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PathogenCombat  
for safe food

# PathogenCombat

*”Control and prevention of emerging and future pathogens  
at cellular and molecular level throughout the food chain”*

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University of Copenhagen**

*Food Quality and Safety*





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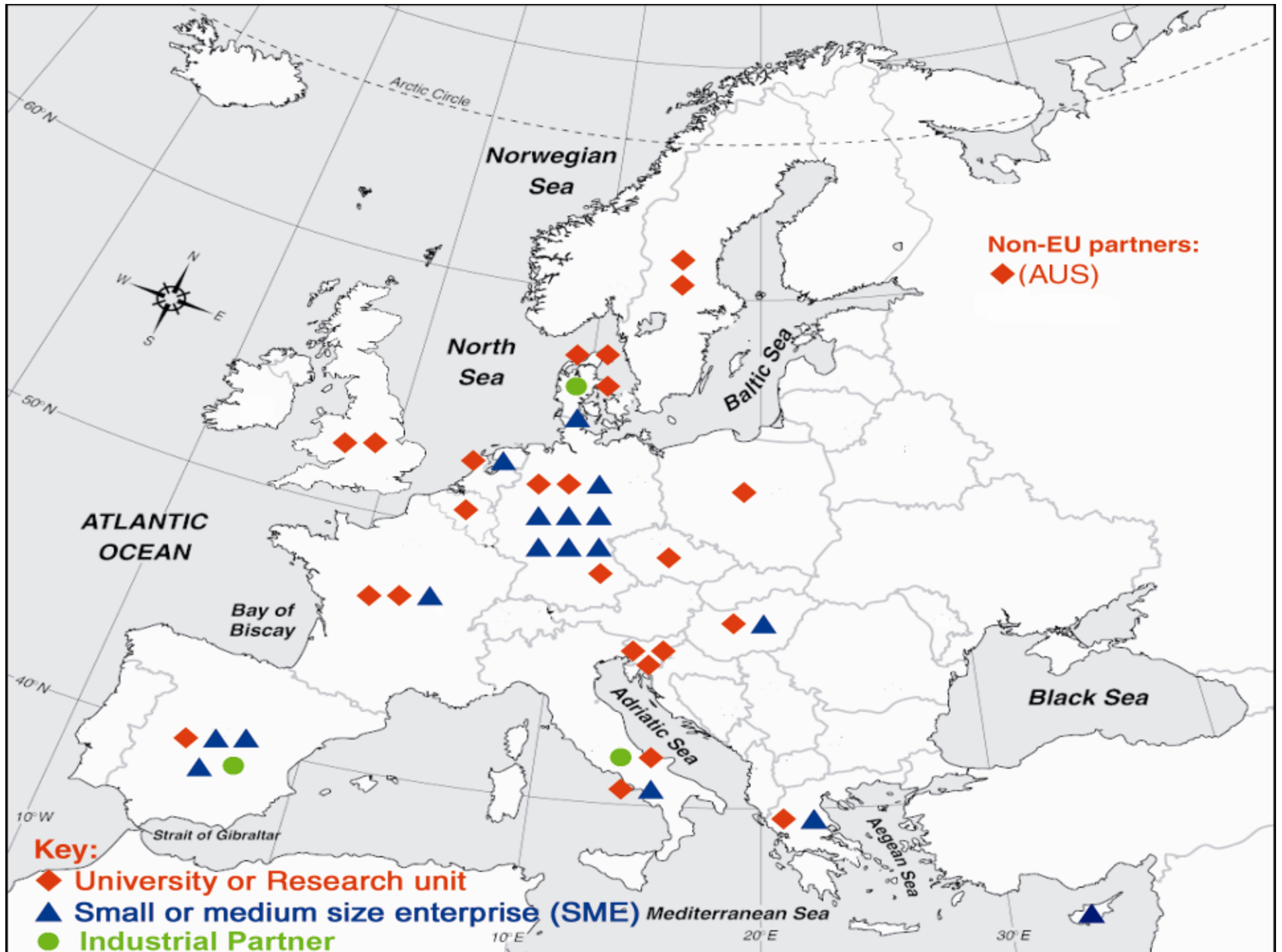
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# PathogenCombat Facts

- **EU 6th Framework Programme (FP6)**
- **Activity area: Food Quality and Safety (Priority 5)**
- **Integrated Project (IP)**
- **Project start April 1st 2005**
- **Project end April 1st 2010**
- **44 Partners in 15 European countries + Australia**
- **Total budget 14.3 mill €**
- **EU grant to the budget 11.3 mill €**

Food Quality and Safety







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**The overall objective of PathogenCombat is to provide new essential information and methods to the food industry and public authorities on how to reduce the prevalence of new and emerging food borne pathogens**

**"The entire food chain"**

*Food Quality and Safety*





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# European Food Safety Authority

