Prioritization of Food Borne Pathogens

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rivm National Institute for Public Health and the Environment

Introduction

- There are many foodborne and zoonotic pathogens
- Evidence-based food safety policy requires focusing on the most relevant ones
- **This study aims to support Dutch decision makers in establishing the priority of pathogens that can (also) be transmitted by food**

- It is the basis for a study at the European level in Med-Vet-Net
- It has been strengthened by a fruitful collaboration with the US Food Safety Research Consortium

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Criteria for priority setting

- **Incidence (severity grade)**
- **Disease burden**
- **Cost-of-illness**
  - **DHC**
  - **Total costs**
- *Involved food products (food attribution)*
- *Prevention measures*
- *Trends*
- *Risk perception*

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Selected pathogens (2005)

- **Most frequent pathogens of <u>community-acquired GE</u>:**
  - **Norovirus**
  - **Rotavirus**
- **Most frequently observed bacterial pathogens**
  - **Campylobacter**
  - **Salmonella**
- ***Other pathogens considered were:***
  - *Escherichia coli O157*
  - *Listeria monocytogenes*
  - *Toxoplasma gondii*

- **All routes considered**

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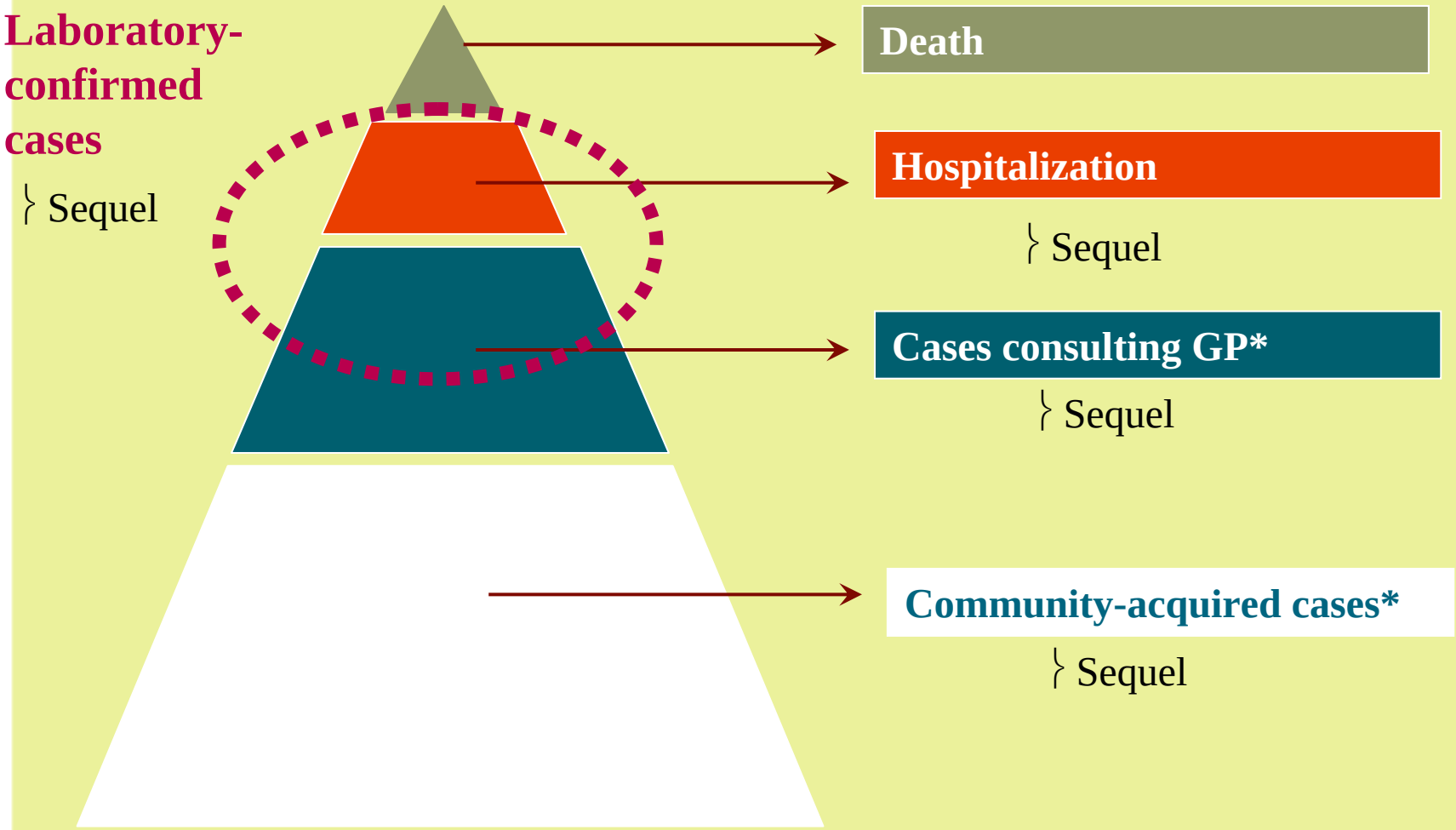
Gastro-enteritis and sequel



