Evaluation of the microbiota with metagenetics
Agenda

- Introduction
  - The food microbial ecosystem
  - -omic technology
  - Metagenetics
  - Case study
- Take home message

- Objectives
  - To give an overview of the metagenomics tool available for food industries
  - To present case study from food industries
  - To illustrate the power of this technology to manage food quality
Structural Interdisciplinary Research Center in **Fundamental and Applied Research for Animals & Health**

Food science of the University of Liege
Analysis, Inspection, Quality, microbiology and technology

Objectives
- Research
- Teaching
- Services

2 spin offs

- Analysis, certification and inspection
- Consulting and training
The food microbial ecosystem
Microbieel ecosysteem: uitdaging

Ressources

Microbiota

Environment

Food matrix: nutrients for microorganisms, structure, pH

Process: temperature, pH, gaz, additives, ...
To detect, to identify, to count

Louis Pasteur, 1822-1895
Robert Koch, 1843-1910
Julius Pétrí, 1852-1921

Counting
Detection
Culture step

24 h to 5 D
3-7 D
24 h
Metagenetics

A technological breakthrough

Classical approach

Metagenomics

Deposits of 2 european patents: «Metagenomic Analysis of Samples» «Detection Method»
Targeted metagenomics provides identification, in a single analysis, of several thousand microorganisms (bacteria and yeast/molds) in one sample.

**Classical approach**
- Work
- Time consuming
- Costs
- Partial and biased results

**Metagenomics**
- Many more informations
- Flexible
- Cost effective
- Rapid
How does it work?

Next generation sequencing

High throughput sequencing

Bioinformatics

Non random approach
Microbiota characterization of a Belgian protected designation of origin cheese, Herve cheese, using metagenomic analysis

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Study: The microbiota of steak tartare from different origin

n=59

- Pre packed in supermarket (SM1; n=8) at day 0 and at day 2
- Intern butcheries in supermarket (SM2; n=8) and Butcheries (Butchery; n=7) At day 0 and day 2
- Restaurant (n=6) at day 0
- Sandwich bars (n=6) at day 0
Case study 2: Human
Intestinal tract: Crohn’s disease
Case study 2: Human

Intestinal tract: Crohn ‘s disease
# Applications

## Scope

<table>
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<tr>
<th>Area</th>
<th>Applications</th>
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| **Food**                  | • Quality control  
                          • Innovation  
                          • R&D, Détermination or extension of the shelf life                           |
| **Animals**               | • Feed  
                          • Pre and probiotics  
                          • Intestinal tract                                                   |
| **Cosmetics and pharmaceutics** | • Quality control  
                          • Innovation  
                          • Determination of the shelf life                                       |
| **Human**                 | • Intestinal tract (ex: Crohn disease)  
                          • Cohort studies  
                          • Pre and probiotics                                                   |
| **Environment**           | • Water  
                          • Soils  
                          • Plant, seeds                                                         |
Take home message

• A new starting era for microbiology

• A revisited vision of ecosystems

• Already available for food industries (QC, innovation, trouble shooting), clinical studies, pharmaceutics, etc

We search

• Collaboration, industrial partners, investments
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