Seminario

I Laboratori Nazionali di Riferimento *Listeria monocytogenes* e *Campylobacter*

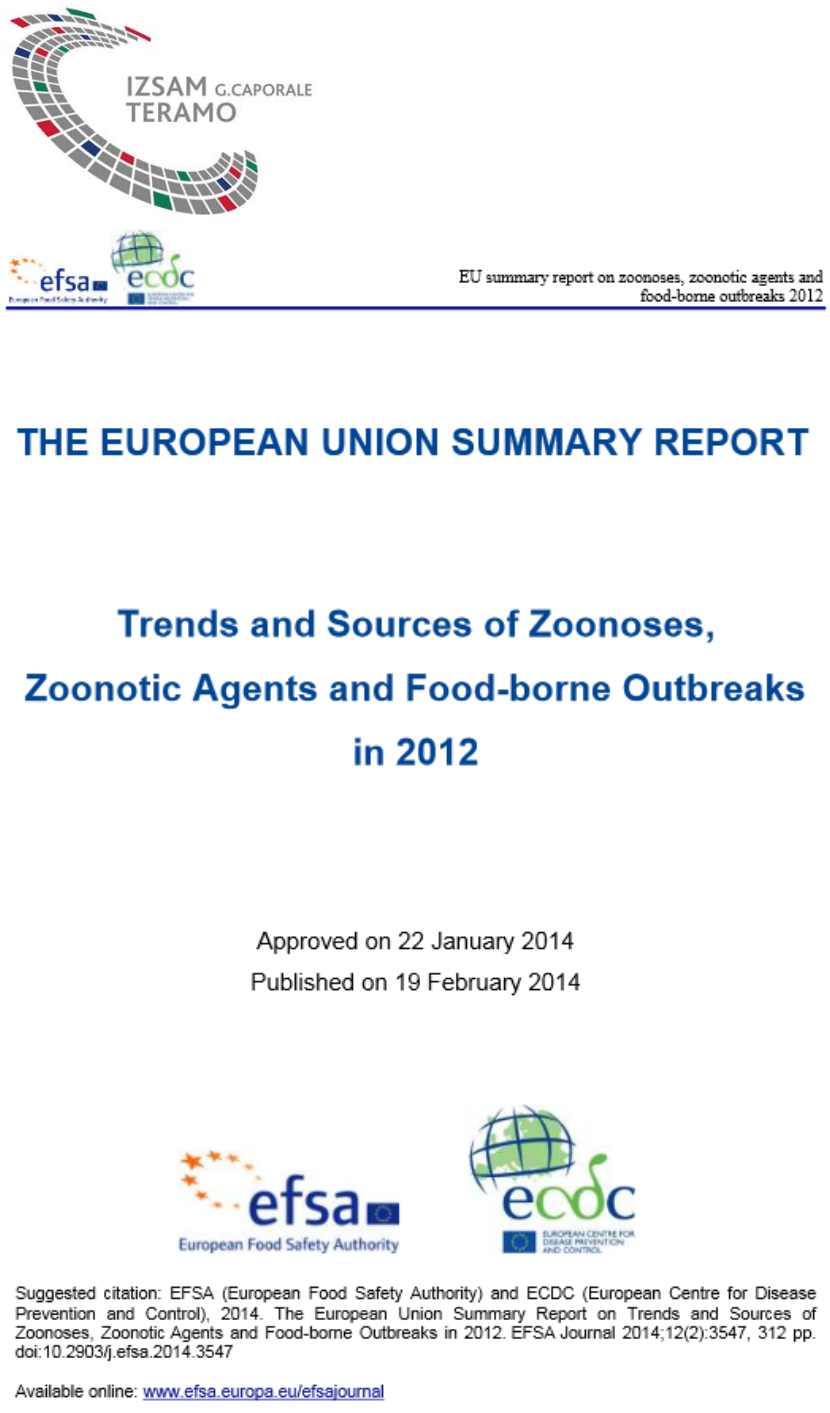
25 - 26 novembre 2014, Centro Internazionale per la Formazione e l'Informazione Veterinaria "Francesco Gramenzi"

IZSAM G.CAPORALE TERAMO

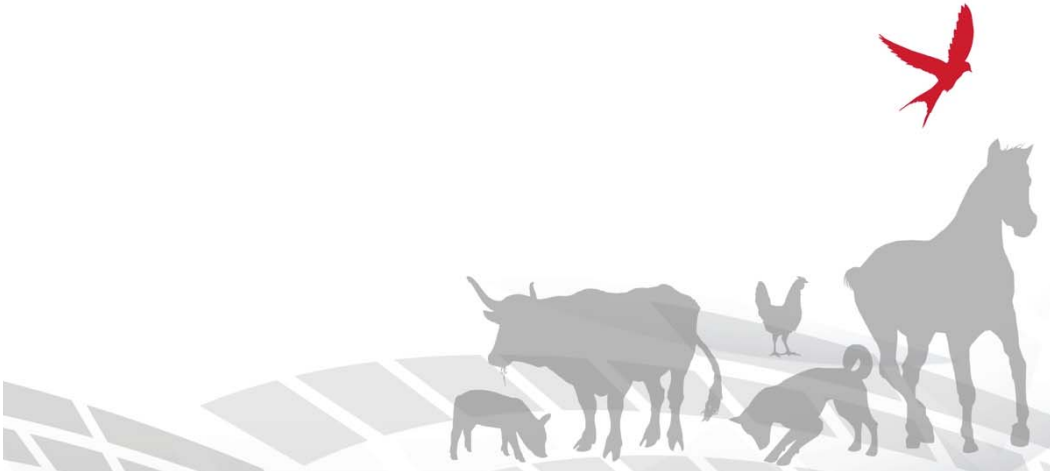
Piano Nazionale di monitoraggio sulla contaminazione da *Campylobacter* spp. nella filiera di produzione del pollo da carne

Paolo Calistri , Simona Iannetti

Introduzione



- La campylobacteriosi è la zoonosi più frequentemente notificata in UE con 214.268 casi umani notificati nel 2012.



Introduzione

Advisory Committee on the Microbiological Safety of Food

Annual Report 2005

Advises the Food Standards Agency on the Microbiological Safety of Food

- Diversi studi scientifici indicano che il consumo di alimenti contaminati è la principale fonte d'infezione per l'uomo.

The EFSA Journal (2005) 173 1-10 "*Campylobacter* in animals and foodstuffs"

Opinion of the Scientific Panel on Biological Hazards on the request from the Commission related to *Campylobacter* in animals and foodstuffs[1]

(Question N° EFSA-Q-2003-081)

Adopted on 27th of January 2005

SUMMARY

Campylobacteriosis represent an important public health problem with considerable socio-economic impact in the EU. The primary reservoir of thermophilic *Campylobacter*, the etiological agents of campylobacteriosis, is the alimentary tract of wild and domesticated birds and mammals, and the infective dose seems to be small. Foods represent a significant risk in regard to human campylobacteriosis.

This opinion assesses foodborne routes of campylobacteriosis, and identifies possible control options as well as data gaps which require attention.

Poultry meat products appear to be a major source of campylobacteriosis, through cross-contamination to ready-to-eat (RTE) foods and through direct hand-to-mouth transfer during food preparation, and to a lesser extent from the consumption of undercooked poultry meat.

Reducing the proportion of *Campylobacter* infected poultry flocks and/or reducing the numbers of *Campylobacter* in live poultry and on poultry carcasses will lower the risk to consumers considerably. Reducing the proportion of *Campylobacter* infected poultry flocks can be achieved by the application of strict biosecurity measures in primary production. The setting of performance objectives (PO) or targets in poultry production is recommended. Means for verifying that these POs are met should also be implemented. Setting microbiological standards for *Campylobacter* in poultry meat products at retail level appear not to be cost-effective as this would imply unnecessary testing of end products.

[1] For citation purposes : Opinion of the Scientific Panel on Biological Hazards on « Campylobacter in animals and foodstuffs », The EFSA Journal (2005) 173 1-10

Introduzione

Available online at www.sciencedirect.com
SCIENCE DIRECT
International Journal of Food Microbiology xx (2006) xxx–xxx
INTERNATIONAL JOURNAL OF Food Microbiology
www.elsevier.com/locate/ijfoodmicro

Quantitative risk assessment of *Campylobacter* spp. in poultry based meat preparations as one of the factors to support the development of risk-based microbiological criteria in Belgium

M. Uyttendaele [a,*], K. Baert [a], Y. Ghafir [b], G. Daube [b], L. De Zutter [c], L. Herman [d], K. Dierick [e], D. Pierard [f], J.J. Dubois [g], B. Horion [h], J. Debevere [a]

- Il consumo di carne di pollo contaminata è considerato una delle principali vie d'infezione.

