



GenoPheno4Trait Project

Genomic and phenotypic traits contributing to persistence of *Listeria monocytogenes* in food processing environment

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Project:
PTDC/BAA-AGR/4194/2021

Starting Date: Jan 2022
Project Duration: 36 months

Budget: 242.793,88€

OBJECTIVE

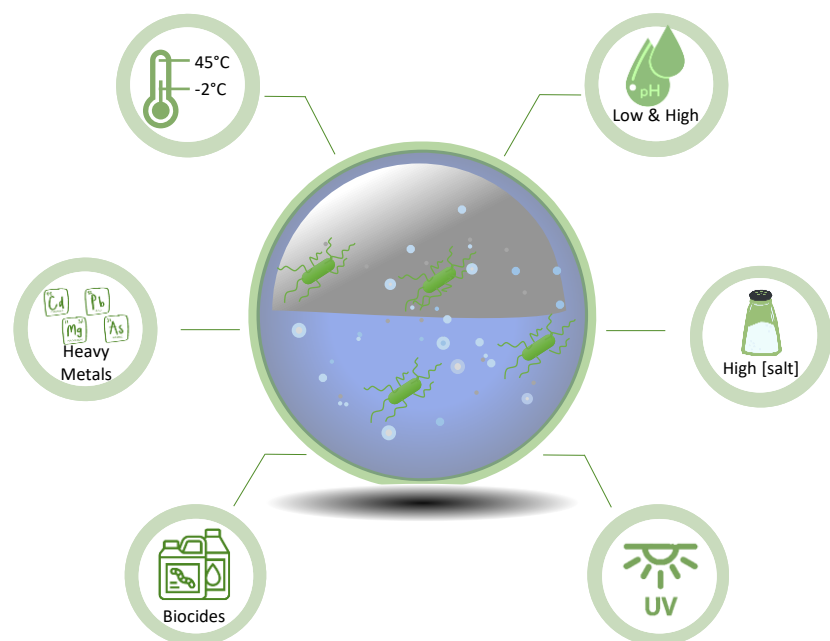
Improve food safety and decrease food waste by reducing food contamination with *Listeria monocytogenes* securing a sufficient supply.

L. monocytogenes: a foodborne pathogen responsible for listeriosis.

Listeriosis can lead to: abortion, premature stillbirth, septicemia, meningitis, encephalitis, brain abscess, endocarditis and death.

IMPACT ON FOOD INDUSTRY

L. monocytogenes can adapt, survive and grow over a wide range of food production environmental stress conditions:



Furthermore

L. monocytogenes is also able to form biofilm structures on a variety of surfaces in food production environments



Fig 1. Schematic representation of the biofilm development stages (Adapted from DOI 10.3390/pathogens6030041)

Stainless steel

Polystyrene & Polyethylene

Polyvinyl chloride

Glass

Bacterial cells in biofilms are embedded in self-produced matrix of extracellular material: DNA, proteins, polysaccharides (teichoic acid), inorganic molecules

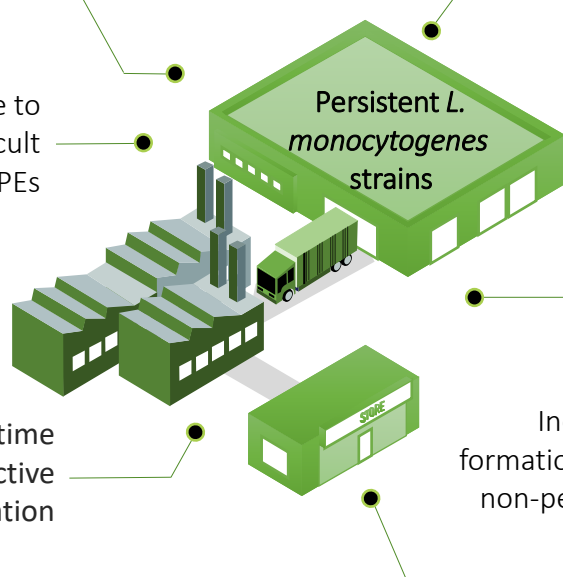
Biofilms formation leads to sanitizing agents resistance in food-processing environments (FPE)

PERSISTENCE

Isolates repeatedly cultured from the same source or ecological niche over time

Persistence for a long time (months and years) in FPEs

Important challenge to food producers: difficult to eliminate from FPEs



Persist for a long time due to ineffective cleaning and sanitation

Increased biofilm formation in relation to non-persistent strains

Cross-contamination of food products

GENOME-BASED APPROACHES

Public health authorities and food producers need reliable tools for source tracking, surveillance, and risk assessment

Is needed a greater knowledge of the genetic relationships between clinical isolates and isolates from a wide range of environments (animals, natural, urban, FPEs)

Whole-genome sequencing (WGS) is regarded as the present and future gold standard

WGS can show which clusters of identical isolates are responsible for outbreaks in order to relate geographical to temporally unrelated sources

Genotypic and phenotypic characterization are important steps to distinguish the strains and understand their persistence abilities in FEP. These studies can help to know more about the persistent strains and avoid their proliferation.

The project aims to alert and help industry to control the prevalence and growth of *L. monocytogenes* along the food chain.