

# HURDLE TECHNOLOGY

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- **Hurdle technology** is a method of ensuring that pathogens in food products can be eliminated or controlled.
- This means that food products will be safe for consumption, and their shelf life will be extended.
- Hurdle technology usually works by combining more than one approach. These approaches can be thought of as "hurdles".
- The pathogen has to overcome if it is to remain active in the food.
- The right combination of hurdles can ensure all pathogens are eliminated or rendered harmless in the final product.

- Defined by Leistner (2000) as an intelligent combination of hurdles which secures the microbial safety and stability as well as the organoleptic and nutritional quality and the economic viability of food products.
- Eg. of hurdles in a food system are high temperature during processing, low temperature during storage, increasing the acidity, lowering the water activity or redox potential, or the presence of preservatives.
- Common salt or organic acids can be used as hurdles to control microbials in food.
- Many natural antimicrobials such as nisin,

- Natamycin, other bacteriocins and essential oils derived from rosemary or thyme, also work well.
- Principal hurdles used for food preservation

Parameter	Symbol	Application
High temperature	F	Heating
Low temperature	T	<u>Chilling</u> , <u>freezing</u>
Reduced <u>water activity</u>	$a_w$	<u>Drying</u> , <u>curing</u> , <u>conserving</u>
Increased <u>acidity</u>	<u>pH</u>	Acid addition or formation
Reduced <u>redox potential</u>	$E_h$	Removal of oxygen or addition of <u>ascorbate</u>
<u>Biopreservatives</u>		Competitive <u>flora</u> such as <u>microbial fermentation</u>
Other <u>preservatives</u>		<u>Sorbates</u> , <u>sulfites</u> , <u>nitrites</u>

# Types of hurdles used for food preservation (from Ohlsson and Bengtsson, 2002)

Type of hurdle	Examples
Physical	<p><u>Aseptic</u> packaging, electromagnetic energy , high temperatures (<u>blanching</u>, <u>pasteurization</u>, <u>sterilization</u>, <u>evaporation</u>, <u>extrusion</u>, <u>baking</u>, <u>frying</u>), <u>ionizing radiation</u>, low temperature (chilling, freezing), <u>modified atmospheres</u> packaging films , photodynamic inactivation, ultra-high pressures, ultrasonication, ultraviolet radiation</p>
Physicochemical	<p>Carbon dioxide, ethanol, <u>lactic acid</u>, <u>lactoperoxidase</u>, low pH, low <u>redox potential</u>, low <u>water activity</u>, <u>Maillard reaction</u> products, organic acids, oxygen, ozone, phenols, phosphates, salt, smoking, sodium nitrite/nitrate, sodium or potassium sulphite, spices and herbs, <u>surface treatment</u> agents</p>
<u>Microbial</u>	<p><u>Antibiotics</u>, <u>bacteriocins</u>, competitive flora, protective cultures</p>

- In modern meat processing, the effect of heat treatment can be supported by the application of **additional “hurdles”**, which have the potential to slow down microbial growth.
- Such “hurdles” allow keeping the heat treatment of sterilized products at lower temperature levels, so that the product quality is less affected.
- Alternatively, this technology can be used to produce shelf-stable products of the non-sterilized type through heat treatments below 100°C.
- This kind of meat preservation is called **hurdle technology**.