- Principali fattori di rischio per l'uomo:
  - Carne non sufficientemente cotta
  - Cross-contaminazione con alimenti RTE

WHO/CDS/CSR/APH/2000.4

EMERGING INFECTIOUS DISEASES®

Emerg Infect Dis. Feb 2006; 12(2): 280–284. PMCID: PMC3373097
doi: 10.3201/eid1202.050936

Fresh Chicken as Main Risk Factor for Campylobacteriosis, Denmark

Anne Wingstrand,[✉*] Jakob Neimann,[*,1] Jørgen Engberg,[†] Eva Møller Nielsen,[*†] Peter Gerner-Smidt,[†,2] Henrik C. Wegener,[*] and Kåre Mølbak[†]

The Increasing Incidence of Human Campylobacteriosis. Report and Proccedings of a WHO Consultation of Experts

Copenhagen, Denmark
21-25 November 2000

Introduzione

- Almeno il 20%-30% dei casi umani di campylobacteriosi sono imputabili direttamente alla preparazione e al consumo di carne di pollo.
- Il 50%-80 dei casi sembra avere nel pollame come *reservoir* la propria fonte d'infezione anche indiretta.

efsa
European Food Safety Authority

EFSA Journal 2010; 8(1):1437

SCIENTIFIC OPINION

Scientific Opinion on Quantification of the risk posed by broiler meat to human campylobacteriosis in the EU[1]

EFSA Panel on Biological Hazards (BIOHAZ)[2, 3]

European Food Safety Authority (EFSA), Parma, Italy

ABSTRACT

This scientific opinion further elaborates a previous EFSA opinion and assesses the extent to which meat derived from broilers contributes to human campylobacteriosis at EU level. It gives an overview of the public health significance and burden of campylobacteriosis, concluding that there is considerable underascertainment and underreporting of clinical campylobacteriosis in the EU. The known and hypothesised factors having an impact of the epidemiology of human campylobacteriosis are summarised. Handling, preparation and consumption of broiler meat may account for 20% to 30% of human cases of campylobacteriosis, while 50% to 80% may be attributed to the chicken reservoir as a whole. Many factors may explain this difference in attribution. There are differences in the point of attribution (reservoir vs. point of consumption). Strains from the chicken reservoir may reach humans by pathways other than food (e.g. by the environment or by direct contact). Results may be biased by inaccurate exposure assessments, confounding by immunity and incomplete data on reservoirs. Data for source attribution in the EU are limited and unavailable for the majority of Member States and there are indications that the epidemiology of human campylobacteriosis differs between regions. Hence, the conclusions of this scientific opinion must be interpreted with care. Recommendations are made on EU surveillance and research activities aimed at improving quantification of the burden of campylobacteriosis, facilitating the evaluation of the human health effects of any interventions and giving a better basis for source attribution.

KEY WORDS

Broiler meat, chicken, campylobacteriosis, *Campylobacter coli*, *Campylobacter jejuni*, source attribution.

1 On request from the European Commission, Question No EFSA-Q-2008-469 adopted on 9 December 2009.

2 Panel members: Olivier Andreoletti, Herbert Budka, Sava Buncic, John D Collins, John Griffin, Tine Hald, Arie Hendrik Havelaar, James Hope, Günter Klein, James McLauchlin, Winy Messens, Christine Müller-Graf, Christophe Nguyen-The, Birgit Noerrung, Luisa Peixe, Miguel Prieto Maradona, Antonia Ricci, John Sofos, John Threlfall, Ivar Vågsholm, Emmanuel Vanopdenbosch. Correspondence: biohaz@efsa.europa.eu

3 Acknowledgement: The Panel wishes to thank the members of the Working Group on *Campylobacter* in broiler meat – Source attribution for the preparation of this opinion: Arie Hendrik Havelaar, Merete Hofshagen, Hilde Kruse, Noel McCarthy, Sara Monteiro Pires, Diane Newell, Norval Strachan.

Suggested citation: EFSA Panel on Biological Hazards (BIOHAZ); Scientific Opinion on Quantification of the risk posed by broiler meat to human campylobacteriosis in the EU. EFSA Journal 2010; 8(1):1437. [89 pp.]. doi:10.2903/j.efsa.2010.1437. Available online: www.efsa.europa.eu

Situazione epidemiologica italiana

efsa
European Food Safety Authority
EFSA Journal 2010; 8(1):1437

SCIENTIFIC OPINION

Scientific Opinion on Quantification of the risk posed by broiler meat to human campylobacteriosis in the EU[1]

EFSA Panel on Biological Hazards (BIOHAZ)[2,3]

European Food Safety Authority (EFSA), Parma, Italy

ABSTRACT

This scientific opinion further elaborates a previous EFSA opinion and assesses the extent to which meat derived from broilers contributes to human campylobacteriosis at EU level. It gives an overview of the public health significance and burden of campylobacteriosis, concluding that there is considerable underascertainment and underreporting of clinical campylobacteriosis in the EU. The known and hypothesised factors having an impact of the epidemiology of human campylobacteriosis are summarised. Handling, preparation and consumption of broiler meat may account for 20% to 30% of human cases of campylobacteriosis, while 50% to 80% may be attributed to the chicken reservoir as a whole. Many factors may explain this difference in attribution. There are differences in the point of attribution (reservoir vs. point of consumption). Strains from the chicken reservoir may reach humans by pathways other than food (e.g. by the environment or by direct contact). Results may be biased

International Journal of Food Microbiology 128 (2008) 274–287

Contents lists available at ScienceDirect

International Journal of Food Microbiology

journal homepage: www.elsevier.com/locate/ijfoodmicro

ELSEVIER

Quantitative risk assessment of human campylobacteriosis related to the consumption of chicken meat in two Italian regions

Paolo Calistri *, Armando Giovannini

Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise "G. Caporale", Via Campo Boario, 64100 Teramo, Italy

ARTICLE INFO

Article history:
Received 3 December 2007
Received in revised form 4 August 2008
Accepted 28 August 2008

Keywords:
Campylobacter
Quantitative risk assessment
Chicken meat
Italy

ABSTRACT

Campylobacteriosis is the most frequently reported zoonotic disease in humans within the European Union. The consumption of contaminated chicken meat is considered one of the main sources of human infection. Although there are no official data on the incidence of *Campylobacter* infection in Italy, the available studies suggest that this infection is a major problem also in Italy. The authors developed a simulation model to quantitatively estimate the expected annual number of human cases of campylobacteriosis in the Italian regions of Abruzzo and Molise, due to the cross-contamination during the handling of *Campylobacter jejuni* contaminated chicken meat in domestic kitchen. The authors considered two different models for the dose–response relationship, given their crucial effects on the model's outputs. The expected percentage of human population, experiencing *Campylobacter* gastroenteritis episodes every year in Abruzzo e Molise regions, varied between 0.8% and 1.8%, according to the dose–response model.

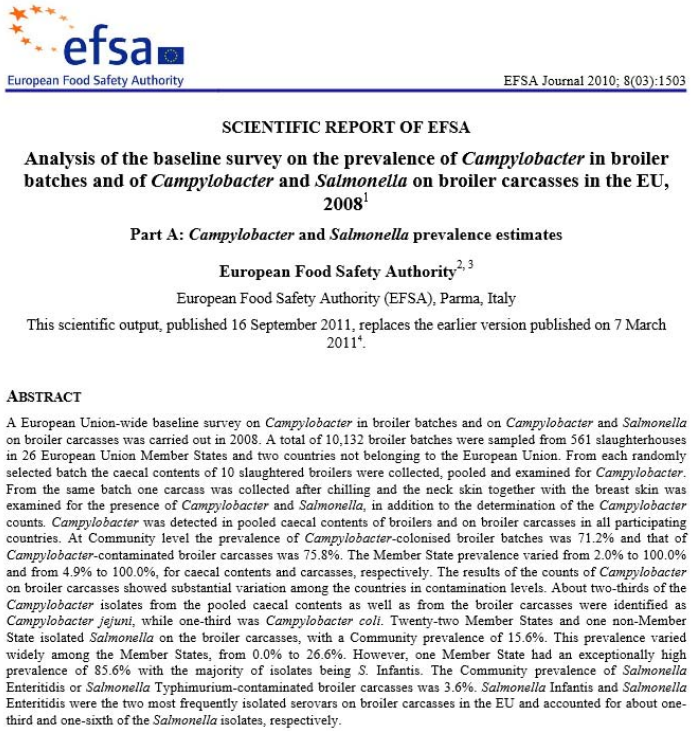
1. Incidenza di infezione nell'uomo

- EFSA, 2011: in Italia 586 casi per centomila abitanti (0.586 %).
- Calistri e Giovannini, 2008: la percentuale prevista di casi in Abruzzo e Molise, varia tra il 0,8% e l'1,8%, a seconda del modello dose-risposta.

Situazione epidemiologica italiana

2. Contaminazione lungo la filiera di produzione del pollo da carne

- Piano di monitoraggio coordinato UE 2008: prelievo ed esame quali-quantitativo di campioni di contenuto ciecale e di pelle del collo prelevati in lotti di macellazione casualmente selezionati.
  - ✓ su 393 lotti di macellazione, il 63.3% è risultato contaminato da *Campylobacter* spp., sulla base del rilievo del patogeno nel **contenuto ciecale** degli animali.
  - ✓ Il 49.6% delle carcasse è risultato contaminato sulla base degli esiti microbiologici sulla **pelle del collo**.



efsa
European Food Safety Authority
EFSA Journal 2010; 8(03):1503

SCIENTIFIC REPORT OF EFSA

Analysis of the baseline survey on the prevalence of *Campylobacter* in broiler batches and of *Campylobacter* and *Salmonella* on broiler carcasses in the EU, 2008[1]

Part A: *Campylobacter* and *Salmonella* prevalence estimates

European Food Safety Authority[2, 3]

European Food Safety Authority (EFSA), Parma, Italy

This scientific output, published 16 September 2011, replaces the earlier version published on 7 March 2011[4].

