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رئيس القسم : أ . د . / محمد عبد الرحمن عشوب .

التجمعات البكتيرية فى السجق الطازج والمحفوظ بالبرودة

طه نعمان ، فتحى النواوى ، عبده العشماوى ، عفاف سرور*

تم تحضير سجق طازج بأربع وصفات معتمدة على الأحلال الجزئ للحم الأحمر بواسطة دقيق الصويا ، البطاطس المغليه والأرز المطحون .

أجرى الفحص البكتريولوجى على عينات من هذه الوصفات لتحديد العدد الكلى للميكروبات ، الميكروبات القولونيه ، الميكروبات السبحية العنقودية ، الميكروب العنقودى الذهبى ، والميكروبات المحبة للبرودة .

تبين ان زيادة تعداد الميكروبات تعتمد على الزيادة فى نسبة اللحم بالسجق الطازج كما اتضح ان سرعة نمو الميكروبات فى درجة التخزين (٥ + ٢ درجة مئوية) يعتمد على التعداد الابتدائى للميكروبات والزيادة فى نسبة اللحم .

تم مناقشة تأثير المواد المالئة على سرعة نمو الميكروبات اثناء التخزين .

* : مركز البحوث الزراعية ـ وزارة الزراعة ـ الجيزة .

Dept. of Hygiene and Food Control,
Faculty of Vet. Med., Cairo University,
Head of Dept. Prof. Dr. M.A. Ashoub.

THE MICROBIAL ASSOCIATION IN COOL-STORED FRESH SAUSAGE
(WITH 4 TABLES & ONE FIGURE)

BY
T. NOUMAN, F.A. EL-NAWAWY, A.M. EL-ASHMAWY and A. SORUR*
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SUMMARY

Fresh sausage, prepared from four formulae, depending on partial replacement of red meat by soy flour and other fillers (boiled potato and ground rice), were examined for bacterial evaluation included determination of Total aerobic plate count Coliforms, Enterococci, Staph. aureus and Psychrotrophs. The higher microbial count of fresh sausage may be attributed to the high percent of meat. The rapid growth of microorganisms during storage at 5 ± 2°C depends on the initial number of bacteria. Effect of fillers on the rate of bacterial growth during cool storage is discussed.

INTRODUCTION

Fresh sausage is one of the most popular items in meat processing. It is formulated from a combination of raw ingredients which yield a final product of acceptable quality and competive price. The microbiological examination is necessary to improve the hygienic standards and to limit the faulty procedures in handling and processing of the meat product. Preliminary studies indicate that addition of soy protein to ground beef formulations can increase the microbial load (SETDEMAN ET AL., 1970). On further storage, there is an increase in the number of aerobic bacterial populations (WALDMAN ET AL., 1974). However, several investigators reported that heterogenous flora of fresh ground beef becomes quite homogenous when meat is kept at 5-7°C (KIRSCH ET AL., 1952; BROWN ET AL., 1958; AYRES, 1960 and JAY, 1972).

The aim of the present work is to identify the microbial population in fresh sausage, and the effect of fillers on the growth of microorganisms during storage at 5 ± 2°C.

MATERIAL AND METHODS

Four kinds of fresh sausage were prepared:

- Formula A: Contain 50% meat and 14.5% soy flour.
- Formula B: Contain 33% meat and 31.5% soy flour.
- Formula C: Contain 40% meat and 14% boiled potato.
- Formula D: Contain 40% meat and 14% ground rice.

All formulae contain 3% common salt, 0.5% black pepper, 0.25% from each of ascorbic acid; nutmeg; red pepper; sodium nitrate, 1% parsely, 10% water and up to 100% fat and some other fillers.

Five samples from each formula were chosen as test samples, each weighing one Kg.

The initial microbial counts were determined using the spread technique recommended by ICMSF (1978).

The samples were stored at 5 ± 2°C and examined for changes in microbial counts every three days till the development of oof odour and taste.

The microbial counts conducted in this work included:-

1- Aerobic plate count using trypticase soy agar.
2- Coliform count on violet red agar (oxoid).
3- Enterococci count on Slanetz and Bartley medium (oxoid).
4- Staph. aureus count on Baired-Parker's medium (oxoid).
5- Psychrotrophic (Preudomonas and Aeromonas) count on GSP Agar (Merck).

* : Agriculture Research Center, Ministry of Agriculture, Giza.

RESULTS

The results reported in Tables (1-4) showed the average log. counts of microorganisms in the four kinds of the freshly prepared sausages and during the period of storage at 5 ± 2°C.

The effect of fillers on the propagation of microorganisms during the storage period was illustrated in Figure I.

DISCUSSION

The higher aerobic microbial count reported in formulae A and D (log. count 5.9) may be attributed to the high percent of meat in formula A, and to the additon of unheated rice flour as a filler in formula D, which could be considered as a major source of contamination (Tables 1 & 4).