* Correcting for trend

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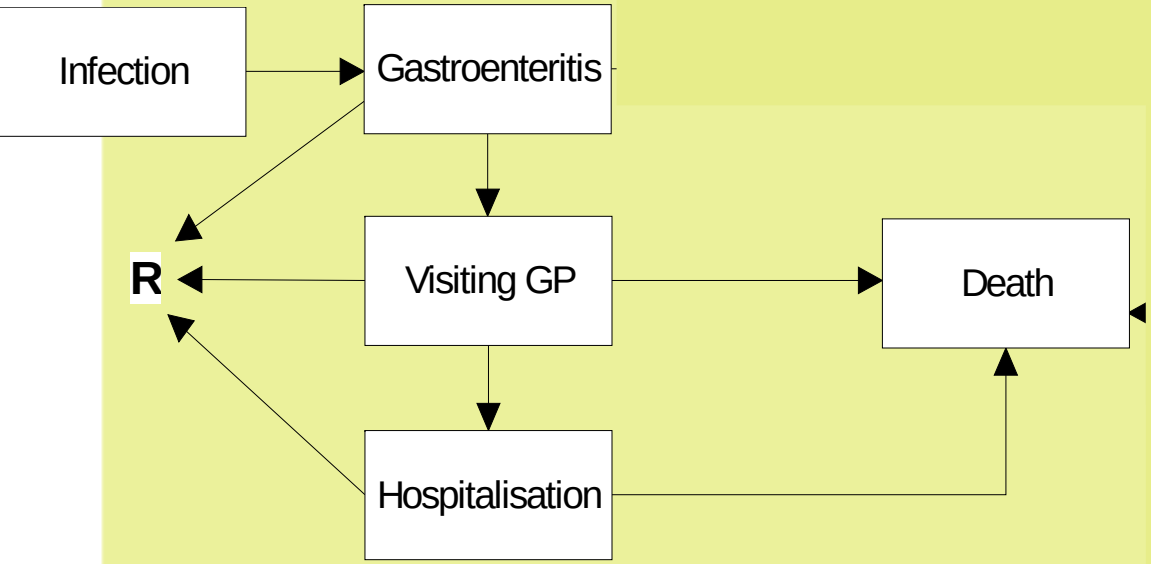
Outcome tree:



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Disease burden

- **DALYs (Disability Adjusted Life Years)**
- **Conceptually simple:**
  - **disease burden is a function of**
    - **the number of affected persons**
    - **the duration of the adverse health effect**
    - **and the severity of the effect**

- **DALY = YLL + YLD**
  - **mortality: years of life lost**

$$YLL = \Sigma_{\text{all diseases}} (D \times e)$$

  - **morbidity: years lived with disability, weighted for severity of illness**

$$YLD = \Sigma_{\text{all diseases}} (N \times t \times w)$$

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Cost-of-illness

- **Direct health care costs**
  - **Consultation of general practitioners and specialists**
  - **Hospitalization**
  - **Drugs**
  - **Rehabilitation**
  - **etc.**
- **Indirect non-health care costs (*not considered)***
- **Direct non-health care costs**
  - **Travel costs by patients**
  - **Co-payments by patients**
- **Indirect non-health care costs**
  - **Productivity losses of patients or care-givers**
    ➔ Friction method

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Friction cost method vs Human capital approach

- **Friction period**
  - Period that is needed to replace sick, invalid or deceased worker.
  - Assuming 154 days at maximum/episode

    ➔changing over the years!

- **Friction vs human capital method**
  - Short sickness leave:
    - Hardly any difference
  - Chronic and long-lasting diseases
    - **Lower productivity losses** than with e.g. human capital method
    - e.g. 30 year old invalid or deceased worker: productivity losses:

      13,300 € → Friction period

      1,519,500 € → Remaining working life years

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What are the priorities?

Outcome	Norovirus	Rotavirus	Campylo-bacter	Salmonella
Gastro-enteritis	470,000	190,000	59,000	35,000
GE – visit to GP	10,000	11,000	14,000	5,400
GE – hospital	1,000	3,000	570	640
GE – death	5	1	25	39
Reactive arthrititis	-	-	1,000	460
Guillain-Barré syndr.	-	-	59	-
Infl. Bowel Disease	-	-	22	9