ABSTRACT

A European Union-wide baseline survey on *Campylobacter* in broiler batches and on *Campylobacter* and *Salmonella* on broiler carcasses was carried out in 2008. A total of 10,132 broiler batches were sampled from 561 slaughterhouses in 26 European Union Member States and two countries not belonging to the European Union. From each randomly selected batch the caecal contents of 10 slaughtered broilers were collected, pooled and examined for *Campylobacter*. From the same batch one carcass was collected after chilling and the neck skin together with the breast skin was examined for the presence of *Campylobacter* and *Salmonella*, in addition to the determination of the *Campylobacter* counts. *Campylobacter* was detected in pooled caecal contents of broilers and on broiler carcasses in all participating countries. At Community level the prevalence of *Campylobacter*-colonised broiler batches was 71.2% and that of *Campylobacter*-contaminated broiler carcasses was 75.8%. The Member State prevalence varied from 2.0% to 100.0% and from 4.9% to 100.0%, for caecal contents and carcasses, respectively. The results of the counts of *Campylobacter* on broiler carcasses showed substantial variation among the countries in contamination levels. About two-thirds of the *Campylobacter* isolates from the pooled caecal contents as well as from the broiler carcasses were identified as *Campylobacter jejuni*, while one-third was *Campylobacter coli*. Twenty-two Member States and one non-Member State isolated *Salmonella* on the broiler carcasses, with a Community prevalence of 15.6%. This prevalence varied widely among the Member States, from 0.0% to 26.6%. However, one Member State had an exceptionally high prevalence of 85.6% with the majority of isolates being *S.* Infantis. The Community prevalence of *Salmonella* Enteritidis or *Salmonella* Typhimurium-contaminated broiler carcasses was 3.6%. *Salmonella* Infantis and *Salmonella* Enteritidis were the two most frequently isolated serovars on broiler carcasses in the EU and accounted for about one-third and one-sixth of the *Salmonella* isolates, respectively.

Situazione epidemiologica italiana

Veterinaria Italiana, 46 (4), 415-423

Prevalence of thermotolerant *Campylobacter* in broiler flocks and broiler carcasses in Italy

Elisabetta Di Giannatale[1], Vincenza Prencipe[1], Patrizia Colangeli[1], Alessandra Alessiani[1], Lisa Barco[2], Monica Staffolani[3], Silvia Tagliabue[4], Carla Grattarola[5], Anna Cerrone[6], Antonella Costa[7], Margherita Pisanu[8], Ugo Santucci[9], Giorgio Iannitto[1] & Giacomo Migliorati[1]

Summary

In accordance with European Union regulations, from 5 February until 15 December 2008, sampling and analysis activities were conducted in Italy to assess the extent of contamination caused by thermotolerant *Campylobacter* in broiler chickens farmed nationwide. The survey involved 48 poultry slaughterhouses distributed across eleven regions of Italy, where the caeca and carcasses of 393 slaughter batches were sampled. A total of 284 batches (72.3%) gave positive results for *Campylobacter* spp. as follows: 52.1% were contaminated by *C. jejuni*, 55.6% by *C. coli* and 1.1% by *C. lari*. *C. jejuni* and *C. coli* were isolated together in 37 batches (13% of positive results). *Campylobacter* spp. was isolated only from the caeca in 251 slaughter batches (63.9%) including caecal isolates of *C. jejuni* (48.2%), *C. coli* (50.6%), and *C. lari* (1.2%). Carcasses from 182 batches (46.3%) were contaminated by *C. jejuni* in 40.7% of cases, *C. coli* in 57.7% and the absence of *C. lari* from all batches examined. The contamination level observed in the carcasses ranged between 10 and 1.6×10^7 cfu/g.

Keywords

Broiler, Caeca, *Campylobacter*, Carcass, Italy, Prevalence.

Introduction

Campylobacter spp. is recognised as the principal agent of gastroenteritis in humans. In the United States, approximately 5.2 million cases of food poisoning are recorded each year, of which 2.5 million are attributed to thermo-tolerant *Campylobacter* (2).

The data collected in the 2007 zoonoses report of the European Food Safety Authority (EFSA) indicate that *Campylobacter* spp., with 200 507 human cases in 23 member states, is the most important source of food poisoning in Europe and the trend has increased over the past five years (9).

Chicken meat has proved to be the most common source of infection. The mean prevalence of *Campylobacter* spp. infection in this product is 26% (range from 0% to 86.5%). In broiler flocks, the mean prevalence of *Campylobacter* spp. infection is 25.2% (range 0% to 82.8%) (9).

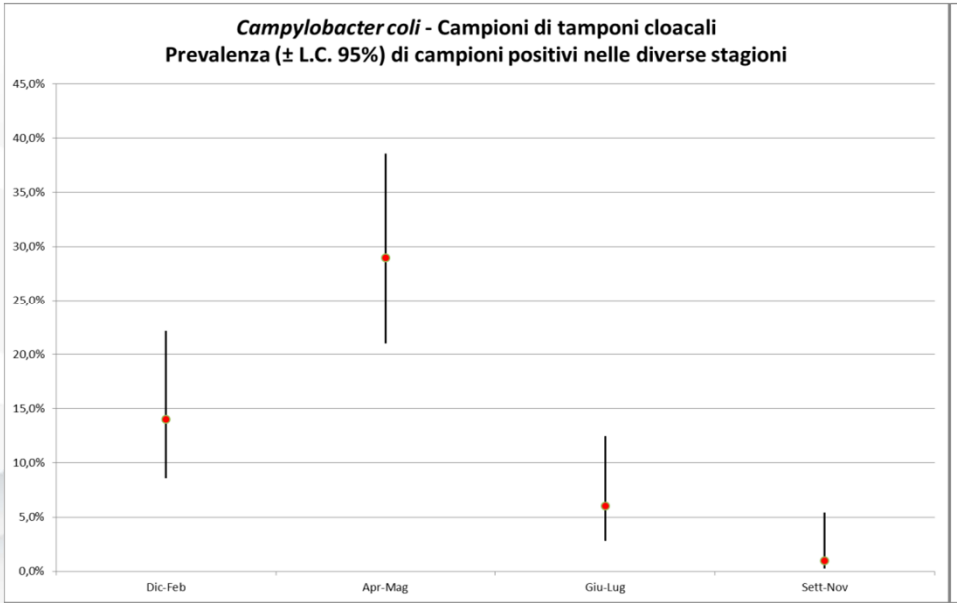
2. Contaminazione lungo la filiera di produzione del pollo da carne

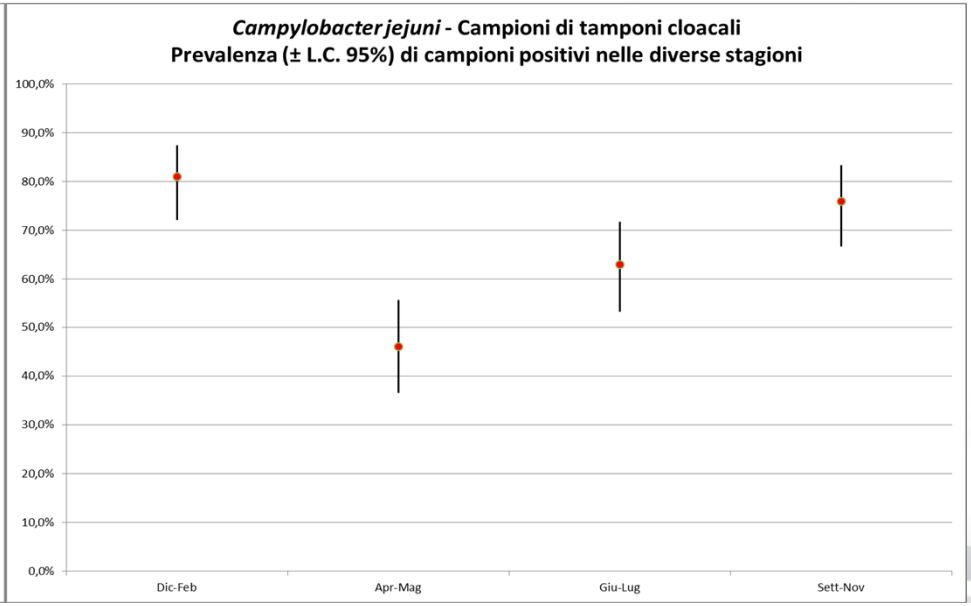
✓ mentre nella maggioranza dei Paesi dell'UE *C.* jejuni è nettamente prevalente sia nel contenuto ciecale (60.8% dei lotti di macellazione in EU), che sulle carcasse (67.9% dei lotti di macellazione in EU), in Italia *C.* coli risulta invece predominante (50.6% nel contenuto ciecale e 57.7% sulla carcassa).

Situazione epidemiologica italiana

2. Contaminazione lungo la filiera di produzione del pollo da carne

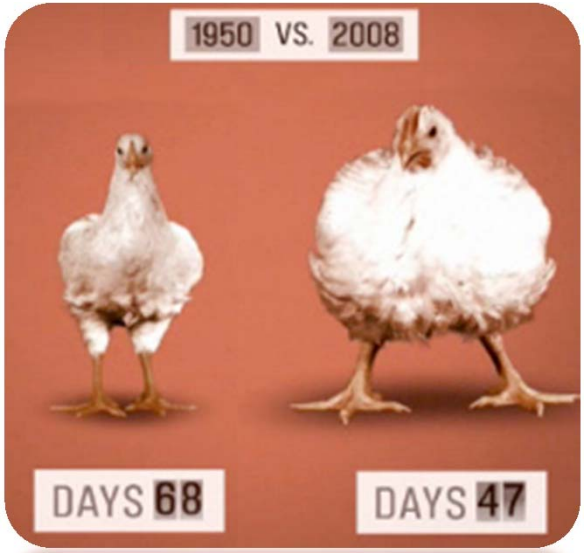
Progetto IZS AM 03/08 RC «Analisi dei fattori di rischio associati a *Listeria monocytogenes* e *Campylobacter* termotolleranti nelle filiere produttive e studi di patogenesi autoimmunitaria nella sindrome di Guillain-Barrè»: C. *jejuni* e C. *coli* sembrano possedere prevalenze diverse nel corso dell'anno che potrebbero, quindi, far ipotizzare meccanismi differenti di contaminazione e diffusione all'interno degli allevamenti e lungo la catena di macellazione.





I fattori di rischio

- Piano di monitoraggio coordinato UE 2008: diversi fattori di rischio sono in grado di **accrescere la prevalenza e/o i livelli di contaminazione nella carne di pollo**, influenzando l'esposizione finale per il consumatore italiano.



