United States Department of Agriculture
Food Safety and Inspection Service
Office of Public Health Science
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Laboratory Guidebook
Notice of Change

Chapter **new**, revised**,** or archived: MLG 10 Appendix 6.00

Title: Key to Probable Cause of Spoilage in Low Acid Canned Foods

Effective Date: 01/10/22

Description and purpose of change(s):

This table outlines the probable causes of spoilage in low acid canned foods and was issued in association with MLG 10 Examination of Heat Processed, Hermetically Sealed (Canned) Meat and Poultry Products.

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Title: Key to Probable Cause of Spoilage in Canned Foods		
Revision: Original	Replaces: NA	Effective: 01/10/22

Key to Probable Cause of Spoilage in Low Acid Canned Foods

Characteristics of Material in Cans							
Condition of Cans	**Odor**	**Appearance**	**Gas (CO_2 & H_2)**	**pH (Low-Acid Foods; pH Range 5.0 to 8.0)**	**Smear**	**Cultures**	**Diagnosis**
Swells	Normal to "metallic"	Normal to frothy (Cans usually etched or corroded)	More than 20% H_2	Normal	Negative to occasional organisms	Negative	Hydrogen swells
	Sour	Frothy; possibly ropy brine	Mostly CO_2	Below Normal	Pure or mixed cultures of rods, cocci, yeasts or molds	Growth, aerobically and/or anaerobically at 35°C, and possibly at 55°C.	Leakage
	Sour	Frothy; possibly ropy brine, food particles firm with uncooked appearance	Mostly CO_2	Below Normal	Pure or mixed cultures of rods, coccoids, cocci and yeasts	Growth, aerobically and/or anaerobically at 35°C, and possibly at 55°C. (If product received high exhaust, only spore formers may be recovered)	No process given
	Normal to sour-cheesy	Frothy	H_2 and CO_2	Slightly to definitely below normal	Rods, med. Short to med. long, usually granular; spores seldom seen	Gas, anaerobically at 55°C, and possibly slowly at 35°C.	Post-processing temperature abuse Thermophilic anaerobes
	Cheesy to putrid	Usually frothy with disintegration of solid particles	Mostly CO_2; possibly some H_2	Slightly to definitely below normal	Rods; usually spores present	Gas anaerobically at 35°C.	Under processing - mesophilic anaerobes (possibility of *C. botulinum*)
	Slightly off – possibly ammoniacal	Normal to frothy		Slightly to definitely below normal	Rods; spores occasionally seen	Growth, aerobically and/or anaerobically with gas at 35°C and possibly at 55°C. Pellicle in aerobic broth tubes. Spores formed on agar and in pellicle.	Under processing - *B. subtilis* type

Characteristics of Material in Cans Cont.							
Condition of Cans	**Odor**	**Appearance**	**Gas (CO_2 & H_2)**	**pH (Low-Acid Foods; pH Range 5.0 to 8.0)**	**Smear**	**Cultures**	**Diagnosis**
No vacuum and/or cans buckled	Normal	Normal	No H_2	Normal to slightly below normal	Negative to moderate number of organisms	Negative	Insufficient vacuum, caused by 1) Incipient spoilage, 2) Insufficient exhaust, 3) Insufficient blanch, 4) Improper retort cooling procedures, 5) Over fill
Flat cans (0 to normal vacuum)	Normal to sour	Normal to cloudy brine		Significantly below normal	Rods, generally granular in appearance; spores seldom seen	Growth without gas at 55°C. Spore formation on nutrient agar	Post-Processing temperature abuse Thermophilic flat sours.
	Normal to sour	Normal to cloudy brine; possibly moldy		Significantly below normal	Pure or mixed cultures of rods, coccoids, cocci or mold	Growth, aerobically and/or anaerobically at 35°C., and possibly at 55°C.	Leakage