
WELCOME

HURDLE TECHNOLOGY

DRISHYA MOHAN

2011-06-006

INTRODUCTION

- Combination of preservation methods.
- Intelligent combination of hurdles which secures the microbial safety and stability as well as the organoleptic and nutritional quality of food products.

IMPORTANT HURDLES IN FOOD

- High temperature
- Low temperature
- Acidity
- a_w
- Redox potential
- preservatives

PHYSICAL HURDLES

- Aseptic packaging, electromagnetic energy ,high temperatures ,blanching, pasteurization, sterilization, evaporation, extrusion,
- Ionic radiation, low temperature (chilling freezing), modified atmospheres, packaging
- Films (including active packaging, edible coatings), photodynamic inactivation, ultra-high pressures,
- Ultrasonication, ultraviolet radiation.

Physico-chemical hurdles

- Carbon dioxide, ethanol, lactic acid, lactoperoxidase, low pH, low redox potential, low water activity.
- Maillard reaction products, organic acids, oxygen, ozone, phenols, phosphates, salt, smoking, sodium.
- Nitrite/nitrate, sodium or potassium sulphite, spices and herbs, surface treatment agents

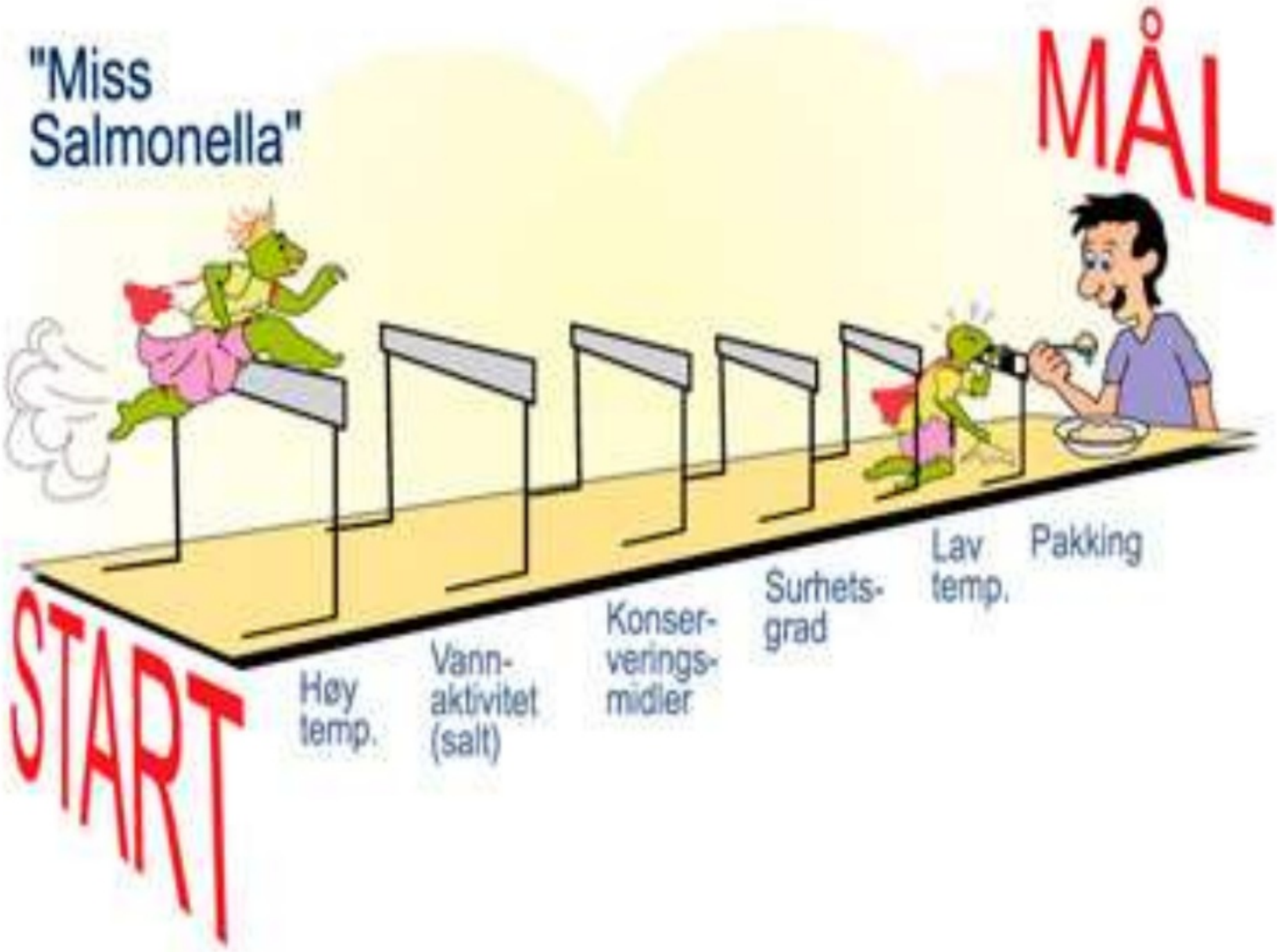
MICROBIALLY DERIVED HURDLES

- Antibiotics, bacteriocins, competitive flora, protective cultures

HURDLES IN FOOD

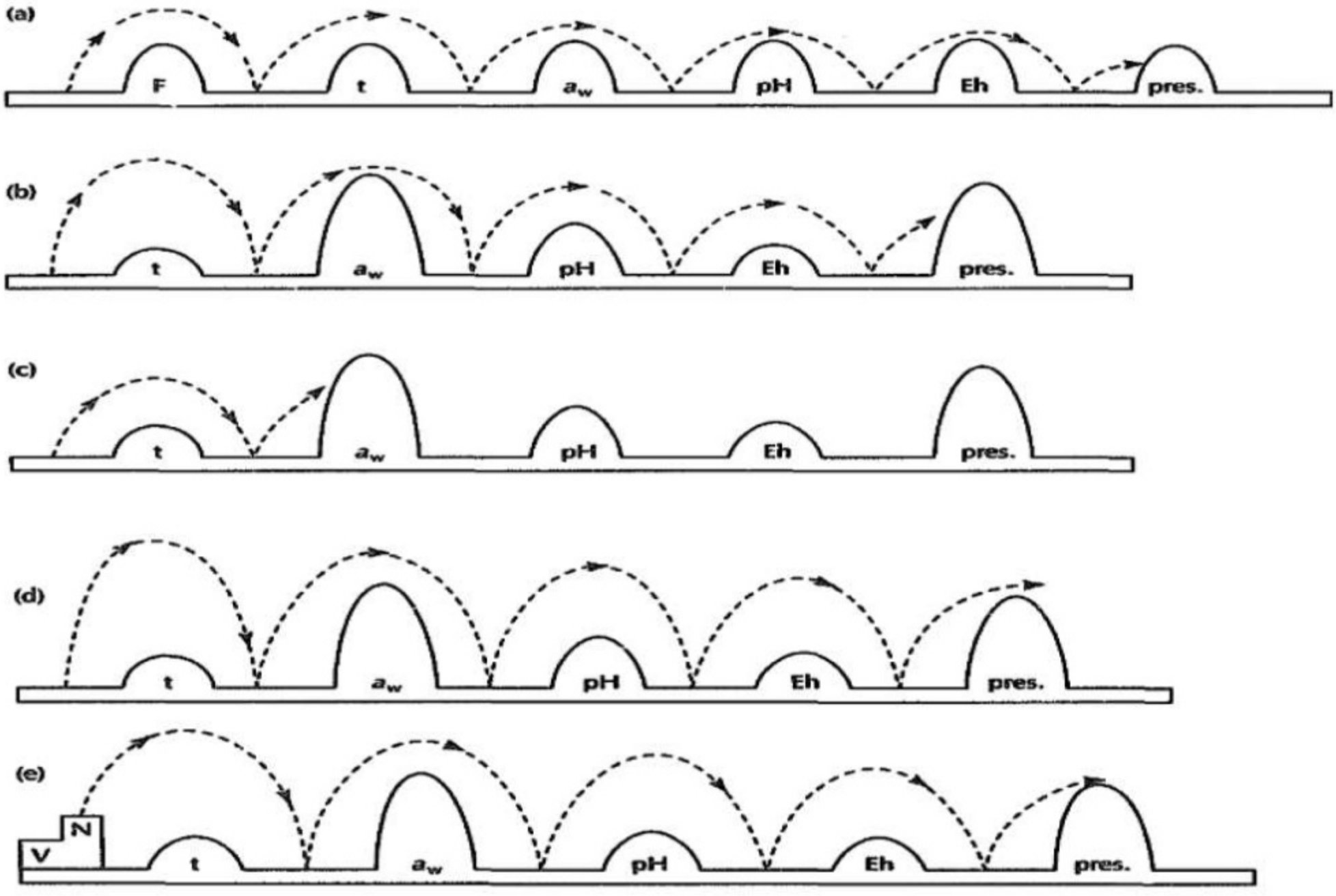
- More than 60 potential hurdles for foods.
- Which improves stability and quality of food.
- Will influence safety ,quality of food products.
- Improve the flavor of the products.