I fattori di rischio

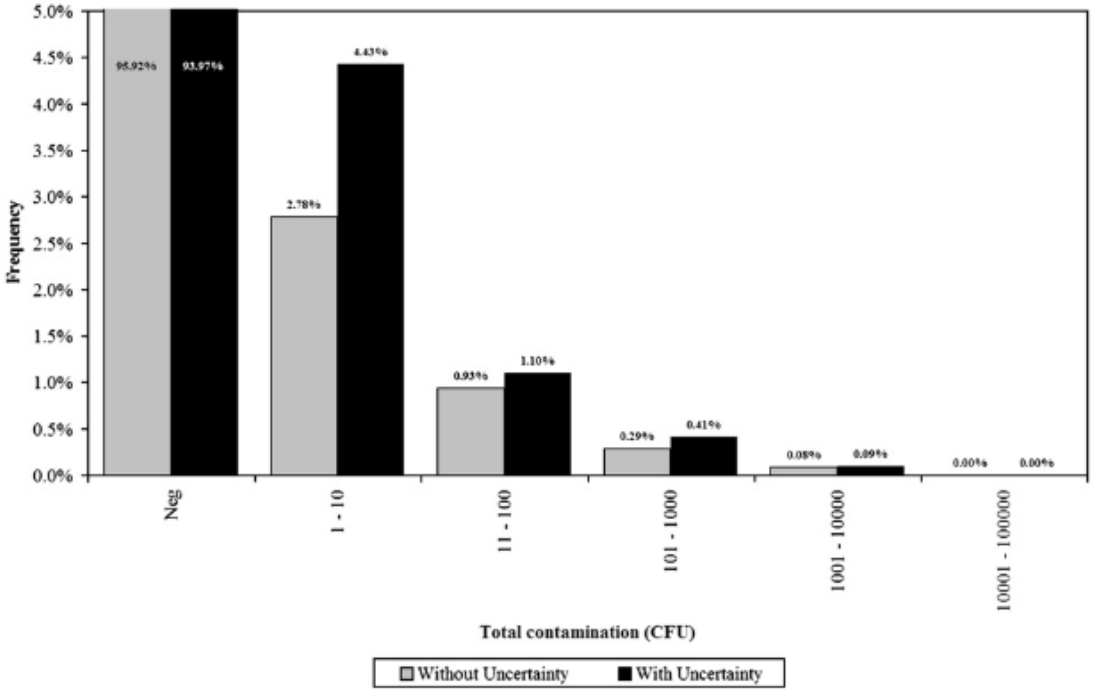
- Ruolo del settore della produzione primaria per il mantenimento e la propagazione della contaminazione lungo al catena di produzione: la probabilità di avere carcasse contaminate da *Campylobacter* è 30 volte maggiore nei lotti di macellazione che pervengono già contaminati.
- Età degli animali alla macellazione: un aumento da 33-35 giorni a 42-44 giorni sembra in grado di raddoppiare la prevalenza di lotti positivi.
- Condizioni igieniche negli allevamenti.
- Imbrattamento delle carcasse nel corso della rimozione del pacchetto intestinale durante la macellazione.

I fattori di rischio

- Altri studi:
  - Ruolo del trasporto verso il mattatoio: importante momento di propagazione dell'infezione tra gli individui

I fattori di rischio

- **Rischio per il consumatore:** un importante fattore di rischio è rappresentato dalle **manipolazioni** che l'alimento subisce nel corso della sua preparazione finale, con possibilità di cross-contaminazione di alimenti RTE.



Simulated final contamination of *Campylobacter jejuni* in prepared meals due to cross contamination during the preparation phase.

- Calistri e Giovannini, 2008: hanno confermato l'importanza di tale fase nella determinazione del rischio finale per consumatore.

Strategie di controllo nella filiera del pollo da carne

- **Obiettivo: riduzione dell'incidenza dei casi nell'uomo**.

✓ Riduzione della prevalenza di contaminazione dei e nei lotti avviati alla macellazione: misure di controllo da applicare nelle fasi di produzione primaria, negli allevamenti e durante il trasporto.

✓ Riduzione dei livelli di contaminazione nelle carcasse: applicazione di severe misure igieniche durante la macellazione.

✓ Riduzione della cross-contaminazione durante la manipolazione degli alimenti da parte dei consumatori e di ristoratori: obiettivo che contribuirebbe ad una effettiva riduzione dell'incidenza di infezione nell'uomo.

Strategie di controllo nella filiera del pollo da carne

European Food Safety Authority EFSA Journal 2011; 9(4):2105

SCIENTIFIC OPINION

Scientific Opinion on *Campylobacter* in broiler meat production: control options and performance objectives and/or targets at different stages of the food chain[1]

EFSA Panel on Biological Hazards (BIOHAZ)[2, 3]

European Food Safety Authority (EFSA), Parma, Italy

ABSTRACT

It is estimated that there are approximately nine million cases of human campylobacteriosis per year in the EU27. The disease burden of campylobacteriosis and its sequelae is 0.35 million disability-adjusted life years (DALYs) per year and total annual costs are 2.4 billion €. Broiler meat may account for 20% to 30% of these, while 50% to 80% may be attributed to the chicken reservoir as a whole (broilers as well as laying hens). The public health benefits of controlling *Campylobacter* in primary broiler production are expected to be greater than control later in the chain as the bacteria may also spread from farms to humans by other pathways than broiler meat. Strict implementation of biosecurity in primary production and GMP/HACCP during slaughter may reduce colonization of broilers with *Campylobacter*, and contamination of carcasses. The effects cannot be quantified because they depend on many interrelated local factors. In addition, the use of fly screens, restriction of slaughter age, or discontinued thinning may further reduce consumer risks but have not yet been tested widely. After slaughter, a 100% risk reduction can be reached by irradiation or cooking of broiler meat on an industrial scale. More than 90% risk reduction can be obtained by freezing carcasses for 2-3 weeks. A 50-90% risk reduction can be achieved by freezing for 2-3 days, hot water or chemical carcass decontamination. Achieving a target of 25% or 5% BFP in all other MS is estimated to result in 50% and 90% reduction of public health risk, respectively. A public health risk reduction > 50% or > 90% could be achieved if all batches would comply with microbiological criteria with a critical limit of 1000 or 500 CFU/gram of neck and breast skin, respectively, while 15% and 45% of all tested batches would not comply with these criteria.

KEY WORDS

Broiler meat, *Campylobacter*, campylobacteriosis, control, microbiological criteria, QMRA, targets

[1] On request from the European Commission, Question No EFSA-Q-2009-00233, adopted on 10 March 2011.

[2] Panel members: Olivier Andreoletti, Herbert Budka, Sava Buncic, John D Collins, John Griffin, Tine Hald, Arie Havelaar, James Hope, Günter Klein, James McLauchlin, Christine Müller-Graf, Christophe Nguyen-The, Birgit Noerrung, Luisa Peixe, Miguel Prieto Maradona, Antonia Ricci, John Sofos, John Threlfall, Ivar Vågsholm and Emmanuel Vanopdenbosch. Correspondence: biohaz@efsa.europa.eu

[3] Acknowledgement: The Panel wishes to thank the members of the Working Group on *Campylobacter* on broiler meat: control options and performance objectives and/or targets for the preparatory work on this scientific opinion: Paolo Calistri, Pierre Colin, Janet Corry, Arie Havelaar, Merete Hofshagen, Günter Klein, Maarten Nauta, Diane Newell, Hanne Rosenquist, Moez Sanaa, John Sofos, Mieke Uyttendaele and Jaap Wagenaar, and EFSA staff Michaela Hempen, Pietro Stella, Winy Messens and Pablo Romero Barrios for the support provided to this EFSA scientific opinion.

Suggested citation: EFSA Panel on Biological Hazards (BIOHAZ); Scientific Opinion on Campylobacter in broiler meat production: control options and performance objectives and/or targets at different stages of the food chain. EFSA Journal 2011;9(4):2105. [141 pp.]. doi:10.2903/j.efsa.2011.2105. Available online: www.efsa.europa.eu/efsajournal

- Una reale strategia di controllo della contaminazione da *Campylobacter* nelle carni di pollo non può portare ad alcun risultato significativo a meno che non si consideri l'intera filiera di produzione, ponendo in atto adeguate misure di controllo sia negli allevamenti che negli stabilimenti di macellazione e trasformazione degli alimenti.

Benefici e costi attesi

- L'EFSA stima che vi siano circa 9 milioni di casi di campylobacteriosi umana ogni anno in UE e che l'impatto di tale infezione abbia un costo complessivo annuo di circa 2.4 miliardi di euro.

efsa
European Food Safety Authority

EFSA Journal 2011; 9(4):2105

SCIENTIFIC OPINION

Scientific Opinion on *Campylobacter* in broiler meat production: control options and performance objectives and/or targets at different stages of the food chain[1]

EFSA Panel on Biological Hazards (BIOHAZ)[2,3]

European Food Safety Authority (EFSA), Parma, Italy

ABSTRACT

It is estimated that there are approximately nine million cases of human campylobacteriosis per year in the EU27. The disease burden of campylobacteriosis and its sequelae is 0.35 million disability-adjusted life years (DALYs) per year and total annual costs are 2.4 billion €. Broiler meat may account for 20% to 30% of these, while 50% to 80% may be attributed to the chicken reservoir as a whole (broilers as well as laying hens). The public health benefits of controlling *Campylobacter* in primary broiler production are expected to be greater than control later in the chain as the bacteria may also spread from farms to humans by other pathways than broiler meat. Strict implementation of biosecurity in primary production and GMP/HACCP during slaughter may reduce colonization of broilers with *Campylobacter*, and contamination of carcasses. The effects cannot be quantified because they depend on many interrelated local factors. In addition, the use of fly screens, restriction of slaughter age, or discontinued thinning may further reduce consumer risks but have not yet been tested widely. After slaughter, a 100% risk reduction can be reached by irradiation or cooking of broiler meat on an industrial scale. More than 90% risk reduction can be obtained by freezing carcasses for 2-3 weeks. A 50-90% risk reduction can be achieved by freezing for 2-3 days, hot water or chemical carcass decontamination. Achieving a target of 25% or 5% BFP in all other MS is estimated to result in 50% and 90% reduction of public health risk, respectively. A public health risk reduction > 50% or > 90% could be achieved if all batches would comply with microbiological criteria with a critical limit of 1000 or 500 CFU/gram of neck and breast skin, respectively, while 15% and 45% of all tested batches would not comply with these criteria.

