Department of Food Science

FATTOM – Factors Affecting Bacterial Growth in Food

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FATTOM is an acronym used in food safety to describe the six key factors that affect bacterial growth in food: **F**ood, **A**cidity, **T**emperature, **T**ime, **O**xygen and **M**oisture. Controlling these factors does not kill bacteria already present in food but limits or slows their growth.

FOOD (Nutrient): Bacteria need nutrients to grow. They generally prefer foods that are rich in proteins and carbohydrates such as meat, dairy, cooked rice and eggs.

ACIDITY (pH): Bacteria grow best in neutral to slightly acidic environments (pH 4.6 to 7.5). Foods that are highly acidic (like lemons or vinegar) control bacterial growth.

TEMPERATURE: The "danger zone" in food safety refers to the temperature range at which bacteria grow rapidly. According to the FDA Food Code 2022, this temperature range is defined as 41 F to 135 F. Keeping food out of the danger zone limits the bacterial growth.

TIME: Bacteria need time to multiply. If food stays in the danger zone for more than four hours, it can become unsafe*. Time and temperature work together hand in hand.

OXYGEN: Some bacteria need oxygen to grow (aerobic) while others grow without it (anaerobic), and some can grow with or without oxygen (facultative bacteria).

MOISTURE (Water): Bacteria need water to grow. Foods with high water activity (i.e. more available water for microbial growth) are more susceptible to bacterial growth. Drying or adding salt/sugar reduces water activity.

* Cold foods with initial temperature of 41 F or less when removed from cold holding temperature control and kept below 70 F must be discarded after six hours.

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