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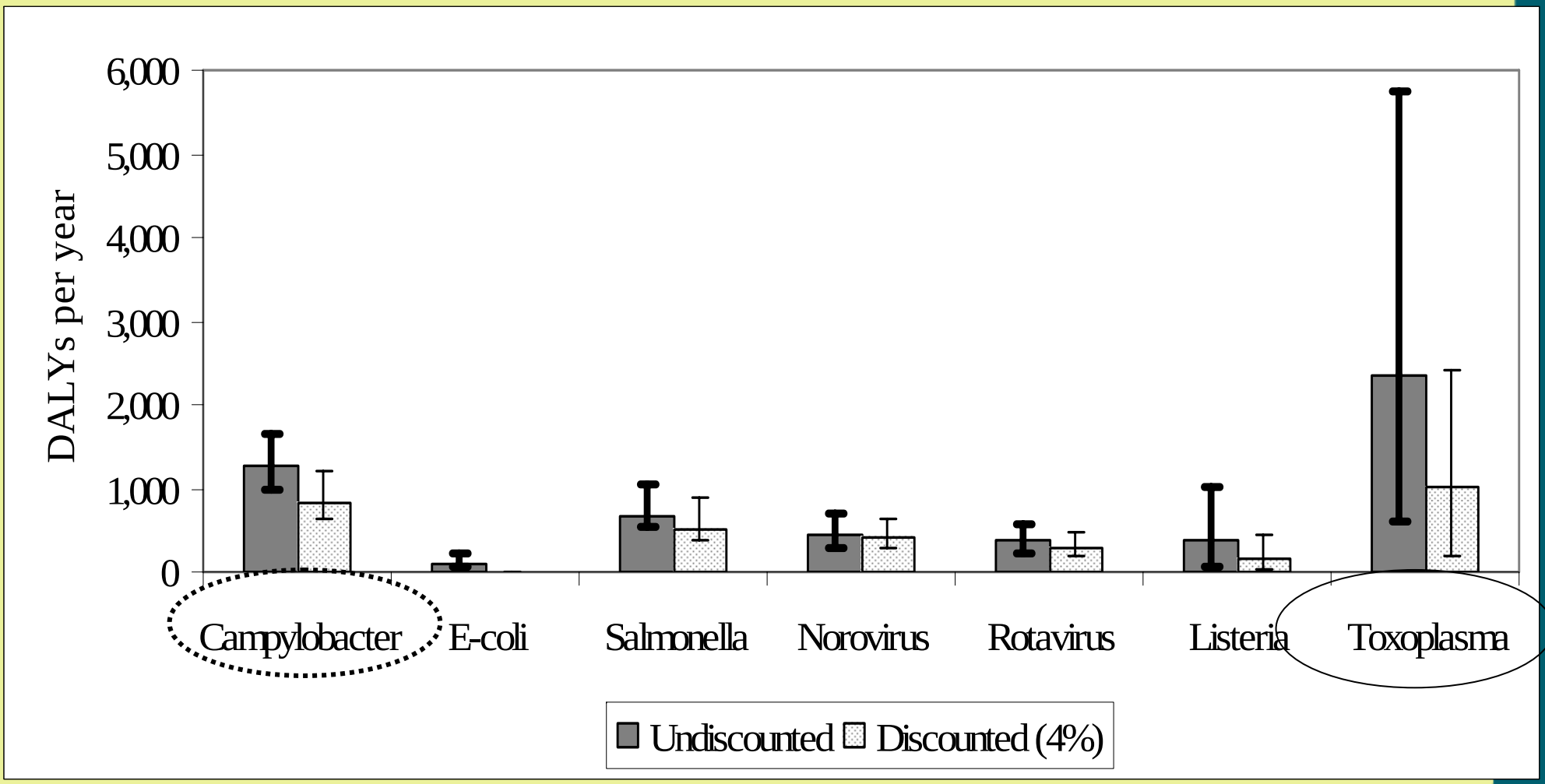
the Netherlands, 2004

Disease burden - results



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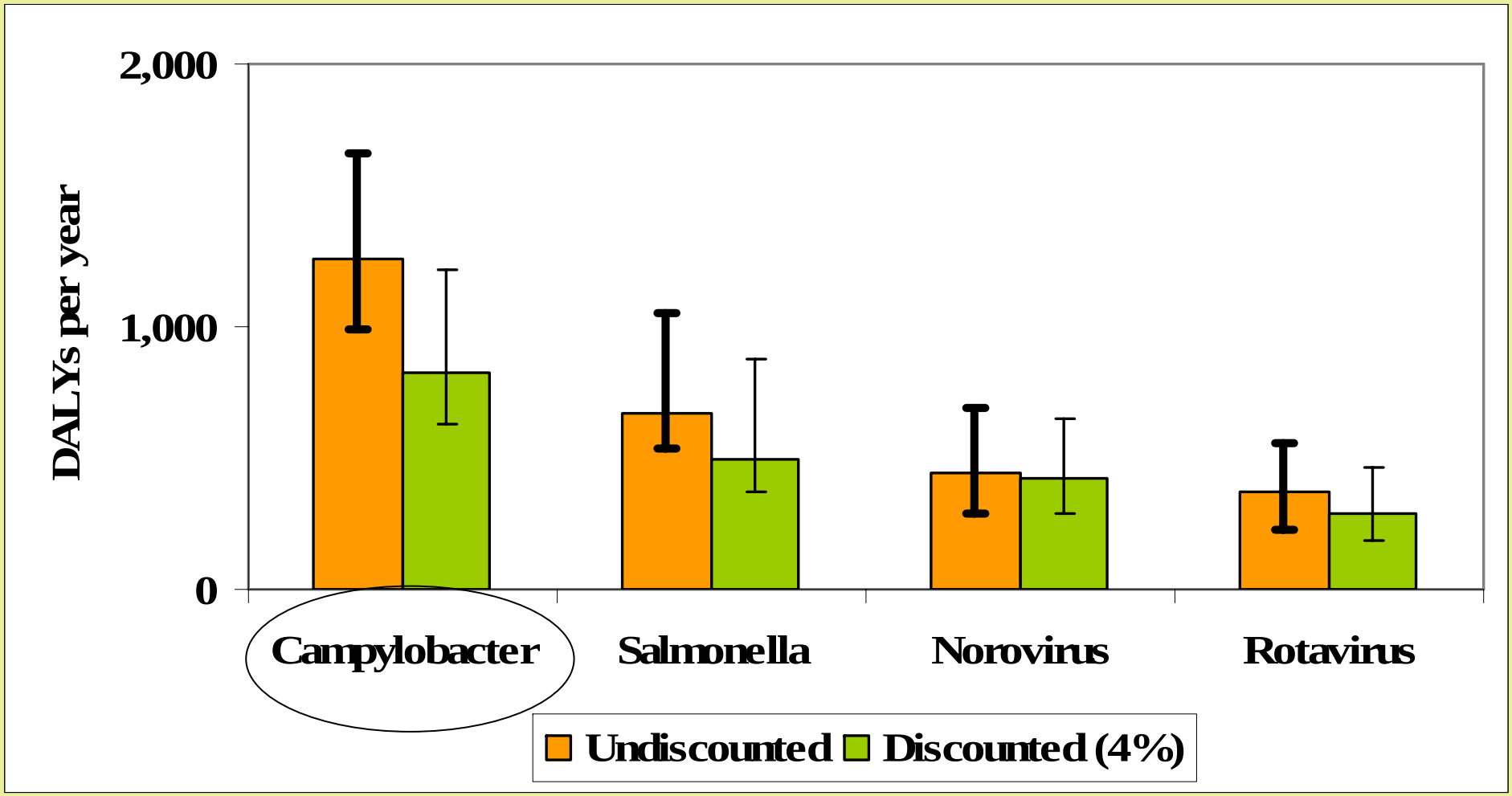
Disease burden – results



