in the examined samples of chicken bouillon/stock cubes.

Therefore, to obtain a high quality chicken bouillon/stock cubes, treatment and the added natural spices should be of good quality. Also hygienic procedures and measures should be adopted during processing, cooling, packaging process and storage.

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Table,1: Microbiological Analysis of the chicken bouillon / stock cubes samples.

Types of count	Brand A			Brand B			Brand C			Brand D		
	Count / g.											
	Min.	Max.	Average	Min.	Max.	Average	Min.	Max.	Average	Min.	Max.	Average
Aerobic plate count	$1x10^4$	$2x10^7$	$3.1x10^6$	$2x10^4$	$2x10^8$	$1.1x10^7$	$1x10^4$	$1x10^8$	$1.7x10^7$	$4x10^4$	$3x10^7$	$4.1x10^6$
Enterobacteriaceae count	$1x10^3$	$4x10^5$	$1.0x10^5$	$1x10^3$	$1x10^5$	$6.2x10^4$	$2x10^3$	$1x10^6$	$2.4x10^5$	$2x10^4$	$4x10^5$	$2.8x10^5$
Enterococci count	$>10^2$	$>10^2$	$>10^2$	$>10^2$	$>10^2$	$>10^2$	$>10^2$	$>10^2$	$>10^2$	$>10^2$	$>10^2$	$>10^2$

Table,2: Enterobacteriaceae organisms detected in the examined samples.

No.of examined samples	positive samples		No.of strains isolated	Types of Enterobacteriaceae organisms					
				Hafnia alvei		Enterobacter spp.		Klebsiella spp.	
	No.	%		No.	%	No.	%	No.	%
80	16	20	80	50	62.5	15	18.75	5	6.25