The growth curve during storage showed that the microbial count reached its maximum after 12 days storage in formula A, while in the other formulae after 18 days (Figure 1). The rapid growth of microorganisms depends on the initial number of bacteria (BOWDELL and BOARD, 1971), and the comparative high percentage of meat in formula A, as the meat obtained from butcher's shops or abattoirs harbours a heterogenous flora (AYRES, 1955, EL-MOSSALAMI and WASSEF, 1971).

Coliform organisms multiplied rapidly and formed large population during storage of sausage containing boiled potato (formula C) and ground rice (formula D) as fillers (Fig. I).

The presence of such large numbers of coliforms gives a warning that the conditions which brings about contamination of ingredients can easily lead to spoilage, loss of quality or consititute public helath hazzard (SADEK, 1963, ICMSF, 1980).

The rapid growth rate of Pseudomonas organisms during storage were obvious in formulae A&B. This could be safely attributed to the presence of soy flour.

Aeromonas bacteria was increased up to 6th to 9th day of storage then tend to decline again. Such finding may be due to other bacteria like coliforms which overcome its growth and also to the effect of refrigeration temperatures in preventing the growth of some genera of organisms normally found on meat including Aeromonas (JAY, 1972).

The count of Staph. aureus seems to be higher in formulae A&B than in the other two formuale. However the growth rate of Staph. aureus was more stable in formulae C&D probably because of the carbohydrate substrate they contain.

The initial count of Enterococci was higher in formula A than in the othem formulae, but the differences in fillers seem to have no remarkable effect on its growth rate.

However, one can safely conclude that the more red meat in sausage, the more microbial flora the product might contain. Although the introduction of boiled potato as a filler in sausage formulation produced lower initial microbial load, yet by storage the carbohydrate substrate provided better flourishing media during cool storage.

It seems obvious that the partial replacement of red meat by soy flour induced better microbial safety.

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Table (1) Bacterial counts in sausage samples formula A.

Storage period at 5±2°C/days	Count (Log./g) Total aerobic	Coli-form	Entero-cocci	Staph. aureus	Pseud-omonas	Aerom-onas.
0	5.9	3.1	3.0	2.9	2.9	2.6
3rd day	6.3	3.9	3.7	3.0	3.3	3.1
6th day	6.5	4.1	4.1	3.2	3.9	3.4
9th day	7.3	4.9	4.8	3.5	4.5	2.9
12th day	8.7	5.2	5.3	4.1	5.1	2.9
15th day	8.9	6.4	5.7	4.6	5.8	2.7
18th day	9.0	7.5	5.9	4.8	6.4	2.7

Table (2) Bacterial counts in sausage samples formula B.

Storage period at 5±2°C/days	Count (Log./g) Total aerobic	Coli-form	Entero-cocci	Staph. aureus	Pseud-onomas	Aerom-onas.
0	5.3	3.0	2.9	2.6	2.3	2.0
3rd day	5.9	3.7	3.0	2.7	2.9	2.9
6th day	6.4	3.9	3.2	3.0	3.7	3.3
9th day	6.9	4.5	3.5	3.2	4.4	3.3
12th day	7.5	4.9	3.9	3.5	4.9	3.2
15th day	8.0	5.2	4.4	3.8	5.0	2.9
18th day	8.9	5.8	4.6	4.1	5.9	2.9

Table (3): Bacterial counts in sausage samples formula C.

Storage period at 5±2°C/days	Count (Leg./g.)					
	Total aerobic	Coli-form	Entero-cocci	Staph. aureus	Pseud-omonas	Aerom-onas
0	5.3	3.1	2.3	2.7	2.3	2.0
3rd day	5.8	3.9	2.9	3.0	3.0	2.0
6th day	6.1	4.3	3.5	3.6	3.7	2.3
9th day	6.9	4.9	4.0	4.0	3.9	2.3
12th day	7.4	5.5	4.6	4.4	4.0	2.0
15th day	7.9	6.1	5.0	4.9	4.6	2.0
18th day	8.7	7.0	5.7	5.0	4.8	2.0

Table (4): Bacterial counts in sausage samples formula D.

Storage period at 5±2°C/days	Count (Log./g.)					
	Total aerobic	Coli-form	Entero-cocci	Staph. aureus	Pseud-omonas	Aerom-onas
0	5.9	3.0	2.6	2.0	2.0	2.0
3rd day	6.1	3.5	3.2	2.0	2.9	2.0
6th day	6.5	4.0	3.9	2.7	3.5	2.0
9th day	7.0	4.9	4.7	3.0	3.9	2.6
12th day	7.6	5.6	4.9	3.2	4.4	2.4
15th day	7.8	6.4	5.3	3.4	4.7	2.0
18th day	8.8	6.9	5.7	3.8	4.8	2.0

Fig. 1. Changes in Bacterial Counts of Sausages stored at 5±2°C