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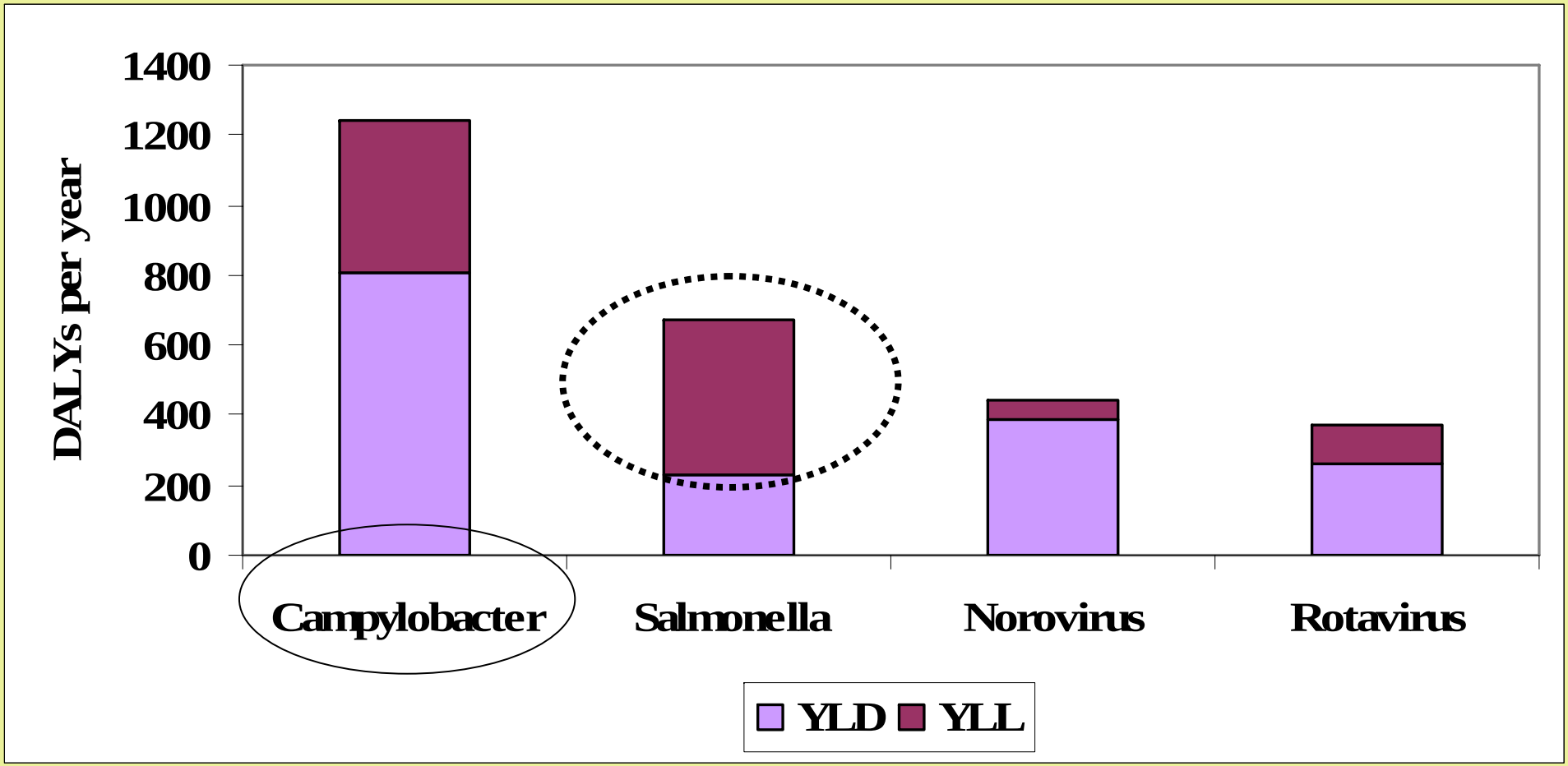
Disease burden – results



