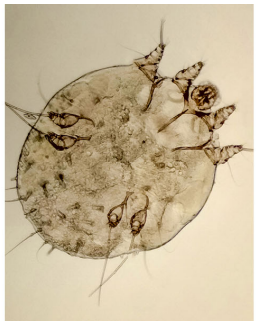
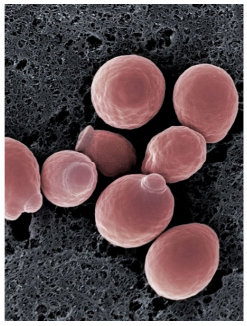
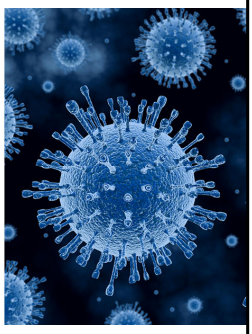

Microbiological Testing of Foods:
Microorganisms in food

ELD2
ELD3

Microorganisms in food



Molds **Bacteria** **Parasites** **Yeast** **Viruses**

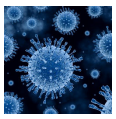
The field of microbiology includes diverse organisms from different domains of life. Parasites, fungi, and yeasts represent eukaryotic, organisms with a nucleus within their cells. They may be unicellular or multicellular organisms. Bacteria are single celled organisms that lack a nucleus. Viruses are actually not living organisms, as they are obligate intracellular parasites. Collectively these diverse organisms are termed germs, microbes, microorganisms, bugs, among other names. Microorganisms are important in a number of fields including medicine, agriculture, chemical and food industries.

Slide 2

ELD2 What parasite is this? Those relevant to this presentation include Giardia, Cyclospora, Toxoplasma, Trichenella. I honestly don't know what all stages of those look like. This image could be one of them.
Erin Leigh DiCaprio, 6/11/2019

ELD3 The viruses we are interested in are norovirus, hepatitis A virus. They look a little different that this image, they don't have surface spikes. Can we find a image more like that?
Erin Leigh DiCaprio, 6/11/2019

Microorganisms in food

	 bacteria	 yeasts	 molds	 viruses	 parasites
Foodborne Illness	✔		*	✔	✔
Fermentation	✔	✔	✔		
Spoilage	✔	✔	✔		

*Some molds can produce a mycotoxin in certain foods.

This slide lists the types of microorganisms important to foods. They are categorized as either contributors of food spoilage, foodborne illness, or food enhancement. Bacteria are the most important group of microorganisms to consider because they contribute significantly to food safety, food spoilage, and fermentation. Therefore they are often a frequent target for microbial testing. Molds and yeasts are also targeted because of their association with spoilage. Viruses and parasites are not included in most microbial testing schemes and are often only tested for in an outbreak investigation.