KEY WORDS

Broiler meat, *Campylobacter*, campylobacteriosis, control, microbiological criteria, QMRA, targets

[1] On request from the European Commission, Question No EFSA-Q-2009-00233, adopted on 10 March 2011.

[2] Panel members: Olivier Andreoletti, Herbert Budka, Sava Buncic, John D Collins, John Griffin, Tine Hald, Arie Havelaar, James Hope, Günter Klein, James McLauchlin, Christine Müller-Graf, Christophe Nguyen-The, Birgit Noerrung, Luisa Peixe, Miguel Prieto Maradona, Antonia Ricci, John Sofos, John Threlfall, Ivar Vågsholm and Emmanuel Vanopdenbosch. Correspondence: biohaz@efsa.europa.eu

[3] Acknowledgement: The Panel wishes to thank the members of the Working Group on *Campylobacter* on broiler meat: control options and performance objectives and/or targets for the preparatory work on this scientific opinion: Paolo Calistri, Pierre Colin, Janet Corry, Arie Havelaar, Mereete Hofshagen, Günter Klein, Maarten Nauta, Diane Newell, Hanne Rosenquist, Moez Sanaa, John Sofos, Mieke Uyttendaele and Jaap Wagenaar, and EFSA staff Michaela Hempen, Pietro Stella, Winy Messens and Pablo Romero Barrios for the support provided to this EFSA scientific opinion.

Suggested citation: EFSA Panel on Biological Hazards (BIOHAZ); Scientific Opinion on Campylobacter in broiler meat production: control options and performance objectives and/or targets at different stages of the food chain. EFSA Journal 2011;9(4):2105. [141 pp.]. doi:10.2903/j.efsa.2011.2105. Available online: www.efsa.europa.eu/efsajournal

IZSAM G.CAPORALE TERAMO

Benefici e costi attesi

efsa
European Food Safety Authority

EFSA Journal 2011; 9(4):2105

SCIENTIFIC OPINION

Scientific Opinion on *Campylobacter* in broiler meat production: control options and performance objectives and/or targets at different stages of the food chain[1]

EFSA Panel on Biological Hazards (BIOHAZ)[2,3]

European Food Safety Authority (EFSA), Parma, Italy

ABSTRACT

It is estimated that there are approximately nine million cases of human campylobacteriosis per year in the EU27. The disease burden of campylobacteriosis and its sequelae is 0.35 million disability-adjusted life years (DALYs) per year and total annual costs are 2.4 billion €. Broiler meat may account for 20% to 30% of these, while 50% to 80% may be attributed to the chicken reservoir as a whole (broilers as well as laying hens). The public health benefits of controlling *Campylobacter* in primary broiler production are expected to be greater than control later in the chain as the bacteria may also spread from farms to humans by other pathways than broiler meat. Strict implementation of biosecurity in primary production and GMP/HACCP during slaughter may reduce colonization of broilers with *Campylobacter*, and contamination of carcasses. The effects cannot be quantified because they depend on many interrelated local factors. In addition, the use of fly screens, restriction of slaughter age, or discontinued thinning may further reduce consumer risks but have not yet been tested widely. After slaughter, a 100% risk reduction can be reached by irradiation or cooking of broiler meat on an industrial scale. More than 90% risk reduction can be obtained by freezing carcasses for 2-3 weeks. A 50-90% risk reduction can be achieved by freezing for 2-3 days, hot water or chemical carcass decontamination. Achieving a target of 25% or 5% BFP in all other MS is estimated to result in 50% and 90% reduction of public health risk, respectively. A public health risk reduction > 50% or > 90% could be achieved if all batches would comply with microbiological criteria with a critical limit of 1000 or 500 CFU/gram of neck and breast skin, respectively, while 15% and 45% of all tested batches would not comply with these criteria.

KEY WORDS

Broiler meat, *Campylobacter*, campylobacteriosis, control, microbiological criteria, QMRA, targets

[1] On request from the European Commission, Question No EFSA-Q-2009-00233, adopted on 10 March 2011.

[2] Panel members: Olivier Andreoletti, Herbert Budka, Sava Buncic, John D Collins, John Griffin, Tine Hald, Arie Havelaar, James Hope, Günter Klein, James McLauchlin, Christine Muller-Graf, Christophe Nguyen-The, Birgit Noerrung, Luisa Peixe, Miguel Prieto Maradona, Antonia Ricci, John Sofos, John Threlfall, Ivar Vågsholm and Emmanuel Vanopdenbosch. Correspondence: biohaz@efsa.europa.eu

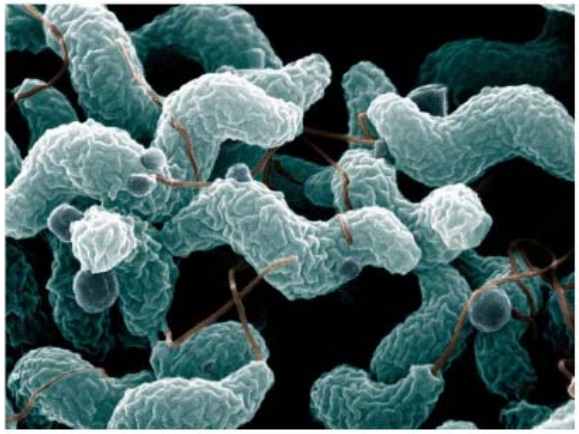
[3] Acknowledgement: The Panel wishes to thank the members of the Working Group on *Campylobacter* on broiler meat: control options and performance objectives and/or targets for the preparatory work on this scientific opinion: Paolo Calistri, Pierre Colin, Janet Corry, Arie Havelaar, Merete Hofshagen, Günter Klein, Maarten Nauta, Diane Newell, Hanne Rosenquist, Moez Sanaa, John Sofos, Mieke Uyttendaele and Jaap Wagenaar, and EFSA staff Michaela Hempen, Pietro Stella, Winy Messens and Pablo Romero Barrios for the support provided to this EFSA scientific opinion.

Suggested citation: EFSA Panel on Biological Hazards (BIOHAZ); Scientific Opinion on Campylobacter in broiler meat production: control options and performance objectives and/or targets at different stages of the food chain. EFSA Journal 2011;9(4):2105. [141 pp.]. doi:10.2903/j.efsa.2011.2105. Available online: www.efsa.europa.eu/efsajournal

- La stessa EFSA stima per l'Italia le seguenti riduzioni del rischio di infezione nell'uomo a seguito della riduzione della prevalenza di allevamenti infetti:
  - riduzione dell'infezione al 50% dei gruppi allevati (valore di partenza considerato = 63.9%): riduzione del 21.7% del rischio di infezione dell'uomo;
  - riduzione della prevalenza al **25%**: riduzione del 60.9% del rischio per il consumatore;
  - riduzione della prevalenza al **10%**: riduzione del 84.3% del rischio per il consumatore;
  - riduzione della prevalenza al **5%**: riduzione del 92.2% del rischio per il consumatore

Benefici e costi attesi

- L'applicazione di misure di biosicurezza negli allevamenti potrebbe contribuire ad una riduzione dal 40% al 70% della prevalenza, dimostrandosi le misure maggiormente vantaggiose da un punto di vista di costo-beneficio. Infatti, a fronte di un **costo** variabile tra 37 e 54 milioni di euro per il potenziamento di tali misure in UE, si avrebbe un **beneficio** in termini di riduzione di incidenza umana pari a 166-334 milioni di euro.