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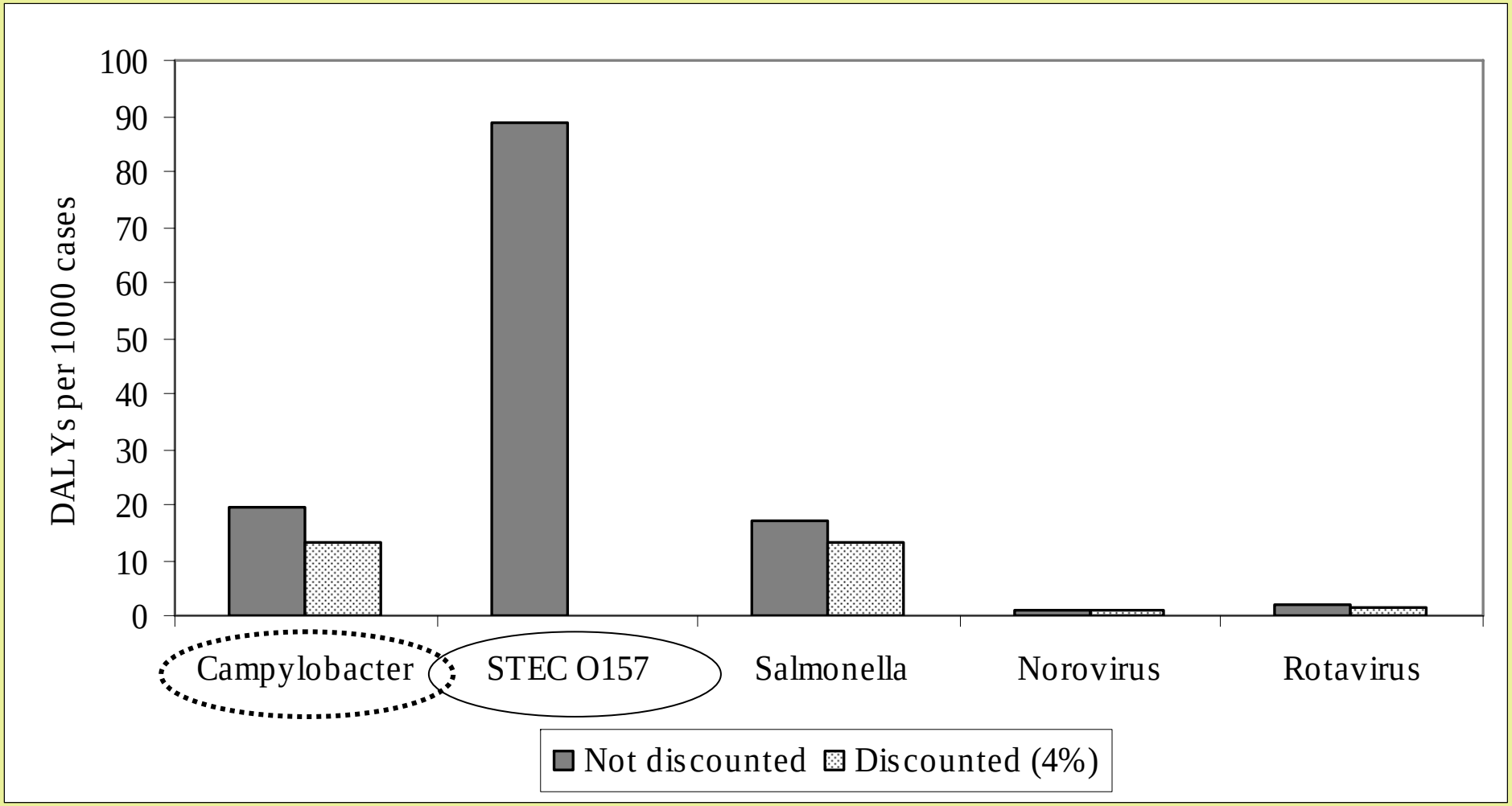
DALYs per 1000 cases