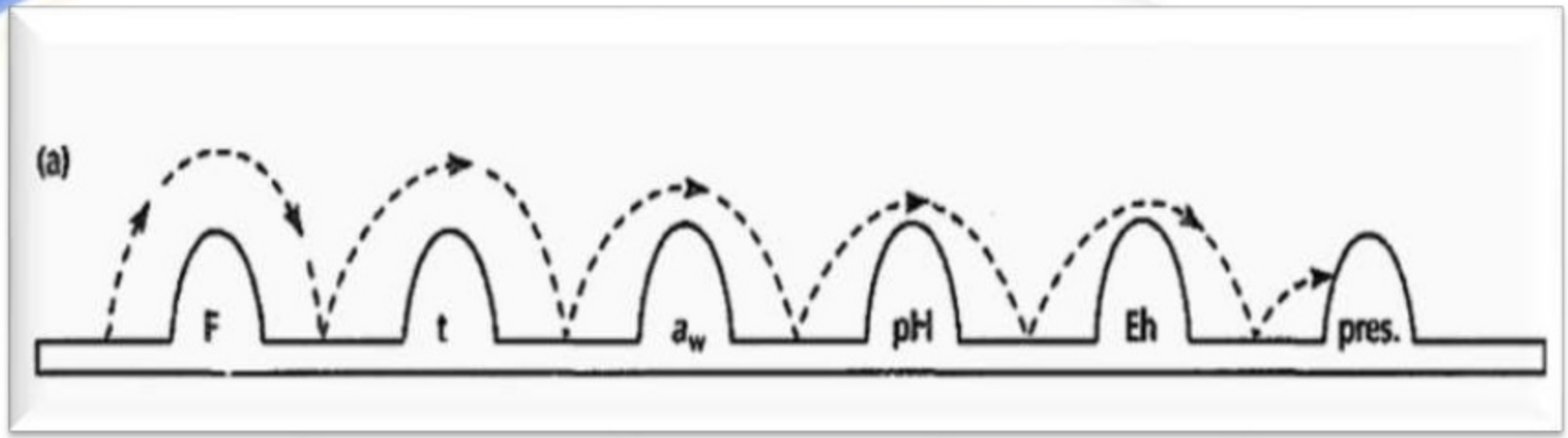
- Some hurdles could have a positive or negative effect on foods.
- Each safe and stable food has a certain set of hurdles is inherent.
- It is important for preservation of IMF and high moisture foods.