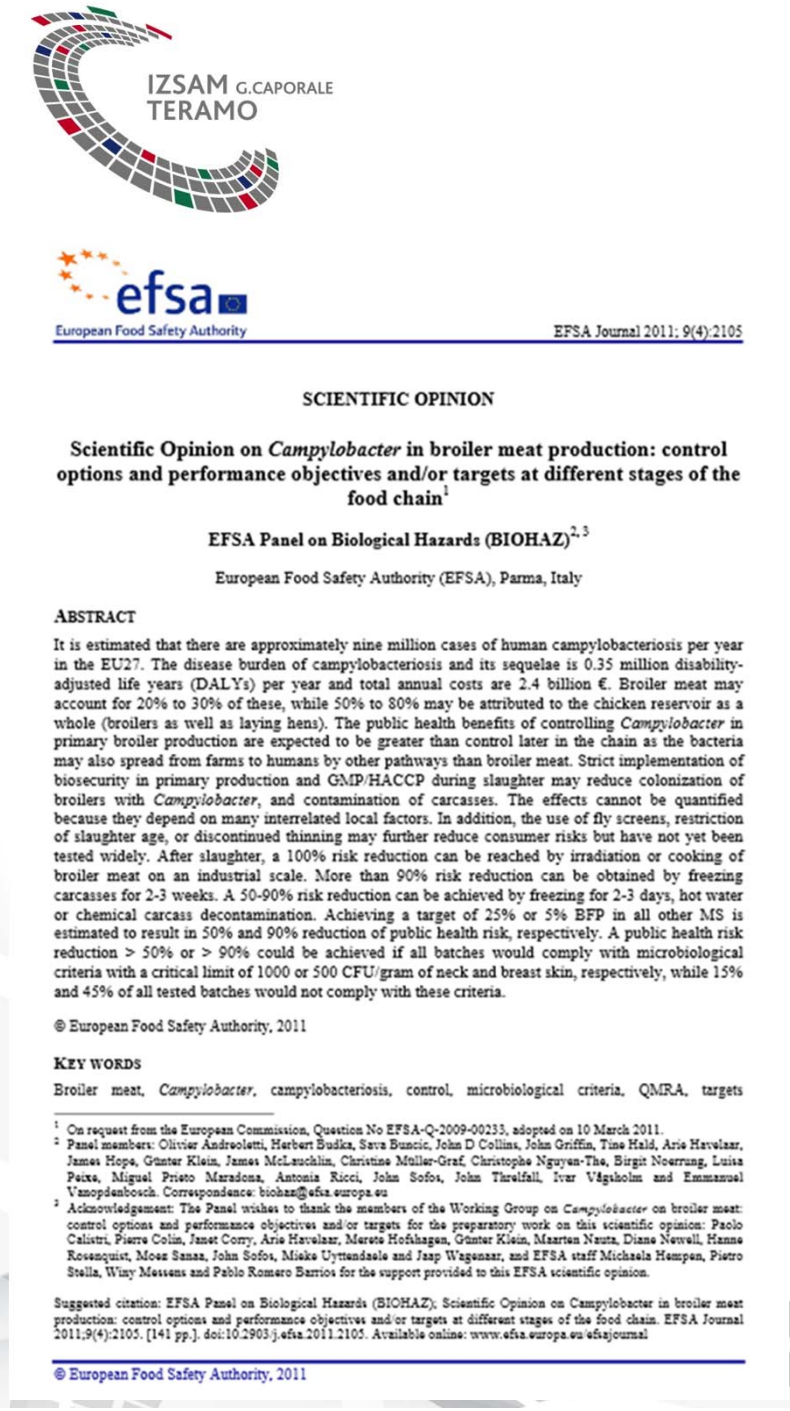


Analysis of the costs and benefits of setting certain control measures for reduction of *Campylobacter* in broiler meat at different stages of the food chain

Final Report

Benefici e costi attesi

- L'EFSA ha anche considerato l'effetto di riduzione del rischio per l'uomo dall'applicazione di possibili criteri microbiologici sulle carcasse di pollo a fine macellazione.



IZSAM G.CAPORALE TERAMO

efsa
European Food Safety Authority

EFSA Journal 2011; 9(4):2105

SCIENTIFIC OPINION

Scientific Opinion on *Campylobacter* in broiler meat production: control options and performance objectives and/or targets at different stages of the food chain[1]

EFSA Panel on Biological Hazards (BIOHAZ)[2,3]

European Food Safety Authority (EFSA), Parma, Italy

ABSTRACT

It is estimated that there are approximately nine million cases of human campylobacteriosis per year in the EU27. The disease burden of campylobacteriosis and its sequelae is 0.35 million disability-adjusted life years (DALYs) per year and total annual costs are 2.4 billion €. Broiler meat may account for 20% to 30% of these, while 50% to 80% may be attributed to the chicken reservoir as a whole (broilers as well as laying hens). The public health benefits of controlling *Campylobacter* in primary broiler production are expected to be greater than control later in the chain as the bacteria may also spread from farms to humans by other pathways than broiler meat. Strict implementation of biosecurity in primary production and GMP/HACCP during slaughter may reduce colonization of broilers with *Campylobacter*, and contamination of carcasses. The effects cannot be quantified because they depend on many interrelated local factors. In addition, the use of fly screens, restriction of slaughter age, or discontinued thinning may further reduce consumer risks but have not yet been tested widely. After slaughter, a 100% risk reduction can be reached by irradiation or cooking of broiler meat on an industrial scale. More than 90% risk reduction can be obtained by freezing carcasses for 2-3 weeks. A 50-90% risk reduction can be achieved by freezing for 2-3 days, hot water or chemical carcass decontamination. Achieving a target of 25% or 5% BFP in all other MS is estimated to result in 50% and 90% reduction of public health risk, respectively. A public health risk reduction > 50% or > 90% could be achieved if all batches would comply with microbiological criteria with a critical limit of 1000 or 500 CFU/gram of neck and breast skin, respectively, while 15% and 45% of all tested batches would not comply with these criteria.

KEY WORDS

Broiler meat, *Campylobacter*, campylobacteriosis, control, microbiological criteria, QMRA, targets

[1] On request from the European Commission, Question No EFSA-Q-2009-00233, adopted on 10 March 2011.

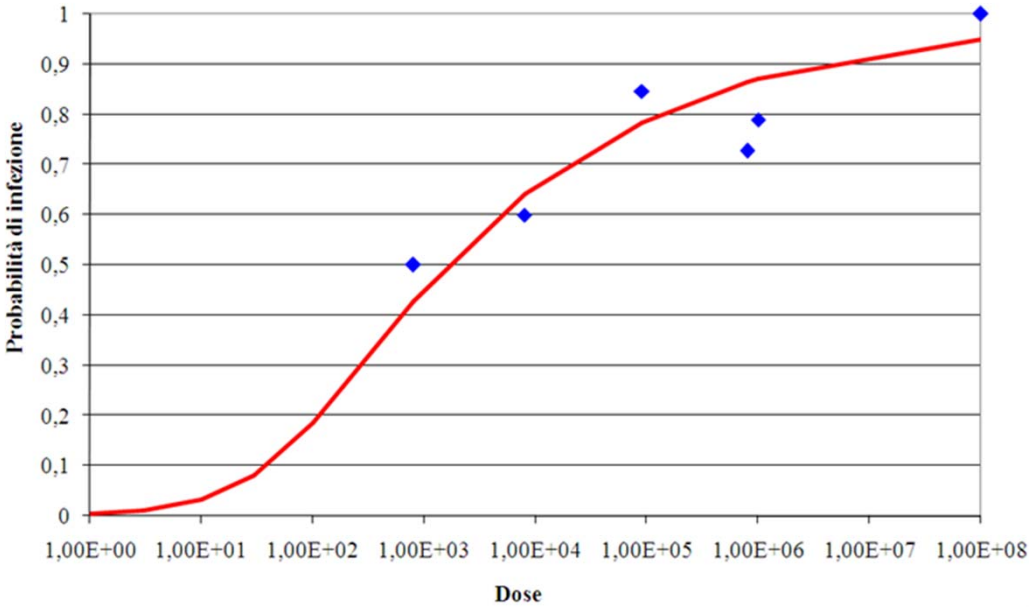
[2] Panel members: Olivier Andreoletti, Herbert Budka, Sava Buncic, John D Collins, John Griffin, Tine Hald, Arie Havelaar, James Hope, Günter Klein, James McLauchlin, Christine Müller-Graf, Christophe Nguyen-The, Birgit Noerrung, Luisa Peixe, Miguel Prieto Maradona, Antonia Ricci, John Sofos, John Threlfall, Ivar Vågsholm and Emmanuel Vanopdenbosch. Correspondence: biohaz@efsa.europa.eu

[3] Acknowledgement: The Panel wishes to thank the members of the Working Group on *Campylobacter* on broiler meat: control options and performance objectives and/or targets for the preparatory work on this scientific opinion: Paolo Calistri, Pierre Colin, Janet Corry, Arie Havelaar, Merete Hofshagen, Günter Klein, Maarten Nauta, Diane Newell, Hanne Rosenquist, Moez Sanaa, John Sofos, Mieke Uyttendaele and Jaap Wagenaar, and EFSA staff Michaela Hempen, Pietro Stella, Winy Messens and Pablo Romero Barrios for the support provided to this EFSA scientific opinion.

Suggested citation: EFSA Panel on Biological Hazards (BIOHAZ); Scientific Opinion on Campylobacter in broiler meat production: control options and performance objectives and/or targets at different stages of the food chain. EFSA Journal 2011;9(4):2105. [141 pp.]. doi:10.2903/j.efsa.2011.2105. Available online: www.efsa.europa.eu/efsajournal

Benefici e costi attesi

- Per l'Italia l'applicazione di criteri microbiologici che considerino il controllo di tutti i lotti di macellazione determinerebbero una riduzione di due terzi del rischio finale per l'uomo:
  - prelievo di 5 campioni (**n**) da altrettante carcasse
  - limite di accettabilità (**m**) di 10^3/g microrganismi
  - n. critico di campioni (**c**) che possono superare tale limite pari a 1



Curva dose-risposta per *Campylobacter jejuni* (dati da Black et al., 1988)

- Tale limite di contaminazione pari 10^3/g è già un limite piuttosto elevato.

Benefici e costi attesi

- Applicando il modello EFSA all'Italia, sulla base di risultati preliminari dello studio in corso di svolgimento da parte del LNR *Campylobacter*, è stato stimato (simulazione svolta con 10 000 iterazioni, utilizzando @Risk 5.7 Palisade Corporation) un superamento dei limiti microbiologici nel 53.3% dei lotti di macellazione.
- Questo risultato conferma che l'impatto dell'applicazione di misure di controllo basate su criteri microbiologici, senza una precedente riduzione della prevalenza di contaminazione nella produzione primaria, determinerebbe costi inaccettabili legati al gran numero di lotti di macellazione che dovrebbero essere posti fuori mercato o comunque avviati a un destino diverso dalla vendita come carne fresca.

Benefici e costi attesi

Inoltre, la variabilità nei livelli di contaminazione delle carcasse all'interno dei medesimi lotti di macellazione influenza grandemente il numero finale di lotti che saranno giudicati non conformi in applicazione di criteri microbiologici.

- Tali livelli di variabilità non sono attualmente conosciuti per le produzioni italiane, ed è quindi fondamentale che un piano nazionale di monitoraggio sia in grado di stimare adeguatamente tali parametri.