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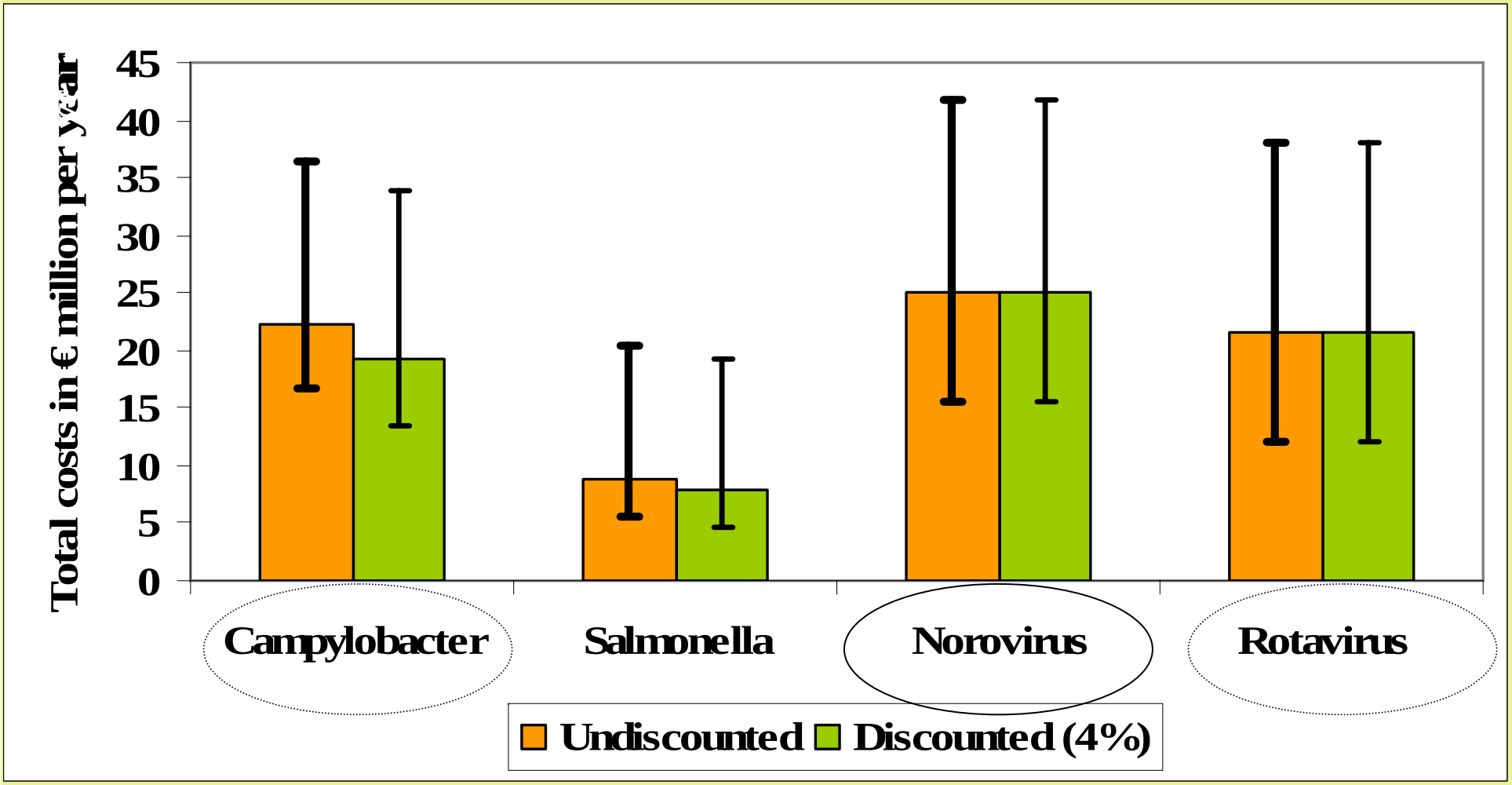
Cost-of-illness - results



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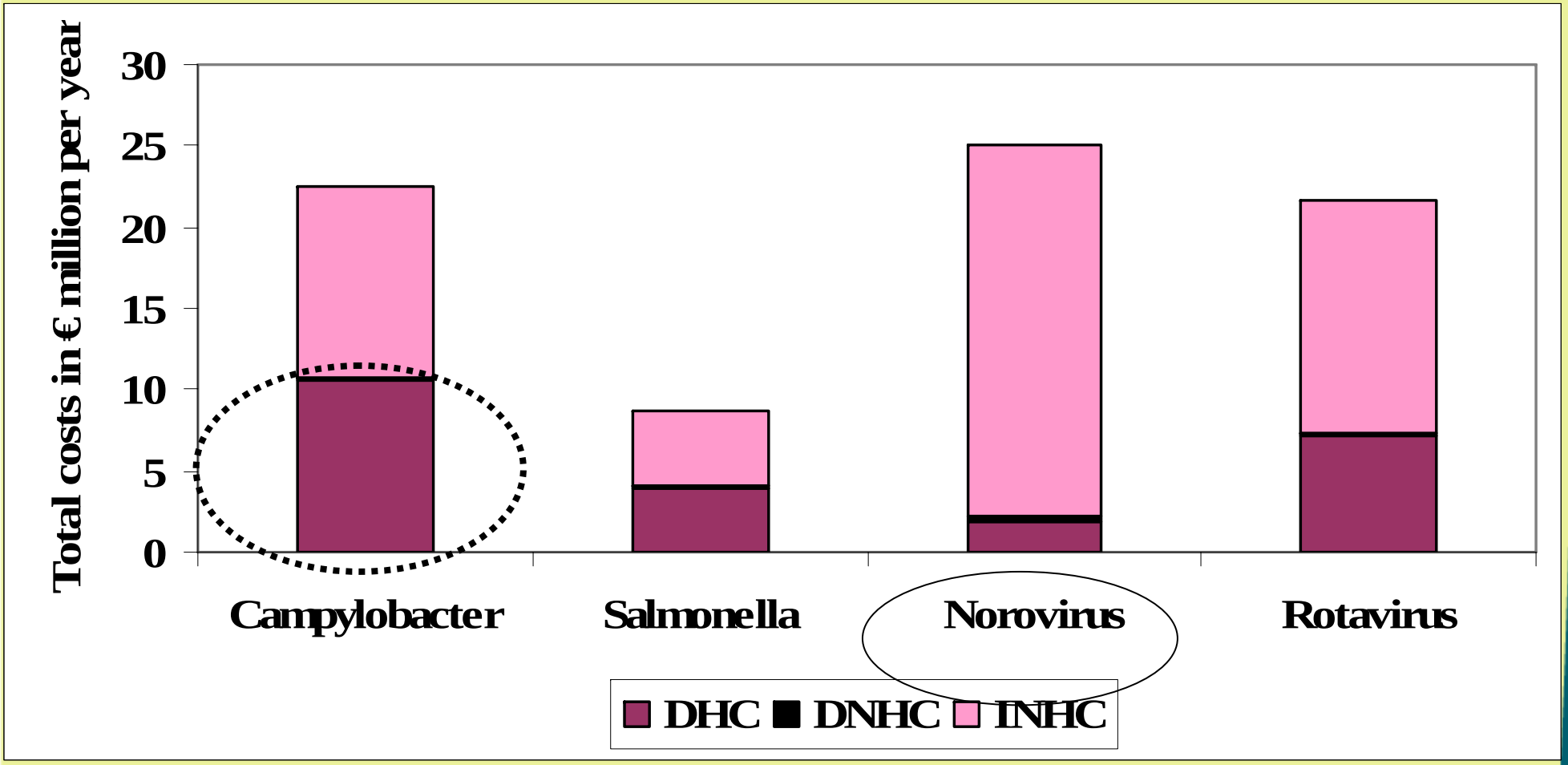
Cost-of-illness – results II