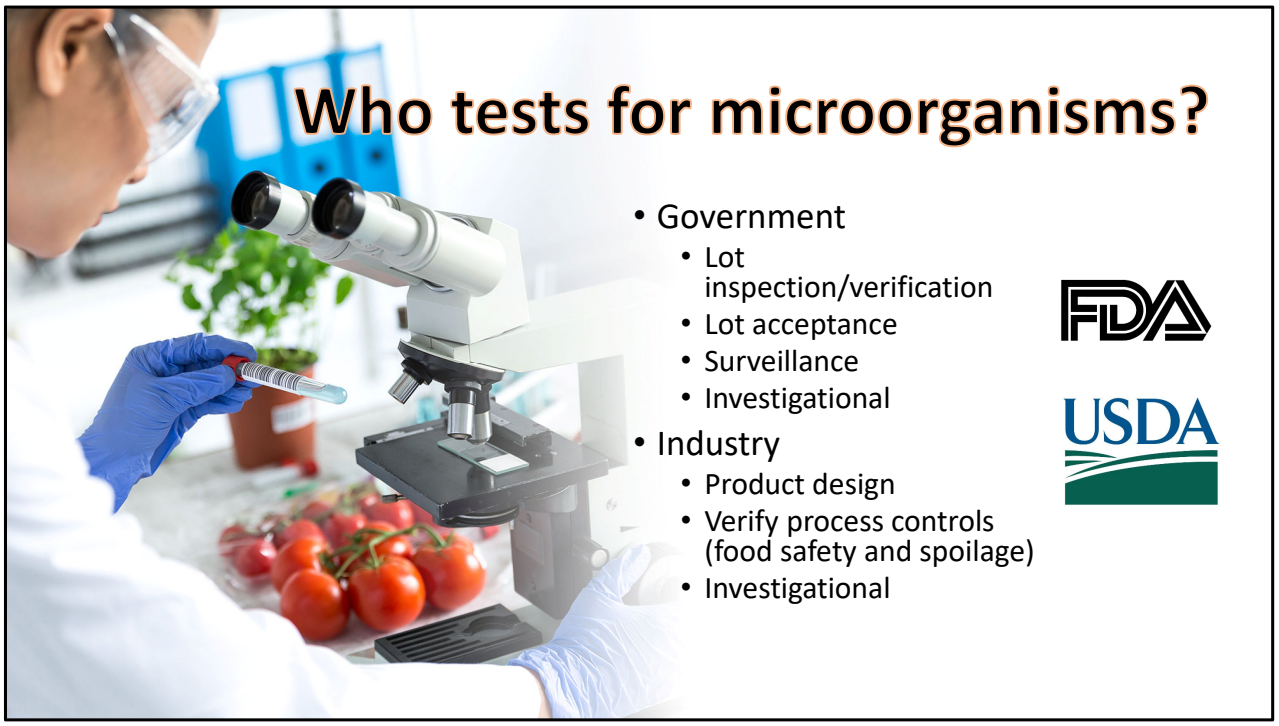
It is important to understand that different types of microorganisms have differing test methods. There are general microbial tests, such as an aerobic plate count (APC), that will test broadly for a general category of microorganisms. In this case, all aerobic bacteria. There are also selective tests that test for specific organisms. It is important to understand the different targets and associated methods for any microbiological testing program.

Why test for microorganisms?

To reach a decision or make a judgement related to:

- Safety
- Adherence to Good Manufacturing Practices (GMPs)
- Raw ingredient utility
- Shelf life

The first thing that often comes to mind when we think of microbiological testing of foods is safety. Microbial pathogens, most notably bacteria, are often the cause of food borne illness and therefore often are the target or microbial testing regimes. An example would be testing for E. coli O157:H7 in final product. Microbial testing may also be used to determine whether GMPs are being followed. An example would be aerobic plate count conducted on non food contact surfaces after cleaning and sanitation. Microbial counts are often used to determine the quality of raw ingredients and can indicate the ability to use raw ingredients for a specific purpose. For example, an ingredient in yogurt with a high microbial load may interfere with fermentation. Finally microbial testing can be used to determine the shelf life of a food. Testing for levels of spoilage molds, yeasts, and bacteria can help one predict how long a product will be stable during storage. Another important reason to do routine microbial testing is to gather baseline data. This allows you to determine your microbial action levels later on. Also important for trace back investigation in the case of a recall.



As a food processor you will be conducting microbial testing in some capacity. Microbial testing is an import aspect to consider when going through the product development process. Understanding the microbial load and impact of product formulation on the growth or inhibition of growth of microorganisms will ultimately drive decision making. Often, microbial testing is used to verify that a process control is effective. For example, a producer of pickled beets may routinely test final product for both spoilage and pathogenic organisms to ensure that the acidification and heat treatment are effectively eliminating these organisms. Microbial testing can also be used to assist in root cause analysis. If a fermentation is consistently failing, microbial testing may point to an ingredient with a high initial microbial count that is outcompeting the fermentation organisms. Environmental microbial testing can also help point to a source of contamination that occurs after a kill step, leading to either food safety or spoilage issues.

Summary

- Microorganisms include: fungi (molds and yeasts), parasites, bacteria, and viruses
- Microorganisms can cause spoilage or safety issues or be used beneficially in food production
- Reasons for microbial testing include safety, adherence to Good Manufacturing Practices (GMPs), raw ingredient utility, shelf life

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