University: Basrah College: veterinary Medicine Course Level: Master Course: Food micrbiology Topic: Spoilage of canned food

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## Spoilage of canned food

#### Introduction

Canning is one of important method of packaging food for long term storage. Normally food is stored in metallic containers along with heat treatment. The heat treatment differs depending upon type of food. There is always a chance that microorganisms may survive if the heat treatment is not proper thereby leading to spoilage of food.

The spoilage of can could be due:

### 1. Chemical reason

The chemical spoilage in most cases is due to production of hydrogen gas in can due to reaction of acid in food and iron on can. This spoilage is termed as Hydrogen swell. It occurs due to following factors:

- a) Increased storage temperature
- b) Increased acidity of food
- c) Presence of soluble sulfur and phosphorous compounds
- d) Lack of lacquering of can at internal surfaces

### 2. Biological reason

The biological spoilage is due to microbial activity. In heat treated cans, the growth of microorganisms occur due to:

\*sub-optimal heat treatment

\* excessive microbial load and contamination in product

\* leakage of can are introduced Bacteria into can by holes.

The microbial spoilages of canned food are caused by:

## a)thermophilic bacteria spore forming

Spoilage by these types of bacteria is most prevalent in under processed heat treated canned foods. Their spores survive the heat treatment and undergo asexual cell formation and subsequent growth in canned conditions. **Major spoilages by these organisms are:** 

**Flat sour spoilage:** One characteristic of this spoilage is that ends of can remain flat during souring. Because of this condition, the detection of spoilage from outside is impossible thereby culturing of contents become necessary to detect the type of organisms. Main organisms involved are Bacillus. Bacillus spp has ability to produce acid without gas formation. Flat sour spoilage occurs more frequently in low acid foods.

**Thermophilic anaerobic spoilage (TA spoilage):** This type of spoilage is caused by <u>Clostridium</u> thermosaccharolyticum, thermophilic anaerobe not producing hydrogen sulfide. It produces acid and gas in foods. Spoiled food produces sour or cheesy smell.

Sulfur stinker spoilage (putrefaction): This type of spoilage is caused by <u>Desulfotomaculum nigricans</u>. The spores of these organisms are destroyed at optimal heat treatment, thus presence of this organism usually indicates under processing in terms of heat treatment. It produces hydrogen sulfide which produce typical odour. This type of spoilage occurs in low acid foods

# b) mesophilic bacteria spore forming

Bacillus and Clostridium are involved in this type of spoilage which is usually indicative of under spoilage

# c)mesophilic bacteria non-spore forming

Presence of bacteria non spore formers in cans indicate post processing contamination. The organisms whose asexual cells are heat resistant are more readily found. Following organisms are more prominent: Enterococcus, Micrococcus, Leuconostoc, Streptococcus thermophiles, Lactobacillus and Microbacterium.

Note: presence of these organisms indicates leakage of container. Cooling water is one of the important source of contamination, thus coilforms also gain entry into the can through leakage

## d)Yeasts

Yeasts and their spores are not thermo tolerant, thus they are not found in suitably heat treated cans. Their presence indicates under processing or post pasteurization contamination through leakage. Fermentative yeasts are more prominent and they produce carbon dioxide, thus causing swelling of cans. Film yeasts too can grow on the surface of the food products

## e)Molds

Among molds, Aspergilus and Penicillium are most spoiling organisms. These can grow at high sugar concentration. Acidification is considered method of preventing growth of molds. Some of the molds are resistant to heat. Molds are more common in home canned foods where heating as well as sealing is not under total aseptic conditions

### 3. Physical reason

The Physical spoilage is due to

\*Over filling

\*Internal vacuum too high

\*Use of cans of inadequate substances

\*Rough handling