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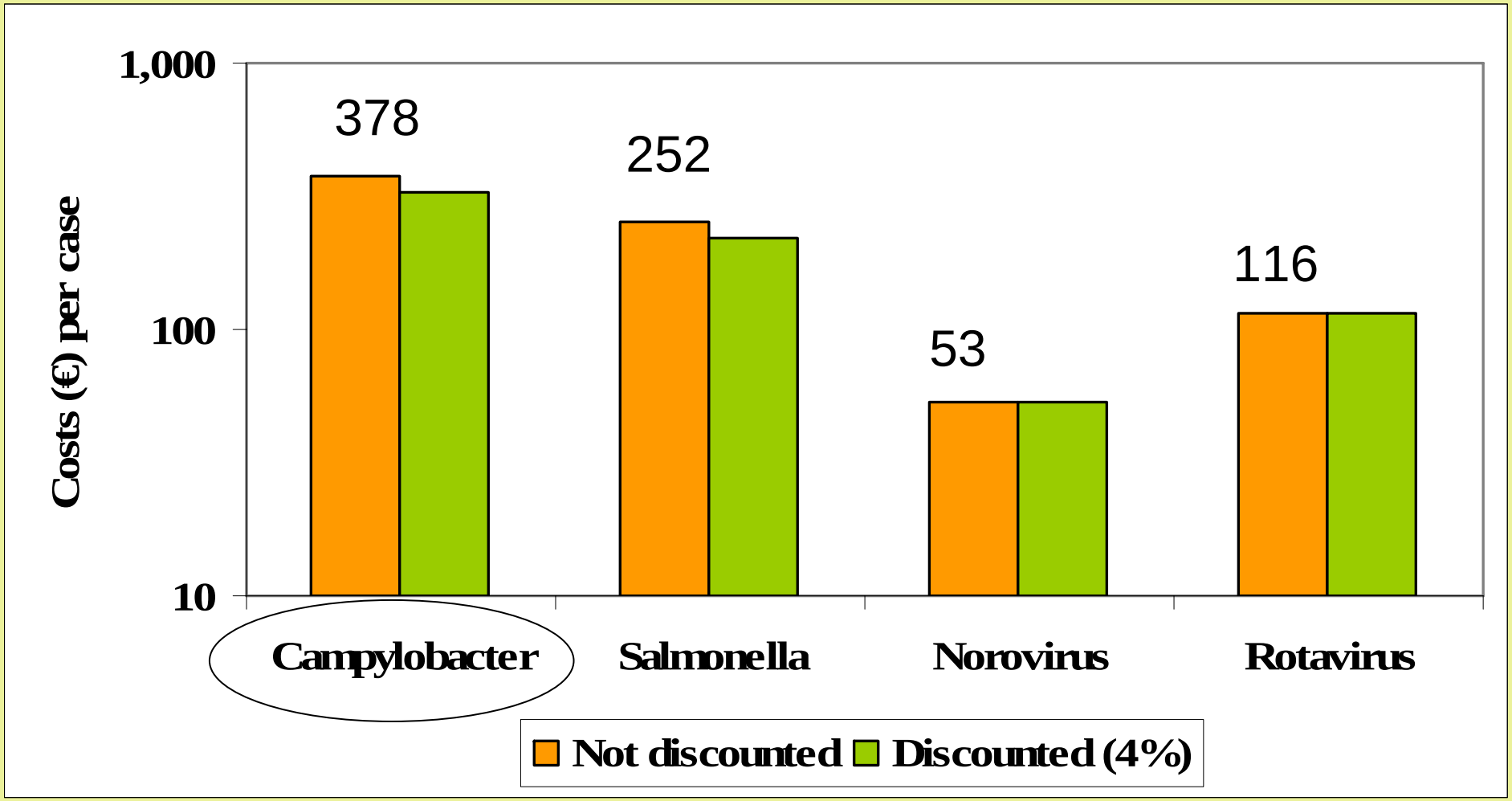
Cost-of-illness (€) per case



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Conclusion and future perspective

- **Priority setting is a multidimensional problem**
- **Ranking depends on the criterium used**
- **A quantitative and systematic approach is necessary**
- **Current data are not complete, but data needs can be prioritised**

- **International collaboration will speed up the process**

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Thank you for your attention

QUESTIONS?