The Community Summary Report on Trends and Sources of Zoonoses,  
Zoonotic Agents in the European Union 2007

20 January 2009



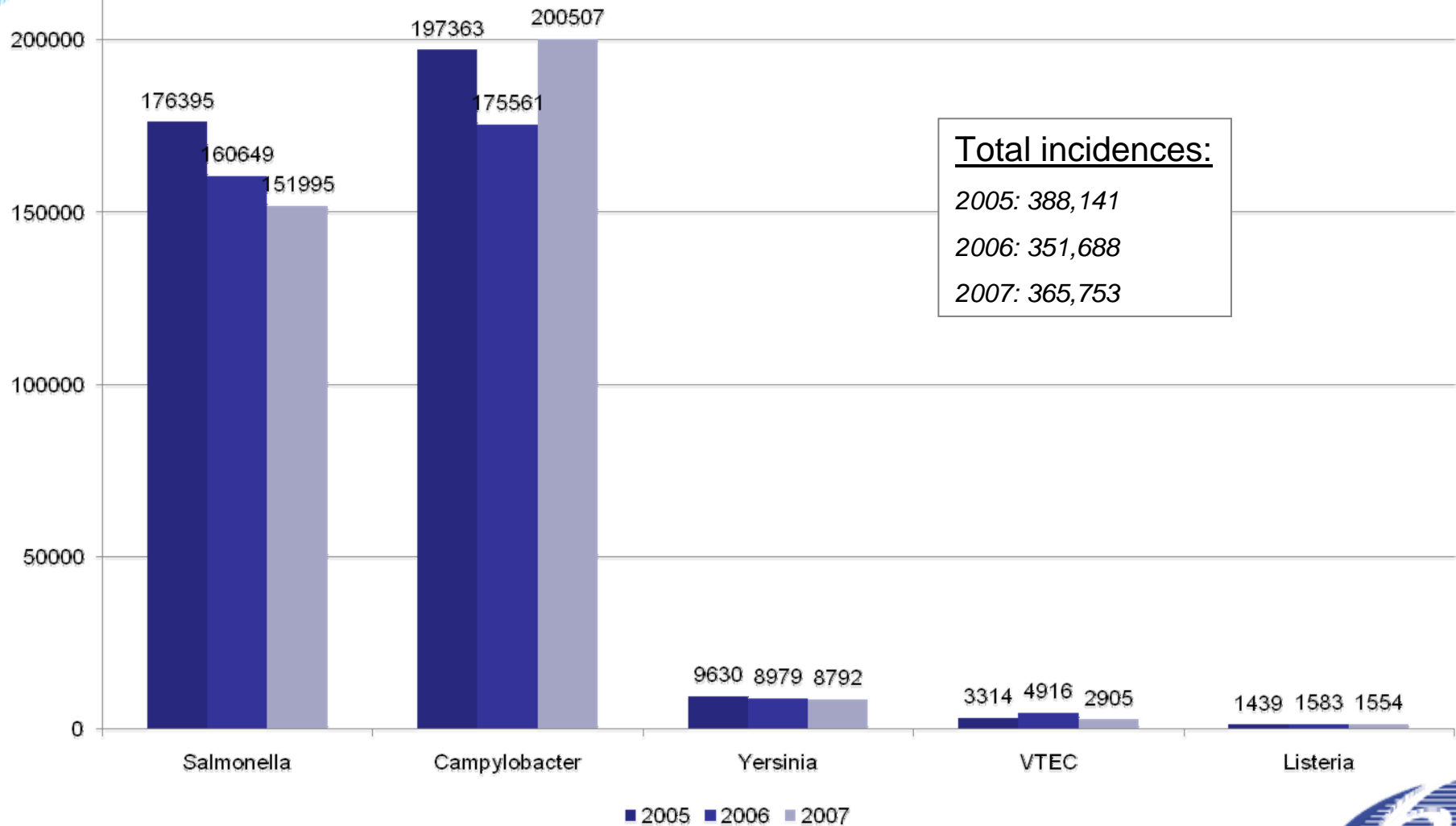


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## Reported incidences of Food Borne diseases in EU





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## The "real" incidence of Foodborne diseases in EU

Reported incidences x 10 ➡ 3,7 Millions/per year

Reported incidences x 20 ➡ 7,3 Millions/per year



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# 10 specific objectives

1. New approach to estimate the prevalence of pathogens up to the time of consumption - pathogen food matrix interaction
2. New methods to detect and monitor the viability and virulence of pathogens throughout the food chain until the time of consumption
3. New methods for estimation of host-pathogen interaction based upon functional cell models
4. Novel processing technologies to inactivate pathogens
5. New probiotic and protective cultures to eliminate pathogens





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## Specific objectives -*continued*