International Journal of Food Microbiology 158 (2012) 209–217

Contents lists available at SciVerse ScienceDirect

International Journal of Food Microbiology

journal homepage: www.elsevier.com/locate/ijfoodmicro

Risk based microbiological criteria for *Campylobacter* in broiler meat in the European Union

Maarten J. Nauta [a,*], Moez Sanaa [b], Arie H. Havelaar [c,d]

[a] Technical University of Denmark, National Food Institute, Division of Epidemiology and Microbial Genomics, Søborg, Denmark
[b] French agency for food, environmental and occupational health safety (ANSES) Risk Assessment department, Maisons-Alfort, France
[c] National Institute for Public Health and the Environment, Centre for Infectious Disease Control, Bilthoven, The Netherlands
[d] Utrecht University, Faculty of Veterinary Medicine, Institute for Risk Assessment Sciences, Utrecht, The Netherlands

ARTICLE INFO

Article history:
Received 4 October 2011
Received in revised form 26 June 2012
Accepted 20 July 2012
Available online 27 July 2012

Keywords:
Microbiological criterion
Campylobacter
Broiler meat
Risk assessment

ABSTRACT

Quantitative microbiological risk assessment (QMRA) allows evaluating the public health impact of food safe ty targets to support the control of foodborne pathogens. We estimate the risk reduction of setting microbi ological criteria (MCs) for *Campylobacter* on broiler meat in 25 European countries, applying quantitative data from the 2008 EU baseline survey. We demonstrate that risk based MCs can be derived without explicit consideration of Food Safety Objectives or Performance Objectives. Published QMRA models for the consumer phase and dose response provide a relation between *Campylobacter* concentration on skin samples and the attending probability of illness for the consumer. Probabilistic modelling is used to evaluate a set of potential MCs. We present the percentage of batches not complying with the potential criteria, in relation to the risk reduction attending totally efficient treatment of these batches. We find different risk estimates and different impacts of MCs in different countries, which offers a practical and flexible tool for risk managers to select the most appropriate MC by weighing the costs (i.e. non compliant batches) and the benefits (i.e. reduction in public health risk). Our analyses show that the estimated percentage of batches not complying with the MC is better correlated with the risk estimate than surrogate risk measures like the flock prevalence or the arithmetic mean concentration of bacteria on carcasses, and would therefore be a good measure for the risk of *Campylobacter* on broiler meat in a particular country. Two uncertain parameters in the model are the ratio of within and between flock variances in concentrations, and the transition factor of skin sample concentrations to concentrations on the meat. Sensitivity analyses show that these parameters have a consid erable effect on our results, but the impact of their uncertainty is small compared to that of the parameters defining the Microbiological Criterion and the concentration on the meat.

Obiettivi

- Per motivi logistici, si è scelto di concentrare le attività di prelievo esclusivamente a livello degli stabilimenti di macellazione, punto della filiera in grado di fornire indicazioni sia sui livelli di contaminazione nelle fasi precedenti sia dati utili per una analisi dei rischi per il consumatore finale.
- La durata del piano è di **12 mesi**.

Obiettivi

1. determinare i livelli di contaminazione delle carcasse prodotte nei mattatoi italiani;
2. stimare i livelli di prevalenza di infezione negli allevamenti da ingrasso italiani;
3. stimare il numero atteso di lotti di macellazione non conformi ed il livello di riduzione finale del rischio in caso di applicazione di criteri microbiologici alla macellazione.

Popolazione di riferimento

- La popolazione di riferimento è composta da:
  - 5178 allevamenti da ingrasso,
  - 35 stabilimenti di macellazione.
- Include la quasi totalità della produzione intensiva del pollo da carne in Italia, comprendendo tutti i **maggiori produttori** del settore iscritti all'Unione nazionale delle filiere agroalimentari carni e uova (UNAITALIA).
- I campioni saranno prelevati in regime di autocontrollo da parte dei produttori.
- Gli esami di laboratorio saranno svolti dagli IZS competenti per territorio e dal LNR per il *Campylobacter*.

Piano di campionamento

- Campionamento **casuale** di 450 gruppi di polli carne nel corso di 1 anno dal momento dell'entrata in vigore del Piano.
- *Tale campione permette di stimare il livello di prevalenza di gruppi infetti con una precisione della stima del 4% (95% di livello di confidenza e **prevalenza attesa pari al 63.3%**).*
- I gruppi da campionare saranno selezionati in modo tale che siano distribuiti nel corso dell'intero anno solare e che rappresentino in **modo proporzionale** le diverse categorie di polli da carne (piccoli, medi, grandi).

Gruppo: l'insieme di animali di **uguale stato sanitario**, appartenenti allo **stesso ciclo produttivo,** nel **medesimo capannone**, per i quali è possibile dimostrare la completa separazione fisica e gestionale, ed **avviati assieme alla macellazione**.

Piano di campionamento

- Esempio di calcolo della ripartizione dei gruppi da campionare secondo le attività di macellazione mensili:

Mese	gruppi macellati			gruppi selezionati		
	taglia piccola	taglia media	taglia grande	taglia piccola	taglia media	taglia grande
gen	200	300	500	1(*)	2(**)	3(***)
feb	100	300	500	1	2	3
mar	300	600	750	2	4	5
apr	200	150	500	1	1	3
mag	100	60	500	1	1	3
giu	100	150	250	1	1	2
lug	60	120	250	1	1	2
ago	40	60	250	1	0	2
set	300	450	250	2	3	2
ott	200	210	500	1	1	3
nov	200	300	250	1	2	3
dic	200	300	500	1	2	3
Totale	**2000**	**3000**	**5000**	**14**	**20**	**34**

(*) esempio di calcolo per il valore: (200/2000)*14
(**) esempio di calcolo per il valore: (300/3000)*20
(***) esempio di calcolo per il valore: (500/5000)*34

- Se l'attività di macellazione riguarda nel 20% animali di taglia piccola, 30% di taglia media e 50% di taglia grande e occorre campionare 68 gruppi

Piano di campionamento

- Per ciascun gruppo selezionato, saranno selezionati **5 animali** dai quali saranno prelevati:
  - 5 “pacchetti” viscerali che saranno analizzati in pool per la verifica della presenza di *Campylobacter* nel contenuto ciecale,
  - 5 carcasse dopo il raffreddamento a fine catena, da cui si preleverà una porzione della cute del collo.
- La selezione dei 5 animali da prelevare deve avvenire casualmente nell’ambito dell’intero gruppo selezionato, avendo cura di selezionare animali all’inizio, nel corso e alla fine del gruppo macellato o sessione di macellazione.
- Il numero di campioni è in grado di stimare la media di contaminazione con una precisione della stima del 5%.

Piano di campionamento

- Ciascuna carcassa sarà confezionata e analizzata separatamente, mentre il contenuto dei ciechi dei pacchetti viscerali dei 5 animali sarà analizzato formando un unico pool.
- Tutti i campioni saranno analizzati anche con il metodo della numerazione.

Piano di campionamento

Ripartizione dei campioni di ciechi e di cute del collo per i principali produttori e Regioni di localizzazione dei mattatoi.

Produttore	% produzione	Regione / IZS	Numero gruppi da campionare	Numero carcasse	Numero campioni di pacchetti intestinali (pool)	Numero campioni di cute del collo
AIA	35%	Veneto / IZS Venezie	158	790	158	790
AMADORI	15%	Emilia Romagna / IZS Lombardia e E R	68	340	68	340
	15%	Abruzzo / IZS Abruzzo e Molise	68	340	68	340
FILENI	15%	Abruzzo / IZS Abruzzo e Molise	68	340	68	340
MONTEVERDE	10%	Lombardia / IZS Lombardia e E R	44	220	44	220
VALLESPLUGA	10%	Lombardia / IZS Lombardia e E R	44	220	44	220
TOTALE	**100%**		**450**	**2250**	**450**	**2250**

Piano di campionamento
campioni aggiuntivi

- E’ in corso un dibattito a livello europeo sull’opportunità di considerare la **pelle del collo** per la quantificazione dei livelli di contaminazione della carcassa, in conformità con quanto già previsto dal Reg. 2073/2005 per altri patogeni e considerando che è la porzione di pelle con i maggiori livelli attesi di contaminazione.
- Dati disponibili in letteratura riportano che circa il 70% delle carcasse risultate positive per *C.* jejuni su campioni di pelle del collo lo sono anche in campioni di pelle del petto.

Journal of Food Protection, Vol. 72, No. 8, 2009, Pages 1718–1721

Research Note

Detection of *Campylobacter* from Poultry Carcass Skin Samples at Slaughter in Southern Italy

TIZIANA PEPE,[1]* ROSARIA DE DOMINICIS,[1] GIUSEPPINA ESPOSITO,[1] IOLE VENTRONE,[1] PINA M. FRATAMICO,[2] AND MARIA LUISA CORTESI[1]

[1]*Dipartimento di Scienze Zootecniche e Ispezione degli Alimenti, Sezione di Ispezione degli Alimenti, Università degli studi di Napoli "Federico II", Via Delpino 1, Napoli, 80137 Italy; and* [2]*U.S. Department of Agriculture, Agricultural Research Service, Eastern Regional Research Center, Wyndmoor, Pennsylvania, USA*

MS 08-584: Received 26 November 2008/Accepted 14 March 2009

ABSTRACT

Campylobacter is a major foodborne pathogen responsible for acute gastroenteritis characterized by diarrhea that is sometimes bloody, fever, cramps, and vomiting. *Campylobacter* species are carried in the intestinal tracts of mammals and birds, and sources of human infection include raw milk, contaminated water, direct contact with pets, and foods, particularly poultry. *Campylobacter jejuni* and *C. coli* are the species that account for the majority of human infections. The aim of this work was to determine the prevalence of *Campylobacter* in 190 poultry carcasses sampled at slaughter and to use a multiplex PCR assay to determine if the isolates were *C. jejuni* or *C. coli*. *C. coli* was not isolated, while *C. jejuni* was recovered from 52 (37.1%) of 140 carcasses for which pools of four sampling sites (neck, cloaca, breast, and back) were examined. In the remaining 50 carcasses, the four sites were analyzed separately, and *C. jejuni* was recovered from the samples in the following order: neck ($n = 20$), cloaca ($n = 16$), breast ($n = 14$), and back ($n = 11$). The results are in agreement with those of other studies, which showed that *C. jejuni* is more commonly associated with poultry than is *C. coli*. Control strategies for *Campylobacter* should include interventions to eliminate *C. jejuni* in poultry at various stages of production and processing, including at slaughter.