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Plans for 2006

- **Disease burden and costs for:**
  - Clostridium perfringens
  - Staphylococcus aureus
  - Bacillus cereus
  - Cryptosporidium parvum
  - Giardia lamblia
- **Costs associated with STEC O157**
- **Outbreaks: associated costs (info)**
- **Food attribution**

- ***IBS***

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Marie-Josée J. Mangen is researcher at the National Institute for Public Health and the Environment (NL). She holds an MSc degree in animal science (Dipl.-Ing. agr., equivalent to MSc from the University of Bonn (D)) and in Agricultural Economics and Marketing (Wageningen Agricultural University (NL)). Her PhD is from Wageningen University (NL), and was entitled 'Economic welfare analysis of simulated control strategies for Classical Swine Fever epidemics'. She then moved for a short-term project to the Livestock Information and Policy Branch at the Food and Agricultural Organization in Rome (I). From 2003 to 2004 she held a post-doc at the Agricultural Economic Research Institute (NL) and at RIVM for which she conducted an economic evaluation on the control of *Campylobacters* in the chicken meat chain. Since March 2005 she works now at RIVM, where she conducts economic evaluations in the field of public health and infectious diseases.

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"New Food Safety Incentives & Regulatory, Technological & Organizational Innovations" - 7/22/2006, Long Beach, CA

AAEA section cosponsors: FSN, AEM, FAMPS, INT

Industry perspectives on incentives for food safety innovation

Continuous food safety innovation as a management strategy

Dave Theno, Jack in the Box, US

Economic incentives for food safety in their supply chain

Susan Ajeska, Fresh Express, US

Innovative food safety training systems

Gary Fread, Guelph Food Technology Centre, Canada

Organizational and technological food safety innovations

Is co-regulation more efficient and effective in supplying safer food?

Marian Garcia, Dept. of Agricultural Sciences, Imperial College London

Andrew Fearne, Centre for Supply Chain Research, University of Kent, UK

Chain level dairy innovation and changes in expected recall costs

Annet Velthuis, Cyriel van Erve, Miranda Meuwissen, & Ruud Huirne

Business Economics & Institute for Risk Management in Agriculture, Wageningen University, the Netherlands

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"New Food Safety Incentives & Regulatory, Technological & Organizational Innovations" - 7/22/2006, Long Beach, CA (con't)

Regulatory food safety innovations

Prioritization of foodborne pathogens
Marie-Josée Mangen, J. Kemmeren, Y. van Duynhoven, A.H. and Havelaar, National Institute for Public Health & Environment (RIVM), the Netherlands

Risk-based inspection: US Hazard Coefficients for meat and poultry
Don Anderson, Food Safety and Inspection Service, USDA

UK HAS scores and impact on economic incentives
Wenjing Shang and Neal H. Hooker, Department of Agricultural, Environmental & Development Economics, Ohio State University

Private market mechanisms and food safety insurance

Sweden's decade of success with private insurance for *Salmonella* in broilers
Tanya Roberts, ERS, USDA and Hans Andersson, SLU, Sweden

Are product recalls insurable in the Netherlands dairy supply chain?
Miranda Meuwissen, Natasha Valeeva, Annet Velthuis & Ruud Huirne, Institute for Risk Management in Agriculture; Business Economics & Animal Sciences Group, Wageningen University, the Netherlands

Recapturing value from food safety certification: incentives and firm strategy
Suzanne Thornsbury, Mollie Woods and Kellie Raper
Department of Agricultural Economics, Michigan State University

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"New Food Safety Incentives & Regulatory, Technological & Organizational Innovations" - 7/22/2006, Long Beach, CA (con't)

Applications evaluating innovation and incentives for food safety

Impact of new US food safety standards on produce exporters in northern Mexico
Belem Avendaño, Department of Economics, Universidad Autónoma de Baja California, Mexico and Linda Calvin, ERS, USDA

EU food safety standards and impact on Kenyan exports of green beans and fish
Julius Okello, University of Nairobi, Kenya

Danish *Salmonella* control: benefits, costs, and distributional impacts
Lill Andersen, Food and Resource Economics Institute, and Tove Christensen, Royal Danish Veterinary and Agricultural University, Denmark

Wrap up panel discussion of conference

FSN section rep. – Tanya Roberts, ERS, USDA
AEM section rep. – Randy Westgren, University of Illinois
INT section rep. – Julie Caswell, University of Massachusetts
FAMPS section rep. – Jean Kinsey, University of Minnesota
Discussion of everyone attending conference

Note: speaker is either the 1st person named or the person underlined.

Thanks to RTI International for co-sponsoring the workshop.

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"New Food Safety Incentives & Regulatory, Technological & Organizational Innovations" - 7/22/2006, Long Beach, CA (con't)

Workshop objectives

- Analyze how new public policies and private strategies are changing economic incentives for food safety,
- Showcase frontier research and the array of new analytical tools and methods that economists are applying to food safety research questions,
- Evaluate the economic impact of new food safety public policies and private strategies on the national and international marketplace,
- Demonstrate how new public polices and private strategies in one country can force technological change and influence markets and regulations in other countries, and
- Encourage cross-fertilization of ideas between the four sponsoring sections.

Workshop organizing committee

Tanya Roberts, ERS/USDA, Washington, DC - Chair
Julie Caswell, University of Massachusetts, MA
Helen Jensen, Iowa State University, IA
Drew Starbird, Santa Clara University, CA
Ruud Huirne, Wageningen University, the Netherlands
Andrew Fearne, University of Kent, UK
Mogens Lund, FOI, Denmark
Mary Muth, Research Triangle Institute Foundation, NC
Jayson Lusk, Oklahoma State University, OK
Randy Westgren, University of Illinois, IL
Darren Hudson, Mississippi State University, MI

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