6. Hygienic design, prevention of biofilm formation and persistence of pathogens
7. New mathematical models covering virulence at time of consumption
8. Established strategies and actions for disseminating project deliverables for food SMEs
9. New cost effective management systems – Quality Assurance
10. Improved awareness of food safety for the European consumer, food industries and regulatory agencies



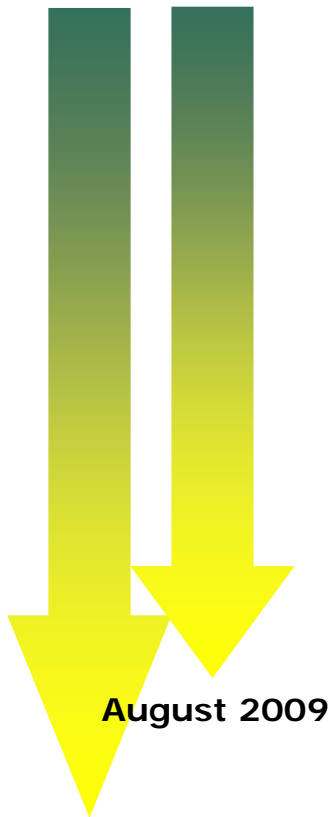


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# Where is PathogenCombat now?



August 2009

**New science-based information**



**New methods and technologies**



**Transfer and application in SMEs**



**Dissemination to industry, regulatory agencies and consumers in Europe**

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## Achievement I: New biotechnological platforms

*Novel approaches to analyse the interactions at cellular and molecular level between pathogens and food and feed matrices and contact surfaces in the food chain including the intestinal tract of farm animals. To understand the mechanisms, by which pathogens enter, adapt, persist and express virulence in the food chain. The platforms include:*

- *Fluorescence Ratio Imaging Microscopy, atomic force microscopy and bio-imaging*
- *Laser tweezer technology*
- *Convergent evolution*
- *Functional genomics*
- *Functional mammalian cell models*





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## Achievement II: Novel information on emerging pathogens

*Listeria monocytogenes*

*Mycobacterium avium* subsp. *paratuberculosis*

*Campylobacter jejuni*

*Escherichia coli* (STEC)

*Saccharomyces cerevisiae*

*Penicillium nordicum*

Hepatitis E (HEV) & tickborne encephalitis (TBEV) virus

*Staphylococcus aureus*





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## Achievement III: Rapid and meaningful detection methods

*Novel analytical methods, including microarrays and molecular biology culture-independent techniques, have been developed for pathogens included in PathogenCombat. The methods will not only report numbers, but include a new approach to estimate viability and virulence of pathogens throughout the food chain*





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## Achievement IV: Virulence expression in food matrices

*A novel strategy for food formulation, food preservation and quantitative risk assessment*





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## Achievement V: Methods for breaking the transmission of pathogens along the food chain

*Three strategies have been applied:*

- *Prevention of cross contamination by hygienic design and development of cleaning and disinfection procedures to remove bio-films in the food chain.*
- *Inactivation of pathogens by mild processing techniques (organic acids, chlorine dioxide, intense UV light pulses, and hydrostatic pressure).*
- *New protective and probiotic cultures for elimination of pathogens in the food chain*





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## Achievement VI: Mammalian functional cell models

*Models developed for pigs, chicken and ruminants.*

*Applied in host-pathogen interactions and selection of protective and probiotic cultures. A new opportunity has been made available for dose-response determinations and risk assessment*





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## Achievement VII: Food Safety Management

*Diagnostic instruments and tools have been developed for SMEs for identification of technological and managerial interventions which can improve food safety management systems (FSMS) and lead to integration of the new knowledge and methods developed in PathogenCombat. Concept of web-based FSMS support systems for SMEs has been developed*





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## Achievement VIII: Interaction with food producing SMEs

*For new knowledge obtained and methods and tools developed, validation and testing of applicability in SMEs are in progress*



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## Achievement IX: The consumer, the food industry and the regulatory bodies in Europe

*The consumers' understanding for key food safety issues has been evaluated and the most effective ways of communicating results is being assessed. A strategy for interaction and exchange of information with the food industry and regulatory agencies has been established*



## Food Safety at farm level

D13.20	Establishment of effective FSMS in SMEs and industrial Partners according to the results obtained in WP14 and WP15. Good hygienic practice for animal production at farm level, with special emphasis on prevention of pathogens (dairy)
D13.33	Identical to D13.20 (poultry)
D13.41	Identical to D13.20 (pork)
D13.49	Measures taken to reduce and prevent the pathogen content in animal farming, slaughtering and processing operations (Spain)
D13.52	Identical to D13.20 (beef & lamb)
D13.60-13.65	Food Safety at farm level (Scottish Agricultural College)
DNTCII.17	Generic Food Safety Management System. Implementation of ISO22000 in an SME (dairy)
DNTCII.22	FSMS for Pan-European dissemination (T8)