"Miss Salmonella"
MÅL
START
Høy temp.
Vann-aktivitet (salt)
Konser-verings-midler
Surhets-grad
Lav temp.
Pakking

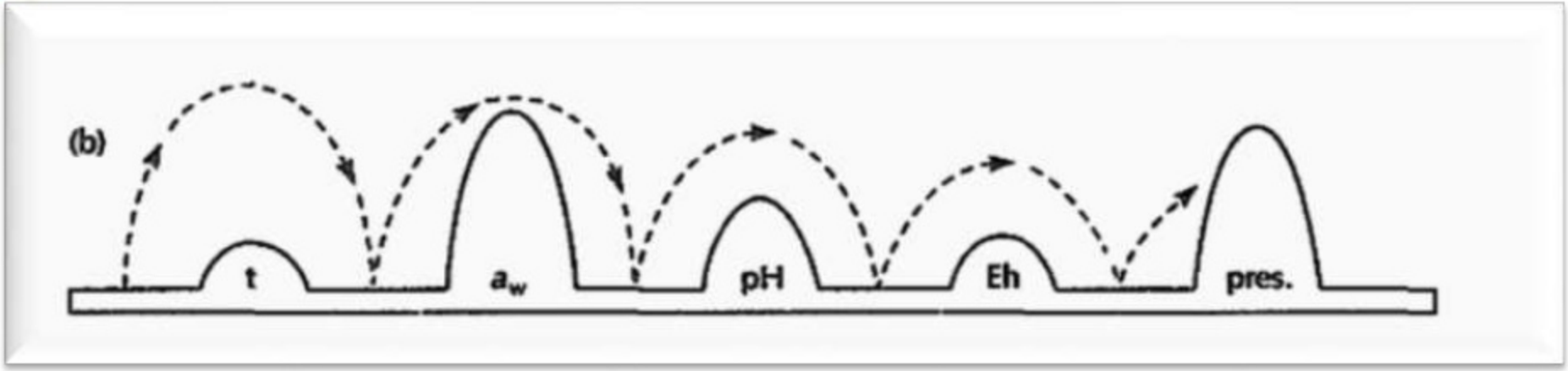
- Each hurdles aim to eliminate unwanted microorganisms.
- The microorganisms present ('at the start') in a food should not be able to overcome ('leap over')the hurdles.
- Otherwise the food will spoil or even cause food poisoning.
- This situation is illustrated by the hurdle effect

EXAMPLES OF HURDLE EFFECT

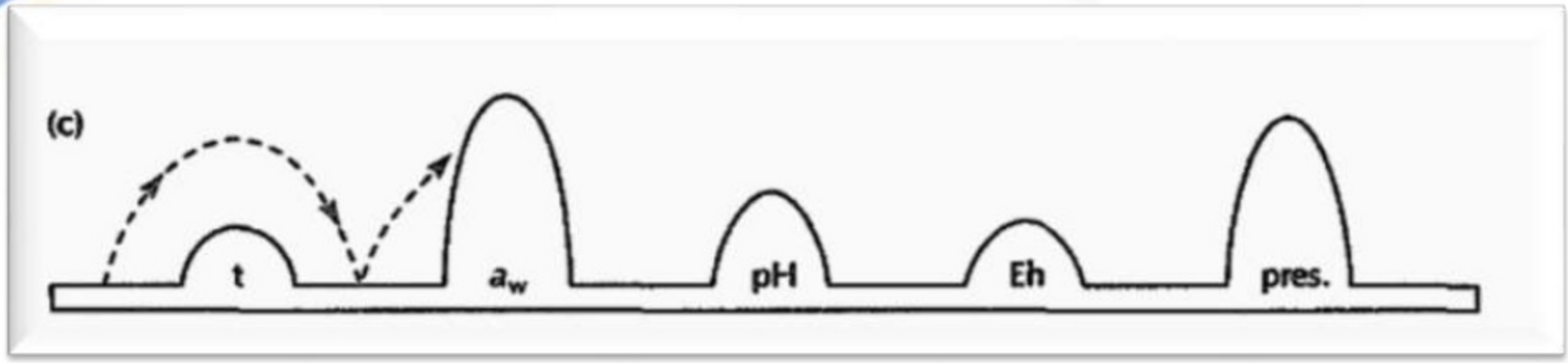




- All the hurdles at the same intensity.