Piano di campionamento
campioni aggiuntivi

335 campioni di cute del petto (67 gruppi per 5 carcasse ogni gruppo) saranno analizzati anche per la ricerca e numerazione di *Campylobacter*.

Produttore	% produzione	Regione / IZS	Numero gruppi da esaminare	Numero carcasse	Numero campioni di cute del petto
AIA	35%	Veneto / IZS Venezie	23	115	115
AMADORI	15%	Emilia Romagna / IZS Lombardia e E R	10	50	50
	15%	Abruzzo / IZS Abruzzo e Molise	10	50	50
FILENI	15%	Abruzzo / IZS Abruzzo e Molise	10	50	50
MONTEVERDE	10%	Lombardia / IZS Lombardia e E R	7	35	35
VALLESPLUGA	10%	Lombardia / IZS Lombardia e E R	7	35	35
TOTALE	**100%**		**67**	**335**	**335**

Ripartizione dei campioni di cute del petto per i principali produttori

Dati e flussi informativi

- Tutti i dati prodotti nel corso del piano di monitoraggio saranno raccolti dal sistema informativo Ars-Alimentaria.
- Con cadenza settimanale Ars-Alimentaria fornirà i dati di dettaglio dei prelievi effettuati e degli esiti al COVEPI, che provvederà all'analisi epidemiologica dei dati stessi, comunicandone gli esiti all'UNAITALIA e ai competenti uffici del Ministero della Salute.

Dati e flussi informativi

Informazioni da registrare per ciascun gruppo campionato:

- Dati identificativi del mattatoio e dell'allevamento di provenienza degli animali (come registrato in BDN, con di coordinate geografiche)
- Età degli animali (in giorni)
- Peso degli animali (in grammi)
- Capacità dell'allevamento di provenienza (numero capi prodotti mediamente anno)
- Giorno e ora di partenza e di arrivo dall'allevamento
- Data accasamento in allevamento da ingrasso
- Data macellazione
- Se l'allevamento di provenienza effettua il tutto pieno – tutto vuoto
- Se l'allevamento effettua la macellazione separata dei gruppi (c.d. thinning) oppure no
- Temperatura acqua di scottatura
- Modalità eviscerazione
- Temperature / tempo del tunnel di raffreddamento
- Esiti per ricerca, identificazione e numerazione dei *Campylobacter*.

Metodi di laboratorio

I campioni devono essere conferiti al laboratorio entro 24 ore dal prelievo e identificati con etichetta adesiva o cartellino recante le seguenti informazioni leggibili:

- ✓ data e ora del prelievo,
- ✓ denominazione ASL del prelevatore,
- ✓ codice del campione
- ✓ firma dell'operatore che ha effettuato il prelievo.

Metodi di laboratorio

- Dai “**pacchetti” viscerali** saranno isolate le porzioni di intestino cieco il cui contenuto per intero sarà analizzato in pool, per ciascun lotto di 5 animali, per la ricerca e numerazione di *Campylobacter*.
- La **pelle di ciascuna carcassa** sarà sottoposta separatamente (senza effettuare pool di campioni) all’esame di ricerca e numerazione di *Campylobacter*.
- Da ciascuna carcassa dovranno essere prelevati almeno 27 grammi di pelle del collo, avendo cura di non prelevare il grasso sottocutaneo.
- Per i lotti selezionati per l’analisi aggiuntiva della cute del petto, si provvederà al prelievo dell’intera porzione di tale cute.

Metodi di laboratorio

- La ricerca del *Campylobacter* sarà effettuata secondo la ISO 10272-/1:2006, mentre la numerazione del batterio sarà eseguita utilizzando la ISO 10272-2:2006.
- Tutti i ceppi di *Campylobacter* saranno sottoposti a PCR multiplex per l'identificazione di specie e alla determinazione della concentrazione minima inibente (MIC) mediante micro-diluizione su piastra (Sensititre) per determinare la sensibilità agli antibiotici.
- Un numero significativo degli stessi sarà sottoposto a caratterizzazione genetica mediante sequencing typing del gene flaA seguita da MLST. Tra i genotipi a diverso complesso clonale saranno selezionati ceppi che saranno sottoposti al completo sequenziamento genomico.

Bibliografia

- ACMSF — Advisory Committee on the Microbiological Safety of Food. 2005. Second report on Campylobacter. Published by Food Standards Agency, UK, March 2005. FSA/0986/0605. 195 pages (http://www.foodstandards.gov.uk/multimedia/pdfs/acmsfcampylobacter.pdf).
- Calistri P., Giovannini A. 2008. Quantitative risk assessment of human campylobacteriosis related to the consumption of chicken meat in two Italian regions. International Journal of Food Microbiology, 128, 274–287.
- Di Giannatale E., Prencipe V., Colangeli P., Alessiani A., Barco L., Staffolani M., Tagliabue S., Grattarola C., Cerrone A., Costa A., Pisanu M., Santucci U., Iannitto G., Migliorati G. 2010. Prevalence of thermotolerant Campylobacter in broiler flocks and broiler carcasses in Italy. Veterinaria Italiana, 46 (4), 415-423.
- Di Giannatale E., Di Serafino G., Persiani T., Sperandii A., Platone I., Marotta F., Iannetti S., Cito F., Calistri P., Prencipe V. 2014. Prevalence and characterization of Campylobacter in farmed broiler flocks in Italy. Veterinaria Italiana, accepted for publication.
- EFSA — European Food Safety Authority. 2005. Scientific report of the scientific panel on biological hazards on the request of the commission related to Campylobacter in animals and foodstuffs. Annex to The EFSA Journal 173, 1–105 (http://www.efsa. europa.eu/etc/medialib/efsa/science/biohaz/biohaz_opinions/857.Par.0003.File.dat/biohaz_ej173_op_campylobacter_report_en1.pdf).
- EFSA — European Food Safety Authority. 2010. Scientific Opinion on Quantification of the risk posed by broiler meat to human campylobacteriosis in the EU. EFSA Journal 2010; 8(1):1437. [89 pp.]. doi:10.2903/j.efsa.2010.1437. Available online: www.efsa.europa.eu
- EFSA — European Food Safety Authority. 2010. Analysis of the baseline survey on the prevalence of Campylobacter in broiler batches and of Campylobacter and Salmonella on broiler carcasses, in the EU, 2008; Part B: Analysis of factors associated with Campylobacter colonisation of broiler batches and with Campylobacter contamination of broiler carcasses; and investigation of the culture method diagnostic characteristics used to analyse broiler carcass samples. EFSA Journal 2010; 8(8):1522. [132 pp.] doi:10.2903/j.efsa.2010.1522. Available online: www.efsa.europa.eu/efsajournal.htm

Bibliografia

- EFSA — European Food Safety Authority. 2011. Scientific Opinion on Campylobacter in broiler meat production: control options and performance objectives and/or targets at different stages of the food chain. EFSA Journal 2011;9(4):2105. [141 pp.]. doi:10.2903/j.efsa.2011.2105. Available online: www.efsa.europa.eu/efsajournal
- EFSA/ECDC - EFSA (European Food Safety Authority) and ECDC (European Centre for Disease Prevention and Control), 2014. The European Union Summary Report on Trends and Sources of Zoonoses, Zoonotic Agents and Food-borne Outbreaks in 2012. EFSA Journal 2014; 12 (2), 3547, 312 pp. doi:10.2903/j.efsa.2014.3547.
- Elliott J., Lee D., Erbilgic A. , Jarvis A. 2012. Analysis of the costs and benefits of setting certain control measures for reduction of Campylobacter in broiler meat at different stages of the food chain. Final report. Available online: http://ec.europa.eu/food/food/biosafety/salmonella/docs/campylobacter_cost_benefit_analysis_en.pdf
- Nauta M.J., Sanaa M., Havelaar A.H. 2012. Risk based microbiological criteria for Campylobacter in broiler meat in the European Union. International Journal of Food Microbiology, 158, 209–217.
- Pepe T., De Dominicis R., Esposito G., Ventrone I., Fratamico P.M., Cortesi M.L. 2009. Detection of Campylobacter from poultry carcass skin samples at slaughter in Southern Italy. Journal of Food Protection, 72(8), 1718-21.
- Uyttendaele M., Baer, K., Ghafir Y., Daube G., De Zutter L., Herman L., Dierick K., Pierard D., Dubois J.J., Horion B., Debevere J. 2006. Quantitative risk assessment of Campylobacter spp. in poultry based meat preparations as one of the factors to support the development of risk-based microbiological criteria in Belgium. International Journal of Food Microbiology 111, 149–163.
- WHO – World Health Organization. 2000. The increasing incidence of human campylobacteriosis. Report and Proceedings of a WHO Consultation of Experts Copenhagen, Denmark. 21–25 November 2000. WHO/CDS/CSR/APH/2000.4, 137 pages. (http://libdoc.who.int/hq/2001/WHO_CDS_CSR_APH_2001.7.pdf).
- Wingstrand A., Neimann J., Engberg J., Nielsen E.M., Gerner-Smid, P., Wegener H.C., Mølbak K. 2006. Fresh chicken as main risk factor for campylobacteriosis, Denmark. Emerging Infectious Diseases 12 (2), 280–284 February.

Grazie per l'attenzione!