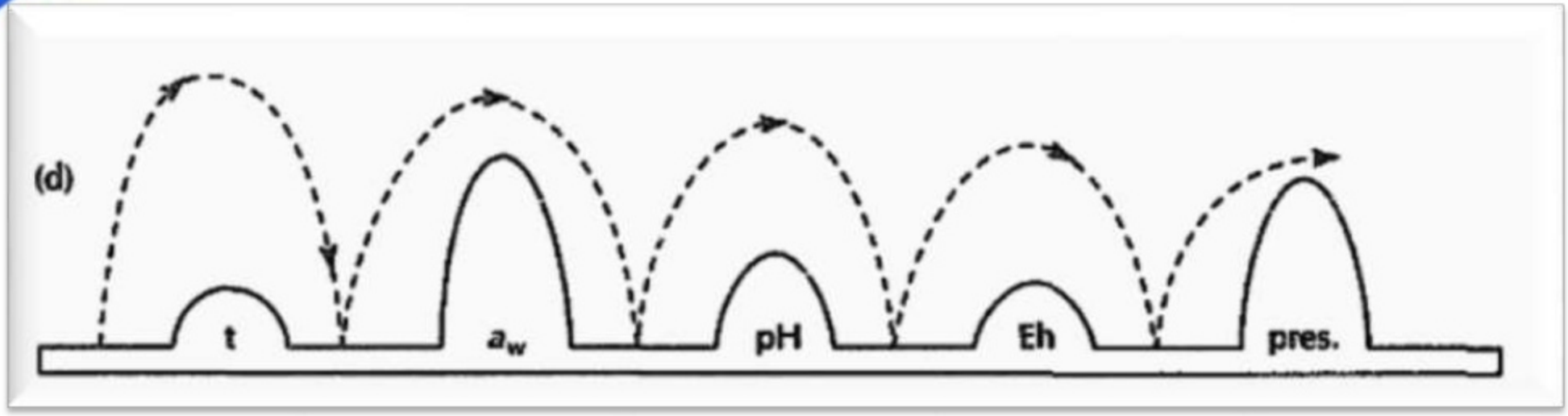


Hurdles of different intensity

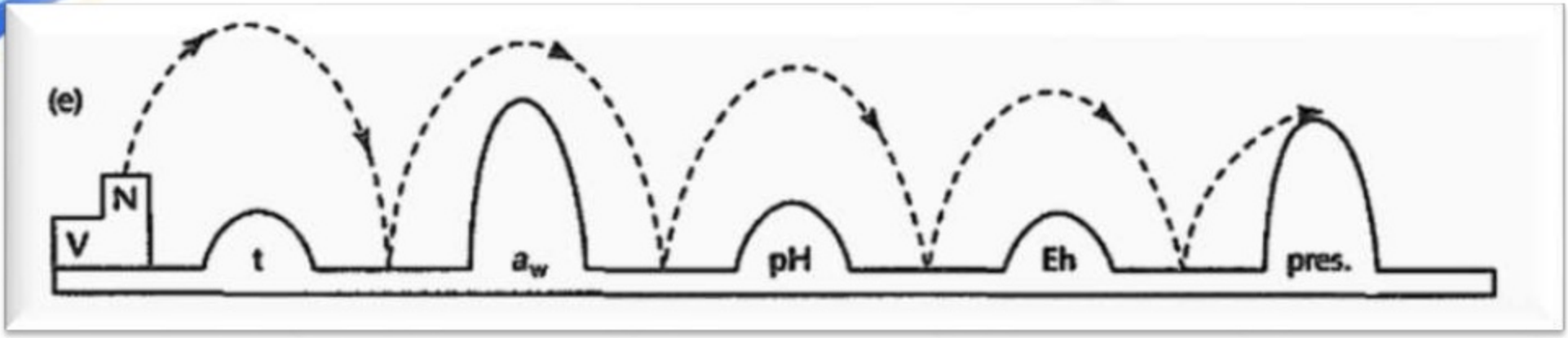


- If only a few micro-organisms are present ('at the start'),

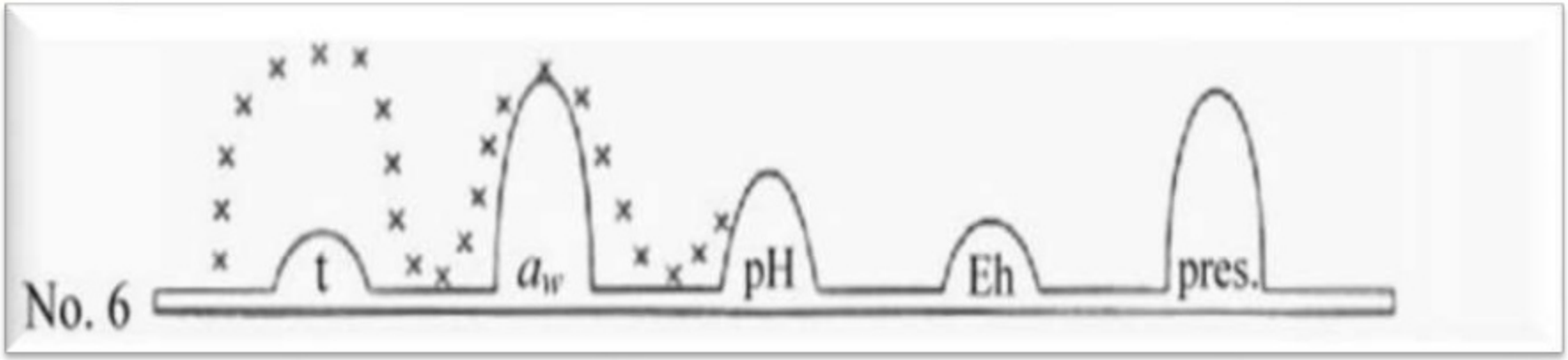
a few or low number of hurdles will be sufficient for the stability of the product.



Too many undesirable micro-organisms are initially present.

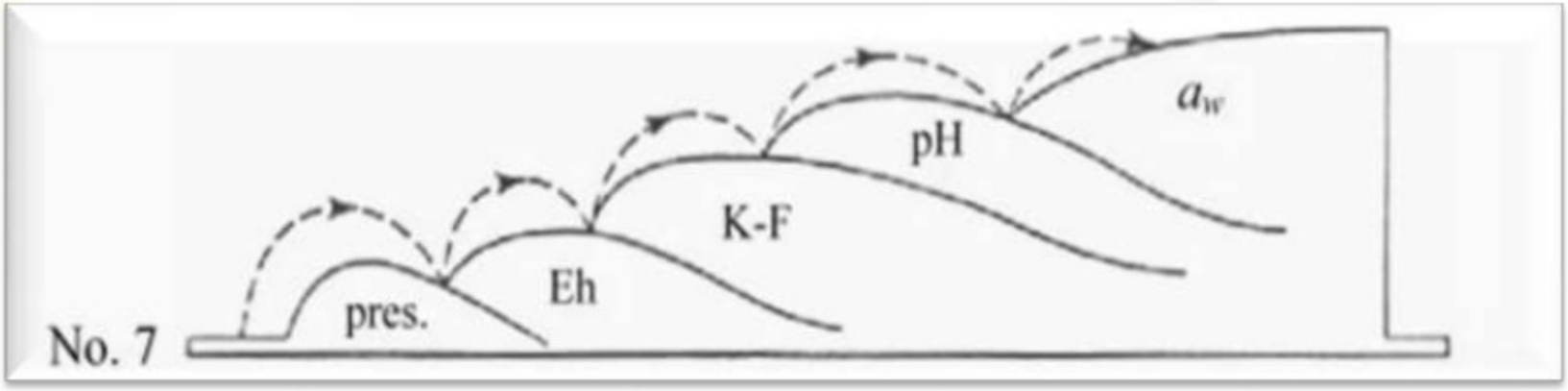


- A food rich in nutrients and vitamins, which could foster the growth of micro-organisms (called the booster or trampoline effect).
- Thus the hurdles in such a product must be enhanced.



Illustrates the behaviour of sub-lethally damaged organisms in food.


CHILLED STORAGE
LOW WATER ACTIVITY



A sequence of hurdles operates in fermented sausages and probably in ripened cheeses or fermented vegetables.